ORAL DISCOURSE: RIGHT-BRAIN DAMAGE, DEMOGRAPHIC VARIABLES AND SAMPLING EFFECTS

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The research presented in this thesis is the original work of the author (except where referenced) and neither the thesis nor the work contained herein has been submitted to this or any other institution for a higher degree.

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ABSTRACT

This study aimed to determine the effects of right brain-damage (RBD), demographic variables and sampling techniques on oral discourse performance using a systematic approach based on a multi-layered discourse processing model. In the **first** stage, the oral discourse of thirty-two neurologically-normal male subjects (in four age and four socio-economic status categories) was analysed to determine the effect of age and socio-economic status and of task factors (genre, method of elicitation, topic) on their discourse production. Narrative and procedural discourse was elicited using two methods (oral request and picture-sequences) with a maximum of fourteen samples from each subject. These were analysed in terms of relevance, discourse grammar, syntactic complexity and productivity, clausal structure, cohesion, clarity disruptors and dysfluency (twenty-three measures). The findings were statistically analysed and correlated with three attention tests. The discourse measures were also inter-correlated to observe their interaction. It was found that the demographic and task variables had a substantial and varying effect on the discourse measures. This finding has important implications as results of discourse analyses will be misleading and inconsistent without taking these into account. In the **second** stage, the discourse production of seven male RBD subjects was examined using eight narrative and procedural tasks evaluated in the first stage as being the most impervious to the effects of age and socio-economic status. Their discourse performance was compared to a matched control group. Due to the heterogeneity of RBD subjects, their discourse was also examined using single-case methodology and three sub-groups were differentiated. In addition, these subjects were assessed on standardised attention, general communication and RBD assessments and the relationships between these and the discourse measures were explored. The impairments which were typical of all RBD subjects and characteristic of each sub-group were explained in terms of a multi-level discourse processing model. Clinical implications and directions for future research are presented.

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OVERVIEW OF THESIS

Chapter 1 provides an introduction to discourse and the inherent difficulties in discourse sampling and analysis. A modified discourse processing model is presented, together with the discourse measures relating to the model's processing levels.

Chapter 2 comprises a detailed description of those variables or factors considered to be relevant to the elicitation and production of discourse. In Chapter 3, the selection of the discourse genres and tasks to be used in this study are discussed as well as the development of the profiles for assessing the discourse samples. It also presents the rationale for selection of the attention tests and the effect of age, socioeconomic status and right brain damage on these.

The effect of age and socioeconomic status on discourse production and specific methodological considerations relating to these are discussed in Chapters 4 and 5. In Chapter 6, previous research into the effect of right brain damage on discourse is detailed as well as the hypotheses (including the role of attention) which have been proposed to account for the impairment.

Chapter 7 provides the methodology for the investigation of the effects of age, SES and discourse sampling on the discourse of non-brain damaged subjects. It sets out the aims, details of the subjects, task selection, procedure for the collection of data, discourse analysis measures and attention assessments. The results of this analysis are presented in Chapter 8. From these results, the discourse tasks were selected for administration to the RBD subjects. In Chapter 9, the effects of age, SES and discourse sampling had on NBD discourse performance are provided. The correlations between the attention and discourse measures as well as the inter-correlations between the discourse measures are also discussed.

The methodology for the assessment of the discourse performance, cognitive and communication assessments of the RBD subjects are provided in Chapter 10 and the results of these are presented in Chapter 11. A discussion of the comparative performance of the RBD and matched groups is given in Chapter 12. Possible explanations for the RBD discourse deficit are discussed and a potential account is proposed based on the discourse model presented in Chapter 1. An in-depth qualitative investigation of the discourse of each RBD subject is then presented in Chapter 13, together with their differentiation into three sub-groups.

The key findings and clinical implications of the study are detailed in Chapter 14, followed by the limitations of the study and directions for future research in Chapter 15.

CHAPTER 1
INTRODUCTION

The chapter presents the two main areas out of which this study arises:-

- the importance of discourse
- the inherent and as yet unsolved problems in discourse sampling and analysis.

It also introduces a modified discourse processing model and the discourse measures relating to the various processing levels which will be used in this study.

The relatively recent movement towards pragmatics has focused attention on discourse (i.e. language beyond the sentence level). To understand human communication, discourse needs to be carefully assessed and analysed as it is the form communication takes during most interaction. The analysis of discourse has become an important area of research in disciplines such as linguistics, anthropology, ethnography of communication, psychology and speech and language pathology.

To produce appropriate discourse, the integration and interaction of three aspects, viz. linguistic knowledge, pragmatic competence and cognitive processes, are required (Simmons 1986, Mentis and Thompson 1991). Adequate linguistic knowledge is needed so that the discourse is semantically and syntactically well-formed both within sentences and across sentence boundaries. Pragmatic or social competence is also necessary to ensure that the message transmitted is relevant, appropriate and sufficient to the idea and the context. To plan, organise and prioritise information in a meaningful sequence, cognitive processes must be intact (Simmons 1986). In a similar depiction of discourse, van Dijk (1997) proposed three main dimensions of discourse viz. discourse as verbal structure or language use, discourse as action and interaction in social situations, and discourse as communication of beliefs or cognition. These three aspects/dimensions of discourse interact and overlap with each other to influence the discourse produced.

Research into normal and pathological discourse has thus far focused predominantly on providing in-depth descriptions of isolated aspects of discourse within one dimension of discourse, mostly within the language or pragmatic dimensions, due to the complexity of the subject matter. This has constituted an appropriate preliminary approach.

> *"For too long, researchers focused on fractionating and distilling the microelements that constitute discourse without considering the broader picture of cognition, communication and behaviour" (Orange and Kertesz 2000, p 172).*

Methodological difficulties (e.g. small subject groups, different discourse tasks and types, methods of elicitation, analysis measures) have made previous studies difficult to compare.

Providing descriptive data on impairments within one discourse dimension cannot be considered as an end in itself. Kent and Fair (1985) state that collecting facts is "little more than stamp collecting - systematic but without potential to advance knowledge" (p 26). In addition, by examining only isolated aspects of discourse, "we have also made a number of idealizations, and many of these have become dogmas - premises we take as gospel" (Clark 1997, p 594). The examination of the data from such investigations must be considered as the necessary groundwork on which to base models of discourse processing. As Fine (1995) observes,

> *"The danger is in seeing a narrow focus on a particular type of analysis as the final step, rather than a stage of a more comprehensive approach within a broad theoretical framework" (p 28).*

Recently, due to the effect of cognitive psychology, focus has shifted from communicative responses to an examination of the processes involved in communication (Wirz 1993, 1995). However, few studies have attempted to investigate the processing aspects of discourse, particularly using a well-defined discourse processing framework which would define the units of analysis, the operations involved and the interactions across discourse levels (Stemmer 1999). It is only recently that discourse theories and models have been used in the study of pathological discourse (e.g. Frederiksen, Bracewell, Breuleux and Renaud 1990, Frederiksen and Stemmer 1992, Joanette, Goulet, Ska and Nespoulous 1986, Stemmer and Joanette 1998).

It is not only the individual levels within each dimension of discourse that need to be investigated. A number of decades ago, Jakobson (1980) had already stressed that the levels of language are interconnected and that "the totality and the interrelation between the different parts of the totality have to be taken into account" (p 95). This approach continues to be emphasised in recent literature, e.g.

> *"The analysis of language must be as broad as possible for it to be valid. Looking at just one type of organisation of language, ...will create a distorted picture of the language being analysed, since the different organisations of language interact to achieve their functional roles." (Fine 1995, p 26).*

Wirz (1995) considers the inter-relationships of symptoms to be at the heart of understanding communication breakdown. Disregard for the need to investigate the connections between the different levels of discourse has been noted (Armstrong 2000, Crystal 1987, Frederiksen and Stemmer 1993). The interaction between discourse levels may also vary as a function of the type of discourse being investigated and the impairments of the group involved. By investigating the interactions, the impact of breakdowns at one level on the others can be determined. In fact, the differential diagnosis of superficially similar disorders may ultimately rely on the combination of impairments of individual discourse levels and/or the relative deficits found in these levels. Individual differences or erratic behaviour may also be explained by the interaction between language levels, rather than problems with fatigue, attention, etc (Crystal 1987).

As stated above, adequate discourse requires the interaction of three dimensions. Although cognitive systems (e.g. memory, attention) are assumed to influence communication, few studies have examined either normal or pathological discourse from the perspective of the cognitive processes or its interaction with the other two dimensions of discourse. Luu and Tucker (1998) have emphasised the need to consider the vertical integration of multiple levels of neural hierarchy and various cognitive operations. Stemmer (1999) also stresses the importance of this approach by stating that

> *"Unless we* systematically *investigate the influence of* facets *of attention or memory processes on discourse processing, the picture will remain vague" (p 414, author's own italics).*

As with the interaction of levels within one dimension of discourse, the effect of cognitive processes on the other two dimensions of discourse may be influenced by the type/genre of discourse examined. Thus the examination of a number of discourse types/genres against the background of an assessment of aspects of cognitive status (e.g. attention) would provide details of the interaction between them and how they impact on each other during discourse performance.

Thus four critical aspects of research into pathological discourse have only received limited attention and will be addressed in this study:-

1) the investigation of a number of different discourse levels in a number of different discourse types within one group of subjects

2) the interaction and inter-relationship of these discourse levels

3) the impact of specific cognitive processes on discourse production

4) the interaction of these aspects with particular subject variables i.e. age, socio-economic status ("SES") and right brain-damage ("RBD").

A methodical investigation of a number of different levels of discourse as well as the effects of subject and task variables within one study would allow the relationship between these aspects to be determined. Applying discourse analysis methods directly to the discourse produced by a subject is considered to be the most costly method but "it can yield the most complete information about the discourse representations that are derivable from a subject's production." (Frederiksen et al 1990, p 92.)

As stated above, to provide a cohesive framework for discourse assessment and performance, discourse investigations should be based on a well-developed theory of discourse processing. Such a theory of discourse processing will provide powerful and well-defined tools for analysis (Frederiksen and Donin 1991, Stemmer and Joanette 1998). Many of the studies investigating brain-damaged populations are primarily descriptive but some have gone beyond this level and attempted to provide integrated descriptions and formulate theories and models that explain the relationship and interaction between these dimensions or between discourse and the organism (Stemmer 1999). One of the few models that have been proposed to identify the sub-processes involved in planning discourse is that of Frederiksen and colleagues (Frederiksen et al 1990, Frederiksen and Donin 1991, Frederiksen and Stemmer 1993). An extended and modified version of their model has been used in this study to provide a framework more relevant to the discourse impairment following RBD (Sherratt 2000b). The model was modified to incorporate the interaction which occurs between the different levels of discourse processing and the necessary cognitive processes (e.g. episodic and semantic memory, judgement etc). It was also extended to include the spoken production of the discourse sample[1].

The model (Figure 1.1) conceives of discourse production as a stratified process involving multiple levels of representation of language and of semantic information. During production, the process moves from specifying a conceptual representation to the generation of sentences in discourse thus gradually constraining the production of semantic and language structures (Frederiksen et al 1990). The different stages are not sequential because top-down and bottom-up processing occurs throughout the discourse process.

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[1] Models based on flow-chart principles may be considered "totally unrealistic in view of the connectivity patterns in the human... brain" (Muller 1992, p 459). However their use can direct and enlighten discourse research at this relatively early stage of investigation.

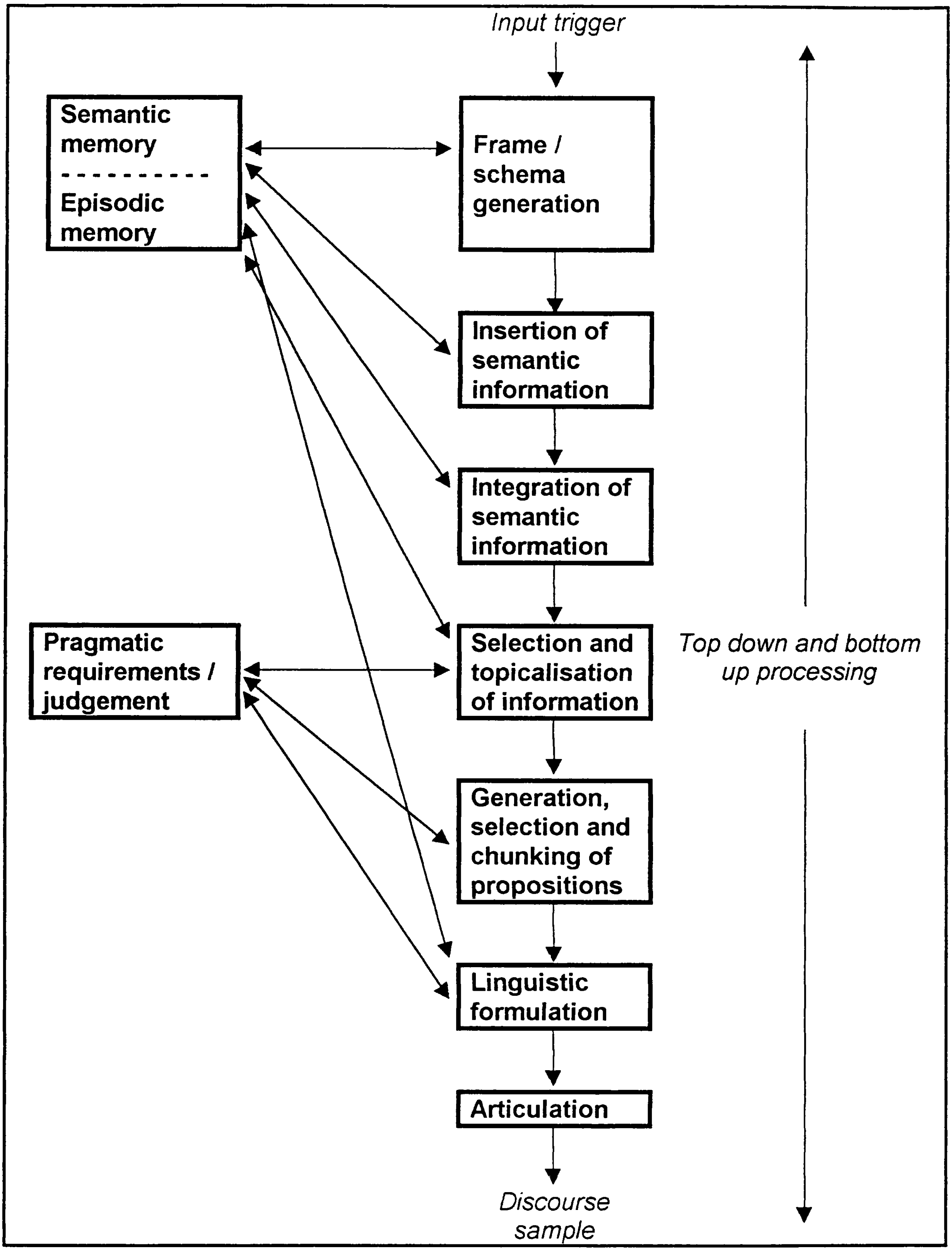

Fig 1.1: Multi-layered discourse processing model

The input trigger for discourse production may take the form of a direct request for a narrative/procedure and/or visual presentation of task. The first stage

(*frame/schema generation*)[2] is the generation of conceptual frames or the retrieval of a frame structure from memory. These frames reflect the different genres of discourse elicited (e.g. narrative, procedure) and provide the organising grammar for the sample. Once the structure has been generated, descriptive semantic information is filled into the framework to provide details of events, participants, setting, etc. (*insertion of semantic information*). In addition, specific integrative operations are required to connect this semantic information to information already in long-term memory. These integrative processes may include retrieval, inferencing and further elaboration which will lead to a more connected and complete representation of the discourse which will fulfill the pragmatic requirement of the discourse.
These stages lead to long and detailed discourse. Decisions need to be made as to what information should be expressed explicitly and what should be considered as shared knowledge between speaker and listener (*selection and prioritization of information)*. Processes then operate to select the information which will be made explicit to the listener. Furthermore, decisions are made to prioritise information so that topics are presented in an ordered manner and so that the selection of sentence structures to express this topicalisation can be made. This selection takes place during interaction with the judgement/evaluation aspects of cognition (what is appropriate to situation, task demands, listener, etc.).

The information selected is encoded by means of a complete specification of propositions (*generation, selection and chunking of propositions*). These must be generated in a sequence to reflect the selection and topicalisation of information. The propositions must also be generated so that local coherence inferences link the propositions together. The propositions must also be generated in terms of the logical and macro-structure inferences for local stretches of text. The propositions also need to be chunked for encoding into a single linguistic structure so that they are likely to be understood (e.g. number of propositions in a single clause, the distance between related propositions). The propositions are related to each other by links and relations to form a

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[2] Terms in italics refer to those stages of processing to be assessed by various measures in this study (Table 1.1)

semantic network. These links and relations (goal relations, thematic relations, causal relations, location relation, temporal order relations etc.) are expressed explicitly by verbal expressions such as conjunctions.

In the next stage (linguistic formulation - *syntactic analysis, lexical/morphological processing*) the chunks of propositions are encoded linguistically to reflect topicalisation of information and propositional content. Content words are then specified for the sentences using common lexical identifiers for propositional concepts, lexical choices to improve style and suprasentential mechanisms like cohesion to produce shorter text and increase semantic connections across sentence boundaries. The discourse sample is then orally produced (*articulation*).

The selection of those aspects of discourse performance which will be assessed was based on this model (Table 1.1) and will be discussed in Chapter 3. Not all of the levels depicted in the model could be analysed for a number of reasons. Firstly, text models are in the process of development and certain aspects and their assessment remain unclear. Secondly, as with all research, there were limitations imposed by the large number of variables already taken into account i.e. the number of subjects assessed, the effects of age, SES and RBD, the number of sampling techniques (different genres of discourse elicited by different methods) and number of measures. Thirdly, assessment measures were selected on the basis of providing a balance between those parameters that are theoretically relevant and the demands of clinical assessment. Fourthly, those aspects of discourse that had been insufficiently examined or had yielded inconclusive results in the populations under investigation were prioritised. This study therefore did attempt to heed the call for the analysis of more than one level of discourse within the same group of subjects (as discussed above). However it was not feasible to assess every aspect of the communication process relating to the levels of the model. Regarding the assessment and analysis of discourse, Simmons (1986) states that "discourse is a complex, multi-dimensional process, and no single procedure captures all of the components" (p 197). Due to the discourse tasks selected, it was not conceivable to analyse the samples using measures such as content units, main concepts, correct information units or propositional analysis which have been used in the assessment of narrative recall to compare the discourse produced with a previously constructed and analysed text (Nicholas and Brookshire 1993a, 1993b, 1995, Stemmer and Joanette 1998, Yorkston and Beukelman 1980).

STAGE OF PRODUCTION	DISCOURSE MEASURE
Processing conceptual structures	
Frame/schema generation	Discourse-grammar
Insertion and integration of semantic information	Discourse-grammar of picture-sequences Relevance scale Conjunctions
Selection and prioritization of Information	Relevance scale Productivity Discourse-grammar (sequence)
Processing propositions	
Generation, selection and chunking of propositions	Discourse-grammar Content and fluency elements Cohesion Syntactic analysis Clausal structures
Processing language units	
Syntactic analysis	Syntactic analysis Clausal structures Cohesive ties (conjunctions)
Lexical/morphological processing	Cohesive ties (reference, substitution, ellipsis, lexicalization) Non-specific elements and word substitutions (in Clarity disruptors scale) Fluency
Articulation	Fluency

Table 1.1: Stages of processing in the model and associated discourse measures

Frederiksen et al (1990) distinguish between linguistic structures (which incorporate lexical, syntactic and supra-sentential analysis) and conceptual or semantic structures (which comprise propositional and frame levels). The selection of levels to be assessed in this study include both conceptual and linguistic structures but the balance is skewed towards linguistic levels. Some of the so-called lower level stages (e.g. syntactic structures, cohesion) can be examined more accurately than higher levels stages (relevance, coherence, well-formedness) and yet the former stages can reflect the latter. Frederiksen et al (1990) consider that the perspective on linguistic structure in assessment needs to be revised in the light of the relationship between linguistic and conceptual structures because

> *"Linguistic structures should not be evaluated in themselves but rather for the role that they play in marking or signalling the conceptual structure of a text" (Frederiksen et al 1990, p 100.).*

If a number of lower level aspects of discourse demonstrate an impairment, an explanation for this may lie at a higher conceptual level. Thus the deficit at a higher level (such as the selection and topicalisation of information) may filter down to become apparent at a lower level (such as linguistic formulation). Thus in using this model-based approach and examining apparently simpler discourse measures more closely, information can be obtained about conceptual and propositional processing.

The investigation of aspects of human behaviour is replete with uncontrollable variables. However this does not mean that researchers in speech-language pathology should resign themselves to carrying out research into the discourse of communicatively-disordered individuals in a piecemeal and unmethodical fashion. Whether the goal is ultimately for speech-language pathology to be considered as a science or to develop a core of knowledge, the field needs to have a cohesive, methodological approach to the collection of knowledge about discourse. Eastwood (1988) argues that the failure of communication disorders to develop core paradigms may reflect the nature of our field -"communication is a social, interactive and complex field whose parameters may never be quantified" (p 176).

Discourse can be investigated following a more scientific approach (quantitative) or a more naturalistic approach (qualitative). Both approaches within the discourse framework would seem to have difficulties. The fact that each discourse production event is unique cannot be ignored. "One, perhaps, may never tell the same story twice" (Milosky 1987, p 311). Many of the variables or factors that affect discourse (the speaker, hearer, setting, content and function of the elicited discourse and the discourse task itself) are specific to that event and their interaction is complex. These factors cannot be scientifically quantified because

> *"human life is characterised by being an open system and is unable to be shielded from external influences or studied in a vacuum or scientifically controlled" (Eastwood 1988, p 183).*

Such factors, which arise out of the nature of the subject being investigated (viz. human behaviour), would be better assessed by means of a naturalistic approach. In contrast, some individual variables can be controlled (e.g. age, education or SES, nature of neurological damage, home environment, gender, etc.). Furthermore, the methods and stimuli involved in eliciting the discourse lend themselves to a more rigorous and objective investigation and thus can be more carefully controlled. The two approaches of qualitative and scientific are not mutually exclusive and may complement each other in many respects (Eastwood 1988). This complementary relationship may be possible in discourse analysis.

The factors considered to affect discourse elicitation can be divided into two areas. Firstly, factors such as socio-cultural background, assessment setting, speaker and interlocutor, are difficult if not impossible to quantify and need to be investigated using a naturalistic approach. Secondly, factors such as the channel/mode of communication and aspects of the discourse task (discourse genre, method of elicitation and stimuli) are directly under the control of the researcher and can be controlled to a large extent. Determining how these factors influence and are reflected in language use is regarded as a challenge (Stemmer 2000). A detailed discussion of these variables is provided in Chapter 2.

If the discourse task features affecting discourse can be carefully investigated so that their effects are identified both in normal and brain-damaged subjects, then the researcher could use a naturalistic approach to explain the data in terms of those factors which are not possible to control. Researchers could then try to estimate if, why and how these factors affect the discourse sample produced and which are more important than others in particular contexts. This may assist in peeling back the layers to reveal the impaired cognitive processes underlying the discourse deficit.

Knowledge of the discourse of brain-damaged populations gathered so far varies from group to group. Furthermore information on the performance of non-brain-damaged ("NBD") subjects on discourse tasks is sparse. There are many requests for further research into the discourse of such subjects and the factors affecting it (e.g. Boles 1990, Doyle, McNeil, Spencer, Goda, Cottrell and Lustig 1998, Smith and Leinonen 1992, Stemmer 2000, Thomas, King, Fraser and Kendell l990, Westby, Van Dongen and Maggart 1989, Yorkston, Farrier, Zeches and Uomoto 1989). As recently as 1995, Tompkins stated that normative information is almost non-existent for abilities and performances broken down by age, education, SES and cultural variables. However, recent research (e.g. Kemper and colleagues - summarised in Kemper 1992, Kemper and Kemtes 1998 - and Mackenzie 2000a, 2000b) has begun to remedy this situation although there still remains a paucity of systematic and detailed research. The difficulties of research into normal performance is exacerbated by the fact that its range is unspecified and potentially vast (Tompkins 1995). Heaton et al's (1996) comment on demographic influences on neuropsychological tests is also applicable to discourse, viz.

> *"while gathering normative data is a time-consuming and labor-intensive enterprise, the importance of such research cannot be overemphasized" (p 143).*

The need for data on non-brain-damaged subjects' performance on various discourse tasks touches on the controversial debate regarding group versus single case research. Problems regarding the use of group studies are the non-representativeness of the mean (i.e. the group means may represent no one at all) and the importance of minority patterns (i.e. information regarding extreme scores, "exceptional subjects" and other minority patterns are salient, particularly in research on brain-damaged patients) (Bates, McDonald, MacWhinney and Appelbaum 1991, Caramazza and McCloskey 1988, Lum 1996). Thus combining group data will mask individual differences and produce a relatively non-specific profile (McDonald 1993). One of the flaws that exists in the single case method is the questionable relevance of findings in individual subjects (including the place of adaptation or compensation). Furthermore difficulties inherent in group studies are also found in the study of single cases (e.g. the summing of scores of the single case across tests or trials) and spurious single and double dissociations can arise. Single case results may not be able to be replicated (Caramazza 1984) as associations between two behaviours in a single case may occur by chance (De Santi and Obler 1991). Bates et al (1991) conclude that in order to avoid the pitfalls of single case studies we need

> *"exhaustive information about the reliability of our measures and the shape of their distribution: across many different individuals, in many different situations, under different levels of severity and/or stress" (p 241).*

Thus to carry out adequate single case studies, a group study is needed in order to interpret individual cases and thus the two methods (single case and group) should be carried out together. Nespoulous (1996) proposes that "parallel to group studies..., there is certainly room and interest for case studies" (p 137).

A further hindrance which may prevent speech-language pathologists from progressing in the field of discourse analysis is the fact that practical implications are always expected (Ringel, Trachtman and Prutting l984). It is a practical discipline but perhaps the focus should be on compiling comprehensive information regarding discourse performance in particular populations. Once a core of knowledge about the discourse deficits of particular impaired populations has been gathered, therapy approaches will become more relevant and effective. The training of speech-language pathologists (incorporating linguistics, neurology, psychology and communication disorders) places them in an ideal and unique position to amalgamate this information into a cohesive approach to discourse analysis.

From the previous discussion it should have become apparent that

> *"If the number of possible variations in discourse assessment which could occur is considered, it is not a surprise that research into discourse (whether in normal or impaired populations) has been largely fragmented. The amount of research required into discourse assessment in different groups can appear overwhelming"(Sherratt 1992, p 11).*

This view has been endorsed by Orange and Kertesz (2000) (specifically with respect to dementia). Crystal (1987) has also pointed out the tendency to consider interactions between variables as "additional complications" (p. 8). However if research could be carried out by systematically varying specific factors within one group of variables within a subject group and attempting to account for those factors that cannot be controlled, perhaps a more cohesive picture of discourse would emerge for NBD and impaired groups. Coupled with this is the need for larger numbers of subjects to be investigated on the same tasks and using the same method because data cannot be compared without the use of the same methodology (Joanette et al 1986).

> *"Multiple narrative discourse samples, elicited with multiple methods, will help provide a complete picture of patients' abilities, especially since deficits in perceptual, attentional, or memorial domains may confound performance on any single elicitation task" (Tompkins 1995, p 120).*

Although the quest for such research may appear overwhelming or futile, the study to be presented does attempt to assess many discourse samples using a variety of measures and to determine the relationship between these measures and attention deficits using a multi-level discourse processing model. This study may thus demonstrate a way in which to begin untangling the many and varied factors that influence discourse production.

Summary

This chapter has provided an introduction to the notion of discourse and the problems involved in its appropriate investigation. A model of discourse processing and related discourse measures to be used in the study has also been presented. Specific factors which affect the discourse performance of any population will be presented in Chapter 2.

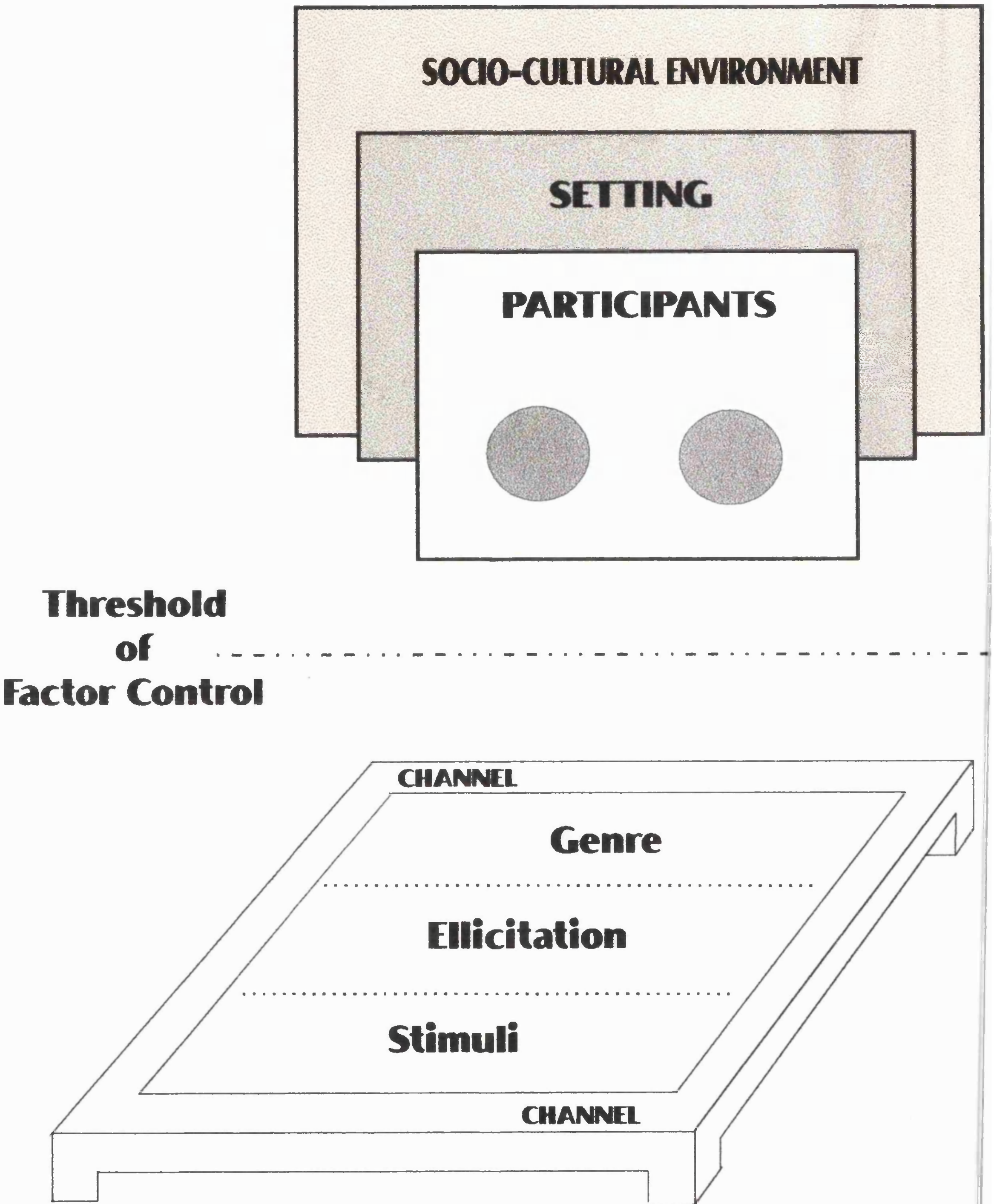

Fig 2.1: Factors affecting discourse production

CHAPTER 2
FACTORS AFFECTING DISCOURSE PRODUCTION

This chapter comprises a detailed description of those variables or factors considered to be relevant to the elicitation and production of discourse by NBD or impaired subjects. Difficulties in the control of these factors are also discussed.

2.1 Introduction

Any discourse sample elicited is affected by a multitude of factors. The number of variables inherent in natural "unplanned" conversation is considered to be nearly infinite (Simmons 1986) and vary both within and across tasks (Shadden 1997).

A framework for examining the variables inherent in each discourse performance and the extent of control that investigators have over them has been developed by the writer (Sherratt 1992, 1998, 2000a) (Figure 2.1). The broad categories depicted in this will be used as the basis for a detailed discussion of the variables. The background against which all discourse is set comprises two aspects:- the wider *socio-cultural environment* and the narrower *setting* or situation in which assessment/discourse elicitation occurs. The participants in the interaction consist of the *speaker* and *hearer(s)* or audience. The *channel* or mode of communication used demarcates the discourse task itself. The task incorporates three main aspects viz. the discourse *genre*, method of *elicitation* and the *stimuli* employed. These broad categories encompass many distinct but often inter-related factors. It is postulated that those variables situated above the "threshold of factor control" are difficult to control and to quantify whilst those factors which lie below the threshold can be controlled and quantitatively examined by the researcher to a considerable extent.

Most of these variables have been noted in the literature (e.g. Allwood, Niver and Ahlsen l989, Caplan 1992, Dembowski, Ulatowska and Haynes l989, Shadden 1997, Scott l984, 1988, Terrell and Ripich 1989, Westby 1984) and research into some of them has been undertaken recently (e.g. Kemper, Rash, Kynette and Norman 1990, Kemper, Kynette and Norman 1992, Gubarchuk and Kemper 1997, Lock and Armstrong 1997, Mackenzie 2000a, 2000b, Ulatowska, Chapman, Highley and Prince 1998, Williams, Li, Della Volpe and Ritterman 1994). However, the effect of many of these variables is merely speculative due to the lack of systematic research carried out into these issues (Tompkins 1995). It is not only each individual variable that is of importance but also the interaction between them. Fine (1995) encourages researchers to undertake investigations into discourse that take into account an even greater number of variables simultaneously.

Based on the framework provided in Figure 2.1, each broad area will be discussed in detail[3].

2.2 Factors affecting discourse performance

2.2.1 Background of discourse elicitation

Due to the trend towards considering pragmatics, rather than syntax, as the focus of research, it is generally accepted that researchers and therapists must consider "the powerful influence of context on communication" (Simmons 1986, p l89). The context in which language occurs ranges from

> *"cultural contexts of shared meanings and world views, to social contexts through which definitions of self and situation are constructed, to cognitive contexts of past experience and knowledge" (Schiffrin 1987, p 3).*

The number of environmental characteristics that may affect communication are infinite (Peck l989) and there is great diversity of opinion as to which contextual features are relevant (Lavandera 1988). In sociolinguistics or the

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[3] The research reviewed is predominantly restricted to that which is relevant to the present study (oral discourse of English-speaking adults).

ethnography of communication, the social context (or "socio-cultural environment") is considered to be the most relevant as it is essential to study events in their natural settings because of the influences of context (Hymes 1972, Ripich and Spinelli 1985). The aim is to determine the way in which characteristics of society affect the language spoken. To construct a theory of language, "the use of utterances in discourse within a communicative situation undivorceable from its social context" needs to be investigated (Lavandera l988, p 4). In addition, speech-language pathologists working with adults who have neurogenic problems need to be highly sensitive to the broad domain of sociolinguistics (Holland 1983). Mentis and Thompson (1991) concluded that

> *"Ultimately, descriptions of language disorders can only be accurate, and treatment programs maximally meaningful, if the effects of different social features on discourse are taken into account and differences across discourse genres are made explicit." (p 217).*

In the study of pragmatics and discourse analysis, the interpersonal (or "interlocutor") context is more important. Thus the focus of research is on the participants in the interaction i.e. the speaker and hearer(s) (see Interlocutor section below). As Schegloff (1993) stated, "the 'definition of the situation' is not separate and anterior; it inhabits the talk" (p 114).

The background aspects of discourse production can be divided broadly into two main areas:- the socio-cultural environment in which the individual exists and the setting or situation in which the communicative event occurs.

a) Socio-cultural environment

The individual whose discourse is being examined exists within a particular society, culture, religious community, schooling system, geographic area, socio-economic class, speech community, etc. (Hymes 1972, Lavandera l988, Schiffrin l987, Traugott 1981). These aspects determine his cultural beliefs, attitudes, perceptions, values, shared knowledge, intentions, presuppositions, inferences, norms of behaviour and the dialects, codes and registers he uses (Allwood et al 1989, Lavandera l988, Polanyi 1985, Taylor, Payne and Anderson 1987). For example, the individual's culture may influence their views of disability and handicap (Wallace 1999) and may affect the way disabled individuals are viewed and treated on a day-to-day basis.

Even more important than the broad concept of the individual's societal background may be the speech community in which he lives i.e. his family, his neighbourhood and his peers (Taylor et al 1987). All speakers belong to a speech community in which they share a set of communicative norms viz. general cultural beliefs, attitudes, perceptions, intentions and values (Hymes l972). The rules of a speech community which govern discourse include pragmatic and semantic rules, amount and type of communication appropriate to certain situations, conversational devices and their use, and topics of conversation (Taylor et al l987). Other aspects to be considered may be such divisions as groups, networks, classes, gangs, organisational membership (e.g. the Masons, Working Men's Clubs), etc. (Lavandera 1988, Labov 1972). The difficulty in analysing the discourse of an individual is that each person belongs simultaneously to many cultural communities and their mental lexicons will differ systematically to reflect this (Clark 1997).

Tannen (l984) suggests that there are high involvement (HI) cultures (e.g. Russians, Eastern European Jews) and low-involvement (LI) cultures (e.g. native Americans in the West). HI speakers tend to speak about themselves, indulge in humour and irony, interrupt frequently, talk too much, and do not give others a chance to talk (Chaika 1989). The division may not be as clear-cut as this and different cultures may be placed on a continuum from high- to low-involvement. The nature of discourse in diverse languages and cultures may vary significantly and the way that participants carry out the demands of a genre (their performance) may be more important in some communities than in others (Chaika 1989) e.g. Greek women were rated as better story-tellers than American women (Tannen 1980, 1982a), and African American children (and possibly adults) use a more rambling style of communication (Wallace 1999). Syntactically, languages and dialects have different means of encoding important aspects of discourse e.g. passives, tenses, it-lefts, reference (Longacre 1976, Prince 1988).

The discourse genres (Section 2.2.4) which exist in different communities may vary. According to Longacre (1976), in some non-literate communities procedural discourse is almost non-existent because people learn by participation rather than by means of verbal/written instructions. Orally elicited procedures may thus not be as well-rehearsed or structured. Although the broad discourse genres may exist in at least most languages, the specific types of discourse within these genres may vary. For example, in Western society, narratives may occur in many forms such as fairy tales, myths, short stories, newspaper reporting, historical accounts, etc., whereas in oral literature traditions, only a few varieties may exist (e.g. myth and personal experiences) (Longacre 1976)[4].

b) Setting

The number of characteristics of the assessment setting that may affect communication is extensive. The discourse elicited from an individual will be affected generally by the assessment situation as well as by his/her individual sensitivity to such aspects. Some of the factors which may affect the success of the discourse elicited are formality (including seating layout), familiarity, order of testing, background noise level, recording methods etc. (Peck 1989, Dembowski 1989, Thomas et al 1990).

The setting in which the assessment occurs reflects certain social attitudes, expectations, values and individual's goals. For example, there may be low expectations of individuals living in long-term care facilities. The subject's general experience with or access to a variety of social settings is important in evaluating their performance in a particular situation[5].

Little research into the effects of physical context on discourse has been carried out although the "consideration of these variables in language assessment and intervention is warranted" (Bedrosian 1985 p 235). However,

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[4] For guidelines to determine cultural, social and cognitive norms of communication in a community as well as structural features (acceptability, impairments etc), the reader is referred to Taylor et al (1987) for a comprehensive list and to Wallace (1999) for general suggestions.
[5] For example, disabled or mentally ill adults may have only had access to a smaller repertoire of settings, spending longer in certain ones (e.g. instructional settings) and less, if at all, in community settings (shops, post office, etc.) (Peck 1989).

certain environmental aspects appear to have limited effect (e.g. home vs. school - Hedberg, Curran and Yoshinaga-Itano 1989 and visual access restrictions - Glosser, Wiener and Kaplan 1988). The optimal setting in which communication takes place may vary for different groups; e.g. the preferred context for adolescent and adult clients is a living room (Bedrosian 1982).

In specifying the parameters of an assessment situation, a conflict may arise between attempting to simulate the most natural setting possible and to eliminate those factors which may have a negative influence on discourse elicitation and production. The traditional practice of removing contextual factors for the purpose of isolating and measuring communication has been viewed as distorting the fundamental properties of the interaction (Peck 1989). It would be anticipated that certain variables (e.g. increased noise level) would be deleterious to the discourse elicitation of some groups who suffer from significant attention deficits. A quiet environment may be facilitative to these populations but it is less "natural" and may obscure their true discourse deficits.

2.2.2 Participants

The number of participants during oral discourse production may vary from two (a speaker and a listener) to many (a speaker and a group).

a) **Speaker**

Westby et al (1989) state that "narratives reflect a person's world view" (p 64). Thus the individual/speaker brings a large number of factors (not yet definitively determined) to the discourse production setting. These include age, gender, educational/literacy level, SES, lifestyle, general health, nature and extent of brain-damage, sensory acuity, effects of medication/drug use, occupation, race and/or culture, geographic background, personal style, previous experience of assessments and therapy, institutionalisation, etc. (Cannito, Hayashi and Ulatowska 1988, Eisenberg 1985, King, Fraser, Thomas and Kendell 1990, Labov 1972, Milosky 1987, Payne 1997, Perera 1984, Ragin, Pogue-Geile and Oltmanns 1989, Taylor et al 1987, Waldron 1985, Walker, Roberts and Hedrick 1988, Yorkston et al 1989). Their discourse performance would also be exacerbated by fatigue, haste, emotion/affective states, distraction and other forms of stress, anxieties relating to the patient role and hospitalisation, mood, goal in producing and comprehending discourse, commitment to the task etc (Alverson and Rosenberg 1990, Kemper, Kynette, Rash, Sprott and O'Brien 1989, Lecours, Lhermitte and Bryans 1983, Shadden, Burnette, Eikenberry and DiBrezzo 1991, Thomas et al 1990).

The home language spoken by the individual and the extent of his bilingualism or multilingualism may result in unique variations in discourse production. For example, code-switching may occur. In addition, the style of discourse and discourse markers used in one language (e.g. from an oral tradition) may be translated or transferred into a bilingual's second language. Thus a bilingual's narratives in a particular language may differ from those elicited from a monolingual individual.

The effect of the gender of the speaker needs to be considered. Women's language has been described as weak, trivial, hesitant, hyperpolite, excessive in amount, less precise, personalised and ineffectual whilst men's is considered to be efficient, serious, effective and authoritative (Lakoff 1973, Spender 1980, Verbiest 1987). However these societal convictions about women's language have not been supported by research (Phillips 1980, McConnell-Ginet 1988, Spender 1980).

What research has demonstrated is that males talk longer, interrupt more frequently and are more dysfluent than females (Coates 1986, Leeper and Culatta 1995). A meta-analysis of 165 studies on gender differences in verbal ability concluded that the magnitude of gender difference in American culture is close to zero (Hyde and Linn 1988). However this conclusion may reflect the nature and detail of the verbal ability tests used. Regarding discourse, those aspects of gender differences which have been investigated have produced inconclusive results (Hertzog, Dixon and Hultsch 1992, Klecan-Aker and Swank 1987, Verbiest 1987). No gender differences have been noted on conversation ratings or picture description measures (Mackenzie 2000b) and in the use of cohesion in conversation (Ripich, Carpenter and Ziol 2000). In contrast, women were found to produce more sentences in interviews (Maxim and Bryan 1994) and more comments and questions in a story telling task, thereby talking for longer (Obler 1980). Women jurors tended towards greater informational redundancy than males, a result consistent with other findings that women's speech is often syntactically and morphologically more complex than male speech (Philips and Reynolds 1987). Females also had higher scores than males on non-verbal rating scales (Mackenzie, Beggs, Lees and Brady 1997b). Gender may interact with other variables (e.g. with age, Chapter 4). These differences in discourse are a controversial area that appears to be as yet unresolved. Hyde and Linn (1988) have stated that

> *"We know very little about the nature of the gender difference in verbal ability" (p 54).*

Further research is thus needed into gender differences in discourse (Phillips and Reynolds 1987) and is also needed to determine how various social variables like age, occupation, class and ethnicity interact with gender in different types of social settings. In addition, the interaction of gender and lateralization of functions needs further investigation to elucidate the theory that females may engage the right hemisphere ("RH") to a greater degree during language tasks than males (Bradshaw 1989). Kimura (1992) concluded that it is not because speech is more bilaterally organized in women but because the critical area is less often affected.

The subjects of most discourse production research have been randomly selected according to gender, although some have only examined the discourse of one gender (Rehak, Kaplan, Weylman, Kelly, Brownell and Gardner 1992b, Walker et al 1988, Ulatowska, Cannito, Hayashi and Fleming 1985). Furthermore the materials and topics used to elicit discourse usually demonstrate some extent of gender bias which has been shown to affect discourse performance (e.g. Correia et al 1990, Sherratt 1992). Until gender effects are clarified it may be prudent to follow Walker et al's (1988) advice that "the language functions of men and women must be studied separately" (p 59).

Another important aspect to take into consideration is the variation of normal performance (Bench 1991, Boles 1990, Wallace 1999). Alverson and Rosenberg (1990) considered the methodological difficulties of research reflect a lack of awareness of how much variation in language style there is among normal speakers. These normal variations must be borne in mind when examining the discourse of pathological populations as not every difference from the "norm" is evidence of impairment. Certain pathological aspects of discourse have been reported to a limited degree in normals e.g. looseness, vagueness, reduction in informative content, amount and nature of information provided and measures of empty speech (Joanette, Goulet and Nespoulous 1984, 1986, Nicholas et al 1985, Reilly et al 1975). Yorkston, Farrier, Zeches and Uomoto (1990) state that care should be taken "not to wrongly ascribe (deviations from "perfection") to the brain injury rather than normal variability" (p 2). Intersubject variability may alter across discourse genres and tasks. Normal subjects may demonstrate less variation in performance on more structured tasks (e.g. single pictures, sequence picture stories) than less structured ones (e.g. self-generated personal-narratives, unplanned conversation). The need for further research into the variability of discourse of normal subjects is widely stated (Chapter 4).

In language-impaired individuals the discourse obtained is not a direct reflection of the pathology. Bates et al (1991) states that

> *"we cannot assume a transparent relationship between symptom patterns and the architecture of either brain or mind" (p 234).*

Neurologically-impaired individuals may attempt to compensate for their language and cognitive deficits in various ways. These strategies can be defined as the "deliberately, self-initiated application of sometimes unconventional procedures to achieve desired goals" (Ylvisaker and Holland 1985, p 252). The strategies may be overt (e.g. requesting a quiet environment, asking the interlocutor to slow down) or covert (e.g. the use of self-cueing or imagery). Unless the individual is able to verbalise the use of covert strategies, it may not be clear that they are being used. For example, do older subjects use less syntactically complex discourse because it is easier to comprehend and because it is considered more interesting and clearer?

(Kemper et al 1989). These strategies may vary across discourse genre, type and method of elicitation.

Certain pathological groups of subjects may be more adept in the use of compensation than others. Some groups (aphasic subjects and those in the early and middle stages of dementia - Penn 1985, Herrmann, Kooch, Johannsen-Horbach and Wallesch 1989, Illes 1989) may develop an effective range of compensatory strategies. However, it would be hypothesised that subjects with severe DAT and RH damage would demonstrate little effective use of compensatory strategies due to a lack of insight into their communication problems[6].

Compensation is thus an unknown factor in the equation of discourse elicitation. Although the existence of compensation or adaptation has been contested (Caramazza 1986), its possible use and effectiveness should be taken into account as it may influence (positively or negatively) the discourse produced.

b) Interlocutor/dyadic variables

Characteristics of the interlocutor (or communicative partner) and the interpersonal context are important considerations (Alverson and Rosenberg 1990, Lavandera l988, Moyano, McGillivray and Rice 1989, Peck 1989) and are influenced by the social, educational and cultural status of the participants.

> *"Speakers try to design their utterances for all the listeners they believe are or might be listening" (Clark 1997, p 575).*

As mentioned above, discourse analysts and pragmaticists have tended to focus on this interpersonal context. What needs to be taken into account regarding the interlocutor is age, gender, race, ethnic or cultural group, geographic origin, educational level, SES, familiarity, interaction style, responsiveness, communicative ability, professional training, etc. (Gould and Dixon 1993, Labov 1972, Lavandera 1988, Liles 1987, Murray 1988,

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[6] e.g. RBD subjects did not self-correct and demonstrated no awareness of errors (Cherney 1990).

Nettelbladt and Hansson 1990, Payne 1997, Peck 1989, Taylor et al 1987, Traugott 1981).

In addition, characteristics of the speaker-listener relationship to be considered are power asymmetry-symmetry, responsiveness or sensitivity of interlocutor, familiarity and intimacy of relationship, attitudes towards each other (including age/race/cultural stereotyping), expectations and experience of the interaction, individual rules of appropriate communicative behaviour, level of language used, formality, interactional skills, professional style, motivation to participate, etc. (Allwood et al 1989, Dollaghan, Campbell and Tomlin 1990, Doyle, Thompson, Oleyar, Wambaugh and Jackson 1994, Hedberg et al 1989, Kemper, Lyons and Anagnopoulos 1995, Lavandera 1988, Peck 1989, Solberg and Wetherby 1989, Westby et al 1989).

The amount of shared information between the two participants and their perceptions and assessment of it will influence the discourse. Besides world knowledge, the interlocutors can rely on three kinds of evidence to assess other knowledge that they may have in common (Chantraine, Joanette and Cardebat et al 1998a), viz.

- linguistic (what the interlocutors have said previously)
- perceptual (what happened in the conversation)
- community membership (what is known, believed, supposed in the various communities to which the interlocutors both belong).

Participants will depend on this knowledge to provide relevant discourse. The level of detail provided during production will depend on the extent of common knowledge which exists or is perceived to exist between interactants e.g. a large age gap may necessitate greater detail on general lifestyle, public amenities, important public events and social structures (see Chapter 4). A similar effect may be observed between interactants of different religions and gender. During the elicitation of a traditionally male-dominated procedure, greater detail would be expected if a male subject was speaking to a female interlocutor rather than a male. Cultural differences are also relevant here. Tannen's (1984) high and low involvement cultures (discussed above) would incorporate widely differing interlocutor behaviour. Furthermore, there is much reliance on audience participation in narrative construction in more oral cultures (Manuel-Dupont 1989). However, the amount of shared knowledge may not invariably overcome communicative difficulties e.g. turn-taking in aphasics (Perkins 1995).

The genre of discourse also indicates the extent of involvement of the interlocutor. In self-generated narratives or procedures, the interlocutor provides minimal assistance or guidance and is considered as a passive partner (Chantraine et al 1998a, Ulatowska and Chapman 1989), whereas conversational discourse implies the active involvement of the interlocutor. The difficulty in standardising interlocutor behaviours is obvious. Some investigators have published general suggestions for eliciting conversational samples (e.g. Lee 1974, Miller 1981, Terrell and Ripich 1989). On the other hand, some have attempted to control interlocutor behaviour by directing them to minimise or limit verbal participation (Biddle, McCabe and Bliss 1996, Glosser and Deser 1991, Ragin et al 1989, Reilly et al 1975). Furthermore, a differing amount of interviewer support was provided for moderately and mildly aphasic subjects (Glosser et al 1988)[7].

During spontaneously produced narratives, turn-taking is temporarily suspended so that a conversational space for the story can be provided (Schiffrin 1987). However this does not mean that all participation on the part of the interlocutor should be suspended. Although the speaker produces the discourse, the hearer's participation is critical e.g. withholding turn-taking, displaying appreciation and evaluation of story, being receptive to the story and responding appropriately to the action (Goffman 1974). The interlocutor demonstrates his/her involvement in the interaction through non-verbal means (e.g. posture, gesture) and by the use of "backchanelling" (e.g. tokens such as "mmm", "yeah", "really" etc.). The use of these tokens elicits further discourse and demonstrates the avoidance of speakership (Biddle et al 1996, Perkins 1995).

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[7] although the effect of this was ignored during the analysis of the discourse so obtained.

The extent of involvement or assistance of the interlocutor may interact with the nature and severity of certain impaired populations e.g. aphasic and closed head injured subjects may require increased interlocutor contributions to maintain conversational flow (Glosser et al 1988, Penn and Cleary 1988). The very nature of the therapeutic relationship between a subject and a clinician (power asymmetry) may encourage undesirable or pathological aspects of discourse to be manifested e.g. supportive interaction and undivided attention may encourage a subject to "ramble" and become verbose. The use of prompts may provide an erroneous picture of the discourse abilities of the subject e.g. a greater need for prompting to complete procedures was found in RBD subjects (Roman, Brownell, Potter, Seibold and Gardner 1987)[8].

In some studies, a number of different interlocutors have been used to elicit the discourse samples (e.g. Kennedy 2000, Shadden et al 1991). The data obtained from these studies would be affected both by within-interlocutor variables but also by between-interlocutor variables. It would thus be virtually impossible to determine which differences are due to the groups of subjects and which are due to interlocutor variations. As Kennedy (2000) suggests, communicative partners should be systematically varied or one partner should interact with all participants.

2.2.3 Channel/mode of communication

The communication channel in which the discourse is produced (e.g. spoken, written, sign language, gesture, A A C communication boards or a combination of two or more of these) would influence discourse production as each mode differs substantially in both structure and function (Milosky 1987, Olson 1977, Westby 1984).

Oral discourse differs from other communication channels in that it is multi-modal, making use of linguistic, prosodic, kinesic and contextual cues to

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[8] An expanded version of the (preliminary) scale for noting the amount of facilitation provided during discourse developed by Dembowski et al (1989) could be used to provide information regarding the extent of the support given.

indicate meaning (Akinnaso 1982) and more natural variations in language occur in the spoken form than the written (Milosky 1987)[9].

2.2.4 Discourse tasks

a) Discourse genre

Although the number of genres of discourse has not been definitively established, five broad categories have been widely accepted (Levelt 1989, Longacre l976, Shadden 1997, Simmons l986, Terrell and Ripich l989, Ulatowska, North and Macaluso-Haynes l981, Waldron 1985). These are

- narrative (which recount events supposed to have happened somewhere),
- procedural (instructions on how to carry out a particular task),
- expository (which explains a body of subject matter like technical or scientific papers, or describes something we see or know),
- conversational (dialogue between two or more people)
- hortatory (which tells us how we should act with regard to a certain subject e.g. sermons, political speeches, etc.).

Each discourse genre differs in such aspects as purpose/function, goal structure, cognitive demands, theme and grammatical form in ways which are more or less apparent (Fayol and Lemaire 1993, Scott 1988, Shadden 1995, Ulatowska and Chapman 1989). Each one has rules governing its size, discourse features required, overall structure or superstructure, principles of organisation, syntactic structure, specific semantic content/vocabularies, sequencing, use of aspects like person, time orientation, evaluation, etc., and each one requires different kinds of contributions on the part of the speaker (Levelt 1989, Liles, Coelho, Duffy and Zalagens 1989, Milosky 1987, Ulatowska, Doyel, Freedman-Stern and Macaluso Haynes 1983a, Schiffrin 1987). Some rules may apply to a number of genres whilst other rules are specific to a particular genre of discourse e.g. similar syntax seen in narratives and conversation (Labov and Auger 1993). Narratives are considered to be

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[9] For a detailed examination of oral-literate differences, the reader is referred to Akinnaso (1982, 1985), Chafe (1982), Tannen (1982b) and Westby (1984).

more complicated than scripts/procedures because they are normally longer and more detailed and because they are designed to entertain (Rehak et al 1992b). In contrast, procedures have fewer features and do not necessarily include a fixed superstructure (Fayol and Lemaire 1993). However, in procedures the speaker needs to be precise and explicit in communicating the necessary information to the listener (Ulatowska, Allard and Chapman 1990).

Terrell and Ripich (1989) consider three genres of discourse, viz. narrative, procedures and conversation, to be commonly part of most adults' communication repertoires. These are thus the genres usually investigated in normal and pathological populations. However, in some non-literate communities procedural discourse is often non-existent (Longacre 1976) as procedures are carried out by means of participation rather than in response to instructions. To these three common types of discourse, expository or descriptive discourse should be added as most speakers have, at the very least, provided a description of an object or action to another listener.

With the increasingly sophisticated analysis of discourse, the investigation of conversation has become a major focus of research as it is considered to be the most relevant and ecologically valid discourse genre in real-life communication, as well as being the most representative of the subject's communication skills. Informal conversation is the least structured form of discourse and provides the greatest opportunity to observe the interaction of linguistic, pragmatic and cognitive abilities. However the complexity of the analysis task rises accordingly due to the greater number and variety of variables involved and the additional set of pragmatic behaviours included (e.g. turn-taking, conversational repair, topic manipulation, etc.). Conversational discourse may incorporate narrative, expository and procedural discourse and would thus not permit appropriate points of comparison with individual types of discourse. Conversation may be considered the most ecologically valid genre and the most representative sample of communication. However, it may be erroneous to assume that a client/clinician conversation is a representative sample (Boles 1990). Ripich et al (2000) concluded that conversation alone may not be sufficiently sensitive to enable a clinician to accurately evaluate the status of an early dementia as other tasks may be more sensitive to cognitive decline and may be more useful in an assessment protocol. Thus the most natural or ecologically appropriate may not be the most informative for theoretical or clinical purposes. However, Shadden et al (1991) have stressed that

> *"constrained narrative and procedural discourse tasks will continue to be major workhorses of pragmatic assessment and intervention" (p. 327).*

Longacre (1976) has provided a useful and interesting comparison of narrative, procedural, expository and hortatory discourse along two parameters of chronological succession and projection. Therefore narrative discourse occurs within real time and usually in the first or third person whereas procedural discourse occurs in projected time (how something would be done) and a non-specific person is required. Both these genres have chronological rather than logical linkage. In contrast, hortatory and expository have logical, rather than chronological linkage. Expository discourse has no necessary personal reference whereas hortatory discourse is aimed at a second person[10].

Within these main discourse genres, there are a number of different types, considered by Longacre (1976) to be the surface manifestation of the deep structure or genre. Some discourse genres include a large number and variety of types. For example, within narrative discourse there are fairy tales, fables, personal experiences, historical narratives, newspaper reporting, novels, simultaneous "blow by blow" descriptions, etc (Longacre 1976, Polanyi 1985, Preece 1987, Scott 1984). Other genres (e.g.procedures) may incorporate fewer types.

Within each discourse genre, the different types are more or less similar to each other. For example, procedural discourse such as a food recipe has much in common with "how to do it" instructions but the former is more restricted in its application and content and more stereotyped in format (Longacre 1976). Although expository discourse may range from essays to technical papers, Longacre feels that descriptive discourse (description of

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[10] The reader is referred to Longacre (1976) for a detailed account of these differences and similarities.

something we see) may be essentially different from other types of expository discourse. Thus the description of a picture or object which is in view may differ from a description given from memory (e.g. describe your house, favourite holiday destination, etc.). Expository discourse has a fairly predictable content, thereby permitting easier comparison with the discourse elicited from other subjects, hence their frequent use in assessment tools. Picture descriptions require "the listing of static concepts, attributes, and relations without an obligatory temporal sequence" (Cherney 1998, p 3) and the starting- and end-points and length are determined by the speaker (Stout, Yorkston and Pimental 2000). The disadvantages of this type are that the social context, content and complexity are reduced (Simmons l986). Such tasks would rarely occur in normal communication and may be considered as ecologically unsound. Nevertheless, they are employed frequently with language-impaired populations (e.g. aphasia tests). Other genres are also problematic to elicit as they do not form part of everyday communication. Unless speakers have had experience in making political or religious speeches or in sales patter, it is unlikely that hortatory discourse is familiar to them. Some procedural discourse is equally problematic to elicit and often cannot be considered as ecologically valid. Whilst descriptions of procedures which are usually learnt later and performed infrequently (e.g. repairing a bicycle puncture) may occur in conversation and also elicited appropriately, those which are learnt early and performed frequently (e.g. making a cup of tea) would rarely, if ever, occur in conversation between neurologically and physically intact adults of the same language group.

These different discourse genres may overlap and one may occur within the framework of another. For example, hortatory discourse may occur during a narrative e.g. in a fable, the moral of the story may be aimed at affecting our behaviour. Similarly, expository or procedural discourse may be incorporated into a narrative, narratives within hortatory discourse (e.g. sermons), expository discourse within a procedure and so on. Apart from the obvious complexities of analysis in these cases, embedded genres may differ from those elicited in isolation.

The terminology used to describe discourse genre in the literature is often confusing even though the genres are fairly clearly defined. For example, in some research, descriptions (of pictures, family, work, vacations, etc.) and procedural discourse are designated as narrative discourse (Armstrong 2000, Glosser et al 1988, Glosser and Deser 1991, Mentis and Prutting 1987, Walker et al 1998a, Yorkston et al 1990). This misnaming adds to the inconsistency and unsystematic nature of research into discourse and the difficulty in comparing results.

Discourse tasks devised to elicit a specific genre may in fact produce samples of another genre. Single pictures used to elicit narratives often result in a description (Armstrong 2000, Sherratt 1988, Ska and Guenard 1993), whilst, conversely, picture description tasks sometimes elicit narratives (Tompkins 1995). Requests for personal-narratives sometimes produce descriptive discourse (Sherratt 1992).

The effect of genre on the discourse elicited from a variety of populations has been investigated[11]. It is obvious that the genre of discourse interacts differentially with the type of disorder so that certain genres may be easier for those patients with certain disorders than for others. It is important to remember that the differences found between genres have varied and there is no clear pattern of results. This is due to the fact that the nature of the stimuli used to elicit the varying discourse genres and the various elicitation methods have been inconsistent and will cloud any clear analysis of genre differences.

b) Method of elicitation

There are a large number of factors pertaining to the discourse task itself which may have an effect on the nature of the discourse samples elicited. The circumstances which give rise to the discourse (or context of elicitation) can

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[11] Differences across genres have been documented in normal adults (Miller 1984, Milosky 1987), normal elderly adults (Kemper et al 1989, Shadden et al 1991, Ulatowska et al 1986), traumatically brain-injured adults (Hartley and Scofelia 1988, Mentis and Prutting 1987, Stout et al 2000, Yorkston et al 1989, 1990), aphasic adult (Doyle, Goda and Spencer 1995, Glosser et al 1988, Ulatowska 1981, Ulatowska et al 1981, Ulatowska and Chapman 1989), frontal-temporal craniotomy (Drummond 1986), right and left brain-damaged patients (Diggs and Basili 1987) and RBD patients (Cherney 1990, Cherney and Canter 1990, Sherratt 1988, Sherratt and Penn 1990, Sohlberg 1990) and Alzheimer's patients (Cherney 1990).

range on a continuum from a more natural situation (self-initiated, conversationally embedded - Polanyi l985 and Preece 1987), through conversationally embedded discourse which is elicited by the examiner to those elicited directly by the examiner (the latter being the predominant method in the assessment and investigation of impaired populations). Both similarities and differences in the results obtained using different methods of elicitation have been noted (Peterson and McCabe 1983, Scott 1984). The discourse abilities reflected in confrontation discourse elicitation (e.g. "Tell me about ..") versus conversationally-embedded discourse may be as different as word-finding abilities in confrontation naming versus conversation. This aspect may be particularly relevant to certain pathological populations who benefit from the additional information gained from the conversational context (e.g. moderately impaired aphasic and dementia patients).

Another discourse task factor which may modify discourse output is the method of eliciting the task[12]:- is it self-generated (by means of oral or written instructions or story stems), a story recall or a retelling of a story presented orally or visually (e.g. written, video, picture-sequences, single picture), a summary of presented stories, the retelling of a video story on-line (as in a sports commentary), etc.? The discourse produced following a request for a narrative describing a personal or memorable experience may differ considerably from a story recall task due to the effect of memory, emotional involvement, etc. As Tompkins (1995) states, each method of elicitation

> *"places different demands on attention, memory, formulation and perceptual analysis, and these demands must be kept in mind when results are interpreted" (p 120).*

Picture tasks may also not elicit representative narrative samples (e.g. with DAT subjects - Smith, Chenery and Murdoch 1989) and they do not require the subject to go beyond an initial analysis of the picture elements (Chapman, Highley and Thompson 1998). Myers (1999) provides details of the

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[12] The effects of method of elicitation have been demonstrated in normal and impaired populations (Atkins and Cartwright 1985, Coelho, Liles and Duffy 1991, Doyle, McNeil, Spencer, Goda, Cottrell and Lustig 1998, Hartley and Scofelia 1988, Hicks 1990, Joanette et al 1986, Kaczmarek 1987, Klecan-Aker et al 1987, Liles et al 1989, Merritt and Liles 1987, 1989, Ska and Guenard 1993, Sohlberg 1990, Ulatowska et al 1983b, 1986).

advantages and disadvantages of story recall and pictured scene interpretation. In adult populations, narratives are most often elicited by means of a single-picture, sequence of pictures or story recall where some control over the output is retained.

Just as confrontation discourse elicitation may be considered "unnatural", the elicitation of discourse from visual stimuli which are visible or have been visible to the interlocutor can be considered pragmatically inappropriate, yet much research has used this method of obtaining picture descriptions, sequence story narratives and in the recall of a videoed narrative (to an interlocutor who can see the stimulus). In such a situation, the level of detail in the discourse produced may be affected. A more oral style may be elicited due to the jointly shared information (Westby 1984) and the narrative may not be as "rich" or elaborate as one elicited by topic (Ulatowska and Chapman 1989). In eliciting procedural discourse, picture-sequence stimuli have been provided for subjects (Ulatowska et al 1981, 1983) and were considered "useful" (Cannito et al 1988, p 125). Whilst this provides a structural framework for more severely impaired individuals, it supplies the superstructure/essential steps and reduces it to a purely descriptive task. The individual's knowledge of the procedure, their ability to provide or order essential and optional steps would not be assessed.

Narrative recall may be confounded by characteristics of the examiner (e.g. rate of speech, intonation, accent), of the subject (e.g. comprehension, memory and attention) and features of the stimulus itself (e.g. discourse structure, mode of presentation, causal and temporal relationships, concreteness, linguistic complexity, context familiarity, etc.) (Graybeal 1981, Liles et al 1989, Milosky 1987, Thorndyke 1977, Trabasso, Secco and van den Broek l984, Westby 1984), thereby obscuring the source of the impairment. However narrative recall is often preferred because the sample can be directly compared to the original model, is more easily transcribed and more reliably scored, and the form and content can be better controlled (Ulatowska and Chapman 1989, Merritt and Liles 1987, 1989, Tompkins 1995). For these reasons, story recall is frequently used with communicatively-impaired subjects. However some groups may have greater difficulty with recall tasks due to memory impairments e.g. Alzheimer's disease and closed head injured patients (Ska and Guenard 1993). Processes (differing from one pathological group to another) which may assist comprehension and therefore recall are making inferences, activating relevant world knowledge and referencing (Milosky 1987). Assessment procedures which attempt to separate comprehension and production need to be used. Thus visual material (e.g. non-narrated videotaped story) may focus more closely on production abilities (Milosky 1987). However, the presentation of visual cues (e.g. picture-sequence story) was not found to be sufficient to compensate for the effects of DAT (Ska and Guenard 1993). On the other hand, personal-narratives or memorable experiences may be overlearned and rely on stereotyped structures and utterances because of frequent repetitions e.g. personal wartime experiences or significant historical events like the end of World War II, coronation of the Queen, assassination of John F Kennedy, etc.

The order of presentation of the assessment procedures or tasks is a fundamental aspect usually controlled in research. For example, Hicks (1990) found a significant order effect for discourse tasks in young children. However a number of studies of discourse have used an invariant order for the presentation of tasks (e.g. Smith and Bottenberg 1989, Sleight and Prinz l985, Wren l985) but in none of these studies was the effect of order on the results considered.

c) Stimuli used

Stimuli which have been used to elicit discourse are numerous and vary widely. Visual stimuli (single pictures, picture-sequences, slides, videos, films or props to manipulate) may vary considerably in complexity, clarity, size, medium (e.g. line drawings, colour photographs etc.), gender dominance, relevance to subjects, etc. Single picture stimuli may range from "projective" pictures (e.g. Norman Rockwell prints) to action pictures (e.g. from aphasia tests) (Myers 1999, Nicholas and Brookshire 1993, Obler et al 1994). Sequence stories may vary in length (number of pictures or episodes) as well as the amount of inferencing required to produce a coherent narrative. Video and film stimuli may vary in comparable ways.

It has been hypothesised that the amount of structure inherent in a discourse task affects the sample obtained. Whereas a sequence picture story provides the subject with the narrative schema, a single picture requires him to formulate an appropriately structured story and should therefore be more demanding. A self-generated narrative may be considered to be less structured and thus the most demanding discourse task (Westby 1984). Taylor et al (1987) state that conversation elicits more language than structured activities but no research is cited to support this claim. Stimulus structure has been found to affect certain aspects of discourse but the results vary depending on the population being studied and the stimuli and method of analysis used (Hedberg et al l989, Lemme et al l984, Wren 1985) and do not occur in every case. Boles (l990) concludes that the "assumptions that one discourse procedure actually has more inherent structure has not been addressed empirically, nor scrutinised carefully" (p 10).

Oral or written instructions used to elicit discourse may vary in formality, length, complexity, level of vocabulary used, etc. The level of literacy and specific reading, hearing and comprehension difficulties will affect the subjects understanding of the task required and thereby the discourse elicited. The use of specific terminology in instructions may influence the production of discourse[13]. The amount of detail and thus length of sample may be increased if instructions ask for an explanation tailored to a person who had never done the activity before (Kaplan 1987, Purdy and Loos-Cosgrove 1990, Ulatowska et al l981). Providing general instructions for procedures (e.g. "tell me how you would...").or specialised instructions ("tell me the three most important steps..") may provide not only different samples but varying insights into the subject's procedural skills. Relating a personal-narrative yields a more orally structured narrative but a request to "make it a story like I would find in a book" will yield a more literal type of narrative (Westby 1984). For ageing adults to provide a story "Like you would tell a child" (e.g. Cheung and Kemper 1992) would obviously affect their production. Two differing instructions on a single-picture

[13] For example, incorporating the notion of "brevity" into the instructions may be sufficient to curb the tendency to verbosity in some subjects, whilst including a notion of "completeness" or "totality" may encourage rambling.

task demonstrated that older adults modified their production whilst fluent aphasics did not (Trahan 1994 described in Ska and Joanette 1996).

Topic or semantic content is an inherent part of any discourse elicitation stimulus. This may include such subject matter as personal experiences (historical remote vs. present), environmental, imaginative (fantasy), fictional, fairy tales, fables, etc. Spoken language topics may be more familiar (Westby l985) and less formal. Certain topics are associated with a particular vocabulary and structure (e.g. fables, scientific papers, particular procedures, etc.). Some of these topics may be easier to discuss e.g. real events and autobiographical stories (Ulatowska and Chapman 1989), and topics such as work or major illness produce more complex language than family or schooling (Glosser et al 1988). Certain topics (e.g. autobiographical data, work and travel are considered by Ford (Illes 1989) to be of equal difficulty[14]. Using abstract or imaginary topics may discriminate against individuals who have a field-dependent, context-bound cognitive style (Taylor et al 1983). Abstract-concrete topic differences have been shown to affect discourse samples in closed head injured subjects (Mentis and Prutting 1987) and narratives with more concrete content may be recalled more easily by normal subjects (Thorndyke 1977). Even aphasia test pictures differ in the amount of action and participants they contain and have been found to produce different speech samples (Correia et al l990).

The individual's relationship to the topics[15] may need consideration. It is difficult to control for the content of personal events because of individual differences regarding specific knowledge of a given topic (Ska and Joanette 1996). These researchers recommend the use of visual stimuli for discourse production as these bypass the problems of individual variation in knowledge of topics because the information is provided and is the same for all participants. However the personal relevance and interest in the topic for each speaker may still affect discourse production (e.g. see Ripich 1989). Norman Rockwell pictures (used for narrative elicitation) are considered to be more

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[14] but no research is cited to support this contention.
[15] e.g. knowledge of them, liking for or dislike of them, interest in them familiarity with them (Milosky 1987, Dembowski et al 1989).

effective with older patients than younger ones as the pictures remind the former of their early years (Ulatowska and Chapman 1989).

Another factor regarding topic which may affect the sample elicited is its interest value. The speaker's involvement in or attitude to the topic, importance/"small talk", vividness, stressful or sensational nature of the topic may affect discourse (Kemper et al 1989, Longacre l976, Reilly, Harrow, Tucker, Quinlan Siegel 1975, Solberg and Wetherby 1989, Tannen 1982). Narratives which highlighted unusual events (e.g. involving blood and gore, recounting accident, visits to casualty departments/emergency rooms) were the most frequently produced by young children (Peterson and McCabe 1983). The longest and most complex narratives were about car accidents, hospitalisations, pets and trips whereas home accidents, trips to the doctor and breaking things produced shorter and less complex stories. Wechsler (l973, 1976) noted differences in the recall of emotionally-charged versus neutral narrative texts by RBD patients and normal subjects. Emotional processing and personal relevance have particular salience for RBD subjects (Chapter 6).

Another aspect of topic to be noted is its complexity. Stimuli's complexity may vary across a number of dimensions. In a narrative, the number of characters, events or episodes, settings or shifts in scenes, variety and importance of evaluation, importance of the setting, etc., will reflect its complexity. A complicated personal-narrative may differ considerably from a fable which has a well-determined structure and anticipated framework. In other discourse genres, complexity is reflected in other ways e.g. the number of essential steps in a procedural task, the flexibility of or constraints on essential steps, the number of content units in a descriptive task, etc. The amount of complexity would modify the discourse produced, depending on the phenomena being investigated. For example, a narrative incorporating two male characters would require more sophisticated referencing skills than if it contained a male and a female. Similarly, some neurologically-impaired subjects may have little difficulty in accurately and appropriately describing a simple procedure (e.g. making a sandwich) but demonstrate deficits on longer and more complex ones (e.g. shopping at a supermarket).

Procedures may include tasks which are learnt early and performed frequently (making a cup of tea, brushing teeth) and those learned later and carried out infrequently or not at all (e.g. changing the flat tyre on a motor vehicle). Certain procedures are learnt by observation (and the subject may or may not have actually performed the task himself), whilst other procedures are learned by reading instructions (D.I.Y. manuals, manufacturer's instructions, etc). The procedures described may relate closely to the speaker's exposure to and experience of the subject matter. Schank and Abelson (1977) considered that the individual variability of scripts/procedures depended on the specific experiences and personal characteristics of the individual involved in the event. Experience of a procedure contains many facets (e.g. specific content, structure and organisation, amount) and each of these may play a role in script development (Ross and Berg 1990). The specific content of a person's experience with an event was found to be the critical factor in producing individual differences in scripts, rather than the amount of experience that the speaker had had (Ross and Berg 1990). Subjects who have frequently carried out particular procedures may be able to produce more adequate verbal procedural discourse. Subjects who have never carried out a particular procedure may be able to describe it with sufficient adequacy but it would be assumed that specific details, difficulties encountered, etc. would not be provided. Some procedures may permit more individualistic interpretations e.g. buying a jacket versus changing a car tyre. Procedures have demonstrated an effect due to topic used (Purdy and Loos-Cosgrove l990, Roman et al 1987) and its familiarity (Li, DellaVolpe, Cabibi and Colarusso 1993,Li, Williams and DellaVolpe 1995).

The gender bias of stimuli used to elicit discourse has only been investigated to a limited extent. This factor can be expected to affect single picture and sequence narratives and procedures. In one of the few studies which have examined gender bias, Correia et al (1990) found that both NBD and male aphasic subjects produced more words and correct information units in response to male-biased pictures than they did to female-biased pictures. However the gender-bias of the pictures did not affect other measures (e.g. speaking rate). The "Cookie theft" picture from the BDAE, which has been widely used in research, was judged as female-biased (Correia et al 1990).

Procedures are often gender-biased due to the traditional gender-differentiation of tasks undertaken in most societies. Even relatively simple, apparently gender-free tasks such as "making a cup of tea" or "changing a light bulb" may demonstrate some level of gender-bias. In more complex procedures, gender-bias becomes more apparent (e.g. "fixing a broken window" and "making a cake"). Frequently procedural tasks presented to mixed-sex subjects show some level of gender-bias (e.g. Ulatowska et al 1981, 1983a, Ulatowska et al 1986). The comparable level of difficulty in gender-appropriate tasks used in research needs to be investigated as it cannot be assumed that gender-bias is not a consideration. For example, "changing a car tyre" and "making an omelette" (Kaplan 1987) are not necessarily of equivalent difficulty.

The use of visual stimuli to elicit discourse is a factor to consider as their use may be contra-indicated with certain brain-damaged populations. The presence of unilateral neglect, hemi-inattention or hemianopias may preclude the use of visual stimuli unless careful consideration is given to presentation. As previously discussed, providing aphasics with picture-sequence stimuli to elicit procedures (Cannito et al 1988) would appear to defeat the purpose of ascertaining whether they are able to provide the appropriate steps in the correct sequence. For certain clinical populations (e.g. aphasic patients Ulatowska et al 1981, Ulatowska, Freedman-Stern, Doyel and Macaluso-Haynes 1983a) who have been shown to retain the overall structure of a procedure providing picture stimuli may have no effect. However, for those populations who produce inadequate or disordered essential steps (e.g. RBD patients - Roman et al 1987, Sherratt 1988), the visual stimuli will provide substantial benefit and may mask the extent of their deficits.

The auditory or written material used in recall tasks may vary along the same parameters as topic (see above) as well as other features (Section 2.2.4b). Materials which have been used in recall have differed widely e.g. fairy tales, short stories, fables etc. Some researchers have attempted to control the material used in recall tasks (e.g. Culatta et al (1988), Ernest-Baron, Brookshire and Nicholas 1987, Graybeal 1981, Kemper 1987) and they have also been specifically investigated (e.g. Doyle, McNeil, Park, Goda, Rubenstein, Spencer, Carrol, Lustig and Szwarc 2000). Others have either not reported details of control of their material or have in fact not done so at all. Although Ulatowska and Chapman (1989) suggest that the material can be modified to meet the subjects' or researchers' needs, the differences inherent in these materials need to be borne in mind when comparisons are being made.

Differences in discourse samples obtained from varying stimuli have been documented in a variety of groups[16]. The nature of the stimuli may have a differential effect on the discourse of pathological populations. In some cases, however, the results of studies cannot be compared due to the fact that, although stimuli differed, the methods of elicitation also varied.

2.3 Summary

This chapter has provided an overview of the variables of socio-cultural environment, setting, discourse participants and sampling that may have an effect on the discourse production of both normal and brain-damaged subjects. The assessment measures to be used in the study will be examined in the next chapter.

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[16] Bottenberg, Lemme and Hedberg (1985a,b), Correia et al (1990), Diggs and Basili (1987), Doyle et al (1994), Hedberg et al (1989), Lemme et al (1984), Ulatowska and Chapman (1989), Ulatowska et al (1983b), Westby (1984), Westby et al (1989).

CHAPTER 3
ANALYSIS OF DISCOURSE AND ATTENTION

This chapter provides details of the selection of the discourse genres and tasks as well as the development of the profiles for assessing the discourse samples (outlined in Chapter 1). It also presents the rationale for selection of the attention tests and the effect of age, SES and RBD on these.

3.2 Selection of discourse genres and tasks

Narratives, procedures and conversation are regarded to be commonly part of most adult speakers' communication repertoire (see Chapter 2). Although the current movement in discourse analysis is towards conversation, this genre was not analysed in this study. A balance is required between discourse which is ecologically valid and the practical and clinical demands of the elicitation and analysis. Expository/descriptive discourse was also not considered for this research. Although it has been widely employed to assess discourse skills, as it s elicitation is contrived and its status as a valid reflection of discourse skills can be questioned.

In this study, the discourse tasks consisted of two broad discourse genres:- narrative and procedural. Narrative discourse was selected for three reasons. Firstly, it is a universal type of discourse (Sleight and Prinz 1985, Tannen 1982b, Freedman-Stern , Ulatowska, |Baker and DeLacoste 1984) which is relevant to all age groups. Secondly, it is relatively easy to elicit. Thirdly, together with conversational discourse, this is the most widely investigated discourse genre in the research on language-impaired populations.

Procedural discourse was selected as it is differs in its syntactic structure and its strong dependence on temporal order (Ulatowska et al 1981, 1983a). It focuses on "how" something is done, not on "what" is done or "who" does it (Ulatowska et al 1983a). It has been relatively widely examined in recent research into neurogenic populations (e.g. Ulatowska et al 1983a, 1986, Cherney 1990, Purdy and Loos-Cosgrove 1990, Li et al 1995, Shadden 1988). Although it is now more commonly included in the assessment of communication, it has less often been studied and is considered to be less well understood than narratives (Tompkins 1995). The selection of these two genres enables a comparison of the discourse samples to those used in previous research and information on the differential performance of NBD subjects on these genres.

For eliciting narrative discourse, two methods were employed:- samples elicited by means of a sequenced picture story and by means of a request for a self-generated personal-narrative. Personal-narratives are felt to be more representative of spontaneous communication (Liles 1993) and difficulties in accessing language to convey one's thoughts are considered to be more transparent in these narratives rather than in retelling tasks (Chapman et al 1998). Story recall was not included due to the effects of memory status (Au and Bowles 1991, Light 1990) and to their more structured nature (Ulatowska et al 1981, 1983).

The two elicitation methods differed from each other in the apparent amount of structure and organisation provided and thus placed different demands on the subjects. However Bottenberg et al (1985b) have warned that stimuli which may logically appear to provide more or less structure may be deceptive. The more structured task was the sequence story in which the entire context and order of events was explicit. These tasks have the advantage of eliciting samples which are constrained and predictable and can easily be compared to the target. The self-generated personal-narratives were less structured with only the general theme of the task being provided and no visual cues supplied. This type of task is considered to be the most taxing on the subjects as they have to produce the narrative structure/schema themselves. Self-generated narratives allow the use of both creativity and control of information, considered to be two vital features of discourse tasks in elderly adults by Ulatowska and Chapman (1991). Compared to picture-sequence tasks, in self-generated narratives the speaker's reliance on external stimuli is reduced and he/she is forced to rely more heavily on internal narrative organisation (Liles 1993).

Self-generated narratives frequently occur in everyday interaction, embedded in conversation and thus provide a valid assessment of the subject's communication skills. However there are obvious advantages to using picture-sequences to elicit narratives and their widespread use in assessment is a tribute to this. Nonetheless these advantages need to be weighed against how adequately they assess the subject/patient's discourse production. The advantages of picture-sequences to the researcher/therapist may or may not also be to the benefit of the subject.

Personal-experience narratives of the generalized type used in this study encourage the subjects to recount personally relevant narratives. Personal relevance is an important feature of everyday cognitive experience and of mental processing (Van Lancker 1991) and thus it has implications for discourse elicitation. It may also be particularly pertinent to the populations assessed in this study. Personal relevance may be of more importance to ageing adults who have been considered to be egocentric due to social factors (Tamir 1979) although this has been disputed (see Shadden 1997). Furthermore the long-term memory skills of older subjects may benefit them in their production of personal-narratives. The disadvantages of personal-experience narratives are that older subjects may produce well-practised discourse samples (e.g. wartime experiences) using stereotyped vocabulary and a simplified structure and thus may not reflect their ability to construct and produce adequate narratives. For RBD subjects, personal relevance is of particular importance as Van Lancker (1991) concluded that the RH has been found to be preferentially involved in establishing the personal relevance of a variety of stimuli.

3.2 Selection of discourse measures

As discussed in Chapter 1, the discourse measures to be used in this study were selected to examine the stages of production of a multi-level discourse processing model. Each area of discourse performance will be presented individually below.

3.2.1 Relevance

Relevance is a term used both in ordinary language and in fields such as psychology, speech pathology and philosophy. The everyday use of this term is non-specific and variable as it is used in a variety of ways by different speakers and by the same speaker in different contexts (Sperber and Wilson 1986). This use of the term is adequate in everyday language e.g. readers understand what is meant by Lodge (1984) when he says that "There should be nothing irrelevant in a good story" (p 67). However two other uses of "relevance" (as a psychological concept and a clinical description) require stricter definition in order to serve a useful purpose. It is frequently used to define the impaired discourse of a variety of clinical populations (e.g. closed head injury, Wernickes aphasia, as well as RH communication deficits). However use of the term "relevance", if it is ill-defined, provides little insight into the exact nature of this impairment.

As a guide to conversation, Grice (1975) stated that normal communication begins with an implicit agreement between a speaker and a listener. The speaker tries to make the listener's task as easy as possible by giving the listener all the necessary information to interpret a narrative but no unnecessary information and by not purposely misleading the listener. From Grice's maxims of conversation, Sperber and Wilson (1986) and Wilson and Sperber (1981) have postulated relevance as the single principle that guides human communication. They state that

> *"Our suggestion is that humans tend to pay attention to the most relevant phenomena available; that they tend to construct the most relevant possible representations of these phenomena, and to process them in a context that maximises their relevance. Relevance, and the maximisation of relevance, is the key to human cognition." (Wilson and Sperber 1991, p 586)*

They propose that facts may be considered irrelevant for three reasons:-

- if the information, although new, is unconnected to facts already known,

- if it is uninformative because the information is already present in the context; or
- if the information added is inconsistent with the context.

To these, a fourth was added to take into account the excessive detail often reported in subjects who have suffered RBD i.e. "the additional information gave too much detail to be relevant to the communication". An "other" category is also included to provide additional or unclassifiable reasons for the sample's irrelevance.

Although the notion of relevance as the sole principle governing communication has been criticised (e.g. Giora 1997), Sperber and Wilson's (1986) definition is useful as it more accurately delineates this concept. Patry and Nespoulous (1990) have suggested that certain discourse properties (e.g. unity, intentionality, appropriateness, topicality and informativeness) are not amenable to empirical investigation.

Sperber and Wilson (1986) state that when relevance is represented

> *"it is represented in terms of comparative judgements and gross absolute judgements (e.g. 'irrelevant', 'weakly relevant', 'very relevant'), but not in terms of fine absolute judgements, i.e. quantitative ones." (p 132).*

Smith and Leionen (1992) also consider it as a "judgement". Therefore a four-part Likert scale was developed to evaluate the data's relevance. The methodological problems of rating scales[17] have been widely discussed (e.g. Ball, Davies, Duckworth and Middelurst 1991, Bloom, Pick, Borod, Kashemi, Andelman, Obler, Sliwinski, Campbell, Tweedy and Welkowitz 1999, Cronbach 1990, Hux, Sanger, Reid and Maschka 1997, Penn 1988) and these are difficult to avoid. However the use of such scales has been reported to be of value and can achieve substantial internal consistency (e.g. Bloom et al 1999, Campbell and Dollaghan 1992), as well as strong correlations with objective measures (Doyle, Tsironas, Goda and Kalinyak 1996).

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[17] (amoûnt of time involved, extensive training for raters, type of scale used, subjective nature of the ratings, etc.)

3.2.2 Discourse structure

Various models have been proposed to provide detailed frameworks for the analysis of the superstructure or structure of narratives (Stein and Glenn 1979, Labov 1972, Longacre 1976, Mandler and Johnson 1977, Rumelhart 1975). The evaluation model of narrative analysis developed by Labov (1972) was selected for this study because it is more applicable to an adult population and has been used in the evaluation of the discourse of neurogenic populations (Freedman-Stern et al 1984, Labov and Auger 1993). This method represents a development of Labov's initial work into informal speech styles and is therefore more suited to the analysis of spontaneous language than other methods (e.g. Stein and Glenn's model for story recall). Labov's model examines the structural properties of narratives in relation to their social functions. This aspect is particularly important to the analysis of discourse-grammar in RBD subjects who demonstrate substantial deficits in their pragmatic skills and in comprehending and expressing emotions. Other story-grammars have not taken into account the emotional reactions to the narrative (Rehak et al 1992b).

Labov suggests that a fully formed oral narrative has a six-part structure. These elements are the abstract, orientation, complicating action. evaluation, results or resolution and coda (defined in Appendix A1). At the least, a narrative must include an orientation, complicating action and resolution but Labov considers evaluation to be the most important element in addition to the complicating action. This has been emphasised by Lahey and Launer (1986) and Peterson and McCabe (1983). Freedman-Stern et al (1984) state that

> *"narratives without evaluation strike listeners as flat and pointless or as strictly reporting rather than story telling. Thus evaluation may be considered a necessary element in a fully formed narrative episode" (p 190).*

To provide additional detail, the orientation and evaluation were further sub-categorised according to suggestions made by Peterson and McCabe (1983).

Labov's narrative model does have limitations which need to be borne in mind. It may only be applicable to narratives with temporal ordering of events and not to those using flashbacks or flashforwards. However the spontaneously produced narratives elicited in this study would be more likely to follow a temporal order. A further criticism of his model is that it is surface oriented and takes no account of cognitive processes (Cortazzi 1993). However in this study, the narrative structure is linked to the discourse processing model used.

Procedural discourse structure has been investigated to a lesser extent and is less well understood than that of narratives (Tompkins 1995). Simple procedures consist of a routine series of steps ending in the target step whereas more complicated procedures may incorporate a description of the particular items needed and the conditions under which the procedure is performed. For this research, Ulatowska et al's (1981, 1983a) modification of Labov's narrative model was used as this provides a more unified approach to the analysis of the two differing discourse genres analysed in this study.

The basic element of procedural discourse is the step and these steps occur within a hierarchy which is either conceptually or chronologically motivated. The features of procedural discourse are the introduction or orientation, sequence of steps, essential, optional and target steps and the coda (defined in Appendix A1).

3.2.3 Clarity disruptors

The clarity of discourse incorporates the notion of non-informativeness or empty speech. The presence or absence of certain elements may disrupt the continuity of meaning in a sample (Ripich and Griffith 1988). This would render it less clear to the listener and increase the communicative burden placed on the listener because of the ease or difficulty with which the listener comprehends the discourse (Demboswki et al 1989).

Those elements which disrupt the clarity of discourse are words, phrases, sentences or ideas that are imprecise, devoid of content, repetitive.

comprehensible only to the speaker or extraneous to the task. Additional categories (such as fluency measures) may disrupt clarity (Brookshire and Nicholas 1995, Linscott, Knight and Godfrey 1996, Galski, Tompkins and Johnston 1998) and these have been assessed separately (see below). Nicholas, Obler, Albert and Helm-Estabrooks (1985) identified fourteen elements which may contribute to non-informative speech in certain neurogenic groups. A revised form of their profile has been used with closed head injury (Kaplan 1987) and RBD subjects (Sherratt 1988) and NBD young adults (Sherratt 1992). It has been further modified to take into account the separate analysis of cohesion as well as additional clarity disruptors from other communication disorders (Brookshire and Nicholas 1995, Chapman, Ulatowska, Kind and Johnson 1995, Cherney, Drimmer and Halper 1997, Chenery and Murdoch 1994, Cooper 1990, Damico 1991, Glosser and Deser 1992, Linscott et al 1996).

Many of these elements are common in normal communication. Certain clarity disruptors that are often used may be less disruptive to communication than less common ones. These more common ones (e.g. the use of phrases such as "you know" or the repetition of a word like "we... we first went...") may be easily ignored with little or no effort whereas less common ones (e.g. neologisms and paraphasias) may be more disruptive and require more processing. It is also not so much their presence/absence but their quantity that may be problematical. The relative frequency of some disruptors compared to others may also be of importance in diagnosis, treatment and manifestations of an underlying deficit (e.g. word-finding difficulty, impairment in selecting and prioritising information).

Empty phrases may be considered as structural cohesion which contributes to the continuity but not the meaning of text (Cherney 1990) and are considered (together with pause fillers and indefinite terms) to be an appropriate cohesion device to maintain the flow of discourse (Ripich and Terrell 1988). However, overuse of these may disrupt the continuity of meaning. Comments on the task and personalised comments (sometimes called modalizations) can give clues to self-appraisal and indicate difficulties that subjects may have in a specific situation (Nespoulous 1996). The participant himself may be in a better position to assess the difficulties he is having and these comments should be noted and further investigated.

These clarity disruptors incorporate three of Grice's (1975) conversational maxims. The manner maxim includes avoiding obscurity of expression and ambiguity. Furthermore, the maxims of quality and of relation would also be contravened by the inclusion of intrusive phrases and personal judgements/comments.

3.2.4 Productivity and syntax

The productivity of the sample, as measured by its length, reflects Grice's (1975) maxim of quantity. Participants in conversation are required to "Be concise" i.e. provide neither too little nor too much information. The length of the sample will also relate to the measure of relevance. Certain discourse genres, tasks and topics used will produce longer samples than others. For research and clinical purposes, sufficiently long samples are needed to be representative of the subject/client's communicative abilities and also to provide enough data for analysis. Furthermore McCabe and Peterson (1990) consider length to be an excellent index of narrative complexity.

Analysis of the syntactic complexity of the samples was based on T-units (minimal terminable units)(Hunt 1970) and clauses. From this, three ratios were calculated. Clauses per T-unit or clausal-embedding gives a more transparent method of determining the frequency of subordinated clauses. The number of clauses per T-unit (or per utterance) is considered by Cheung and Kemper (1992) to provide an adequate index of linguistic complexity for a variety of purposes as it is easily calculated, appears to determine age-related and individual differences and correlates with recall and comprehension measures. An increased clause-length indicates the inclusion of a greater amount of nominal complexity (adjectives, postmodifying phrases) and verbal complexity (complex verbs, adverbial phrases). A longer T-unit incorporates not only the features of greater clause-length but also the increased use of various types of subordinate clauses. These measures have been found to be the best indices of syntactic complexity/maturity in adults (Hunt 1970).

These measures were also selected as they have been widely used in current research (e.g. amongst many - Brenneise-Sarshad, Nicholas and Brookshire 1991, Galski et al 1998, Li, Ritterman, DellaVolpe and Williams 1996, Liles et al 1989) and thus normative data is available on both NBD and impaired populations. Furthermore they relate closely to other measures of syntactic level used in the literature.

3.2.5 Clausal structure

In addition to syntactic complexity, the exact nature of the subordinated sentence structures were also examined. Kemper and her colleagues (Kemper 1986, 1987, Kynette and Kemper 1986, Kemper et al 1989, 1990, Lyons, Kemper, LaBarge, Ferraro, Balota and Storandt 1994, Gubarchuk and Kemper 1997) have examined two types of sentence embeddings :- left-branching structures, in which the embedded clause interrupts the main clause, and right-branching structures, in which the main clause is followed by the embedded clause. A reduction with age in left-branching clauses has been clearly demonstrated in both oral and written discourse (Kynette and Kemper 1986, Kemper 1987, Gubarchuk and Kemper 1997) and difficulties have also been reported in the imitation of these clauses (Kemper 1986). A similar reduction in left-branching clauses has been found in dementia (Lyons et al 1994). It has been suggested that this relates to various cognitive deficits viz. working memory and attention. These deficits may occur both in elderly and RBD subjects as well as other neurologically-impaired subjects.

3.2.6 Cohesion

Cohesion has been defined as

> *"the means by which elements that are structurally unrelated to one another are linked together, through the dependence of one on the other for its interpretation." (Halliday and Hasan 1976, p 27).*

Whilst the concept of "relevance" operates at the overall or global level of discourse, cohesion relates to the structural connections between sentences at a local level.

The analysis of the cohesion of these data is based on the comprehensive method developed by Halliday and Hasan (1976) and incorporates some modifications and clarifications suggested by Hedberg and Stoel-Gammon (1985). The five categories described by these authors were used and are detailed in Appendix A1. Firstly, in the reference category are those items which make reference to something else so that they can be interpreted. Reference has been said to be "the most important single criterion for the coherence of text bases" (Kintsch and van Dijk 1978, p 366). Secondly, substitution involves the replacement of one item with another. Thirdly, ellipsis occurs when something that is structurally necessary is left unsaid, often in conversation. Fourthly, conjunction is a cohesive relation which specifies the way in which what is to follow is systematically connected to what has gone before. Lastly, lexical cohesion is achieved by the selection of vocabulary.

Although the conjunction "and" is analysed as an additive conjunctive tie according to Halliday and Hasan's scheme, it is problematic. It is semantically the least marked conjunction (Nicholas et al 1985) and is often used in the place of other more appropriate conjunctions. The target conjunction may be difficult to determine. It may be used to provide co-ordination to a "list" of sentences, e.g. in description tasks, but this occurs at a grammatical rather than semantic/cohesive level. In spontaneous speech, "and" is also used as a pause filler or a place holder whilst the speaker composes the remaining part of his communication. Co-ordinators (particularly "and") can function as sentence initiators, and indicators of turn-taking and turn continuation (Maxim and Bryan 1996). The over-use of "and" may therefore indicate an underlying difficulty (e.g. in word-finding, semantic relations, fluency). Brookshire and Nicholas (1995) consider "and" as a performance deviation. "And" may be considered as structural cohesion which contributes to the continuity of discourse but not to the continuity of meaning (Cherney 1990).

It is thus often difficult to determine when "and" is used to indicate a cohesive relation (Halliday and Hasan 1976, Hedberg and Stoel-Gammon 1985). Thus "and" was not coded within the cohesion analysis but recorded separately to determine its frequency. "And" has been analysed separately in the discourse of psychotic subjects (Thomas et al 1990, King et al 1990) and RBD subjects (Cherney and Canter 1990) as it was found to be significant in their linguistic performance. Furthermore an additional category of "connectives" was included in this study. This incorporated the incidence of both conjunctions and "ands", thereby representing all sentence connections.

Referential and lexical cohesion are recognised to be the types that are most commonly found in naturally occurring discourse (Patry and Nespoulous 1990). Reference and lexical repetition are inter-related. Using some principle of cognitive economy to overcome information-processing constraints, speakers would be expected to use pronouns when feasible rather than re-introducing the noun (i.e. lexicalization) (Newman, Lovett and Dennis1986). The study of cohesion helps determine what kind of effort is needed for interpreting an utterance and how successful that effort will be. Low levels of unclear reference (3%) are not very disruptive, whereas higher levels (10%) may be quite disruptive (Fine 1995).

Halliday and Hasan's cohesion analysis has been used widely in the NBD and impaired populations (e.g. Armstrong 1991, De Santi, Koenig and Goldberger 1994, Lock and Armstrong 1997, Mentis and Prutting 1985, Nicholas et al 1985, North, Ulatowska, Macaluso-Haynes and Bell 1986, Ripich and Terrell 1988, Ulatowska et al 1985). However only reference has been studied in any detail in older adults (Shadden 1997). Not only quantitative analysis but qualitative analysis can be useful in determining if any particular type of cohesive tie is particularly frequent in specific neurologically-impaired populations. For example, a higher degree of lexicalisation occurred in schizophrenic patients (Rochester and Martin 1979) and the type of cohesive ties was used to track the recovery of aphasic patients (Piehler and Holland 1984).

3.2.7 Dysfluencies

Fluency of speech is a measure of the linguistic formulation stage of discourse processing (see Chapter 1). Dysfluencies are a consequence of the speaker putting out information at a rapid rate - false starts, afterthoughts, repetitions, corrections, fumblings (Chafe 1985). Similarly, dysfluencies can reduce coherence because they interfere with the transmission of a message (Bliss, McCabe and Miranda 1998).

The types of dysfluencies have been variously described and named and a variety of sometimes overlapping categories proposed. The types of dysfluency used to assess a variety of both NBD (adults and children) and brain-damaged (e.g. aphasia, closed head injury, dementia, RBD) populations were examined (Clark 1997, Dollaghan and Campbell 1992, Doyle et al 2000, Glosser et al 1988, Haravon et al 1994, Leeper and Culatta 1995, Yairi and Clifton 1972). From these, five categories of dysfluency were selected as applicable to this study:- false starts, incomplete mazes, repetition, non-word fillers and part-word productions.

The types of dysfluency in both normal and brain-damaged subjects occur in differing frequencies. The ratio of types of dysfluency has varied depending on factors such as subject age and discourse task. For example, normal subjects tend to produce pauses and repetitons more often in conversation whilst false starts and incomplete mazes occur less frequently (Dollaghan and Campbell 1992). In two spontaneous speaking tasks, interjections were the most frequent, followed by revised and incomplete phrases (Leeper and Culatta 1995). Yairi and Clifton (1972) concluded that "the normal speech of adults is characterised by a relatively invariant disfluency pattern regardless of age or amount of disfluency" (p 718) i.e. the most frequent types are interjections and revisions or incomplete phrases. The relative frequency of the types of dysfluency manifested in discourse may differentiate communicatively-impaired groups.

Although dysfluencies may appear to be simple performance errors, they may reflect other difficulties that the speaker may have. Clark (1997) maintains that dysfluencies can be separated into two aspects:- firstly, the problem the speaker is trying to deal with and, secondly, the method by which he is dealing with it. Thus dysfluencies themselves are the visible way the speaker is dealing with the problems which are hidden from direct assessment. Therefore difficulties at a higher or more conceptual level of processing may be manifested in the production of speech, including the incidence of dysfluencies. As discussed in Chapter 1, linguistic and formulation levels are more easily measured than conceptual levels and an assessment of dysfluencies should provide further insight into the deficits occurring at these higher levels. Furthermore different types of dysfluency may indicate more clearly what the underlying difficulties are.

The type of dysfluency which occurs may provide some indication of the difficulty which is being experienced. False starts (or revisions) may indicate their purpose: the speaker is correcting overt errors, adding or deleting information (Dollaghan and Campbell 1992). Furthermore, if the speaker is revising his utterances, this provides important information regarding his/her speech and language monitoring skills. Feyereisen, Pillon and DePartz (1991) report two studies which found no relationship between speech monitoring and auditory comprehension. Repetition, non-word fillers and part-word production suggest that the speaker is using a stalling technique to provide additional time to overcome planning difficulties at a conceptual or formulation level or to circumvent word retrieval problems.

The types of dysfluencies which occur can guide intervention e.g. if the speaker's revisions are predominantly phonological, treatment can be focused on lexical retrieval strategies or sound-production skills (see Dollaghan and Campbell 1992). The speaker's ability to revise and modify their own utterances may have important implications for treatment. For example, RBD subjects were found not to self-correct errors and did not seem aware of them (Cherney 1990), thus making treatment difficult.

3.3 The assessment of attention

The major difficulty in assessing attention is the complexity and controversy of attention as such and the lack of consensus as yet regarding the number and nature of its sub-components (Myers 1999, Tompkins 1995). Furthermore, the various components are highly interdependent (Kinsella 1998). Successful performance on any attention test requires sustained attention (Kinsella 1998, Tompkins 1995). There is also no method by which to measure the amount of attentional energy or mental energy which individuals have access to (Salthouse 1988). As there is thusfar no clear differentiation between certain aspects of attention and other components of cognition (e.g. memory), attention assessments will also be affected by other cognitive capabilities/dysfunction.

Attention tests emphasise slightly different components of attention although there is often overlap among them (Mesulam and Weintraub 1985, Myers 1995). The three tests used to assess attention in this study were selected to focus on the various components of attention. A note of caution is provided by Stemmer (1999) who considers that pencil and paper attention tests only provide a rough estimate of attention deficits.

3.3.1 Digit Span Test

This test assesses concentration span or focused attention and vigilance (Malec, Ivnik and Smith 1993, Wechsler 1987). It is also considered as a measure of auditory short-term/working memory (Craik 1977, Lezak 1995, Salthouse 1988, Schneiderman, Murasugi and Saddy 1992, Skilbeck 1996). Its memory and attention components are considered to make it one of the WAIS subtests most sensitive to the effects of any kind of brain injury (Lezak 1995, Milberg, Hebben and Kaplan 1996). Tompkins (1995) states that as a measure of working memory, forward digit span does not predict either the more complex measures of concurrent information processing and storage or patients' other cognitive and communicative abilities. Salthouse (1991) also considers that digit span may not be the most ideal method assessing short-term memory because of the possible contribution of secondary memory processes.

The two parts of the test may require different processing abilities. Forward digit span (direct repetition of the numbers) requires less processing of the input than backward digit span (repetition of the numbers presented in reverse order). Repeating digits forward seems to require only the capacity to briefly hold several bits of simple information in short term memory. Its simplicity is supported by the fact that amnesic patients can have normal digit spans (Mesulam 1985). Digits backwards constitutes a more difficult test as it places greater demands on working memory (for storage) and requires some cognitive processing to manipulate the bits of information (Au and Bowles 1991, Milberg et al 1996, Prigatano, Pepping and Klonoff 1986). Memory and reversing operations need to proceed simultaneously (mental double-tracking) (Lezak 1995). The disparity between scores from the two parts of the test demonstrates that identical operations are not involved (Lezak 1995). Digit backwards draws on the supervisory attentional control component of working memory (Kinsella 1998).

The reported age effects on digit span performance vary. Forward digit span is rarely reported to be affected by age (Craik 1977, Heaton, Ryan, Grant and Matthews 1996, Malec et al 1993 but see Norman, Kemper, Kynette, Cheung and Anagnopoulos 1991) and it tends to demonstrate smaller effects of age than most memory measures of interest to psychologists (Salthouse 1988). However small to moderate age-related declines are often found (Salthouse 1991). When the number of items is approximately seven or less, there are minimal age group differences in either capacity or speed of retrieval (Bayles and Kaszniak 1987). However age-related decrements on digits backward have been noted (Au and Bowles 1991, Kemper et al 1989, Kemper and Rash 1987, Norman et al 1991, Salthouse 1991). It has been hypothesised that the cognitive operations necessary to perform the backward memory span task may exceed the capacity of short-term memory (Botwinick and Storandt 1974).

On the one hand, digit span (forward and backward) demonstrated a decline with age with adults in their sixties performing between 0.6 and 0.8 standard deviations below the level of adults in their twenties (Salthouse 1991). On the other hand, no age effects were found for both Digit Span measures (Davis and Ball 1989). Albert (1998) concluded that there are minimal age changes in primary memory.

Limited evidence is available on the effect of SES or education on this test. Education was reported to have a greater effect on the variance in digit span scores than age (Heaton et al 1996) but Malec et al (1993) and Davis and Ball (1980) found that it is not strongly related to education. Factorial studies agree that verbal ability plays virtually no role in digit span (Lezak 1995).

Digit span performance has been examined in subjects who have suffered brain-damage. RBD subjects were reported to perform more poorly on this test than non-brain-damaged subjects but not significantly differently to left-brain-damaged subjects (Schneiderman et al 1992). However limited deficits in this population were found by Tanridag, Kirshner and Casey (1987).

Kemper and her colleagues (Gubarchuk and Kemper 1997, Kemper et al 1989, Kemper and Rash 1987, Norman et al 1991) have related performance on the Digit Span test to syntactic complexity, particularly the incidence of left- and right-branching clauses. They conclude that backwards digit span is a significant predictor of embedding and of left-branching clauses as working memory apparently limits the capacity of adults to retain and manipulate syntactic elements simultaneously (Kemper 1992).

3.3.2 Benton Oral Controlled Word Association Test

The second test used is verbal fluency, a continuous performance test, which evaluates attention and vigilance. The Benton Oral Controlled Word Association Test (Benton and Hamsher 1976), a controlled word-association test (known as the FAS test) was selected because it is considered to be a naming test of great value and an excellent measure of verbal fluency (Albert and Kaplan 1980, Cummings and Benton 1983). More specifically, verbal fluency assesses the ability to sustain behaviour or perseverance, to concentrate and to determine vulnerability to distraction (Mesulam 1985). The rationale behind fluency tests is that the number of different words produced in a limited time period will reflect the ease and speed of accessing and retrieving items from long-term (semantic) memory (Salthouse 1988).

A decline with age on verbal fluency tests has been reported, although the severity of the decrement and age of onset has varied (Maxim and Bryan 1994, Salthouse 1988, Ulatowska et al 1986, also see Light 1992). When greater processing requirements (as in verbal fluency tests) are needed, more pronounced age trends are observed than if a single word must be located (Salthouse 1988). If unlimited time is given for this type of task, elderly individuals perform similarly to younger subjects (Obler and Albert 1981). Craik and Rabinowitz (1984) has suggested the speed of retrieval from semantic memory may decrease with age but not the recognition of information.

Level of education affects vocabulary and other verbal abilities (possibly including verbal fluency tests). High education adults (more than high school education) generated significantly more words on fluency tasks than low-education normals (Speedie, O'Donnell, Rabins, Pearlson, Poggi and Rothi 1990). However, older adults (teachers or college professors) were superior to young adults in verbal abilities (Salthouse 1988). Often older adults have fewer years of education and therefore their decreased vocabulary performance may be attributable to fewer years of education (Salthouse 1988).

With regard to brain-damage, verbal fluency is considered as a sensitive test that is disturbed in both cortical and sub cortical disorders and may be an early marker indicating dementia (Cummings and Benson 1983). Impaired verbal fluency has also been associated with frontal lobe damage (Lezak 1995) and the FAS test is thus included in a frontal lobe battery (Albert and Kaplan 1980). The performance of RBD subjects on category naming tasks (e.g. animal naming) has found them to be significantly impaired relative to NBD subjects in some studies (Diggs and Basili 1987, Joanette, Goulet and Le Dorze 1988, Schneiderman and Saddy 1988) but not in others (Cavalli, DeRenzi, Faglioni and Vitale 1981, Cappa, Papagno and Vallar 1990). On verbal fluency tasks such as the FAS, RBD subjects performed at a generally poorer level than the NBD group but at a better level than the left-brain-damaged subjects (Schneiderman et al 1992).

Little research has been carried out into the relationship between verbal fluency and specific aspects of discourse performance. Ulatowska et al (1986) have reported no correlations between fluency and impaired reference in sequence picture, recall and personally generated narratives and procedural discourse in normal ageing adults.

3.3.3 Trail-Making Test

The third measure of assessment is the Trail-Making Test (Reitan 1958). According to Brown et al (1996), this test reflects the integrated, interactive behaviour of the brain. As it requires the simultaneous integration of several abilities, it is considered to be one of the best measures of general brain functions, assessing both speed and efficiency of performance (Reitan and Wolfson 1996). More specifically, it assesses the ability to attend to two tasks simultaneously which involves inhibiting responses and resisting interference (Kinsella 1995, Mesulam 1985). It can also contribute to providing a rough index of the patient's executive functions level (Prigatano et al 1986).

The two parts are considered to assess different aspects of attention, with Part B considered to be the most sensitive part of the test (Kinsella 1998). Trail A appears to be a pure measure of visual tracking or psychomotor functioning while Trail B requires the ability to rapidly shift cognitive set (Prigatano et al 1986). Therefore, Part A is used as a test of sustained attention whilst Part B assesses alternating attention (Tompkins 1995, Myers 1999) but it is not considered to tax vigilance (Tompkins 1995). The operations used are susceptible to interference and perseveration between the number and letter series and requires flexibility between modalities (Milberg et al 1996).

A considerable decline with age was noted on Part B of this test but this may reflect age rather than education (Heaton, Grant and Matthews 1996). However Lezak (1995) reported that the lower the level of education, the slower the performance may be, particularly on Part B. The usual cut-off scores misclassify 90% of normal people in their seventies as brain-damaged (Tompkins 1995).

The effects of brain-damage on the Trail-Making test have been recorded. Like most other tests involving attention functions, it is highly vulnerable to the effects of brain injury (for a review, see Lezak 1995). RBD subjects were found to perform significantly slower on Part B than Part A (Lezak 1995).

3.4 Summary

This chapter described the rationale for the selection of discourse genre and task, the discourse measures and attention tests. It also included a discussion of the effects of age, SES and RBD on the attention tests used. The effect of ageing on discourse performance will be presented in Chapter 4.

CHAPTER 4
THE EFFECT OF AGEING ON DISCOURSE

One subject variable (introduced in Chapter 2) i.e. age, is discussed in detail in this chapter. The rationale for the investigation of the relationship between age and discourse performance and methodological considerations particularly relevant to ageing research is explored. Previous research into its effect on the specific discourse measures used in this study is reported.

4.1 Introduction

Although communication in early life has been widely researched and well-documented, this has not been the case for its continuing development and alterations throughout adulthood into old age. The need for more research into communicative changes in ageing continues to be emphasised in the literature (Bryan and Maxim 1996b, Light and Burke 1988, Mackenzie 2000a, Maxim and Bryan 1994, Ulatowska et al 1985, 1998). The paucity of data on the effects of ageing is particularly evident in discourse performance (Mackenzie 2000b, Ska and Joanette 1996, Ulatowska and Chapman 1991). Ska and Joanette (1996) state that many questions regarding the discourse abilities in normal ageing remain unanswered. Furthermore, they maintain that inconsistencies among current results continue to be evident and some aspects of the problem are ignored.

4.2 Rationale for the investigation of ageing effects on communication.

The rationale for the investigation of communicative changes due to ageing is twofold. Firstly, the communication variation observed in ageing is a valid research area in itself. This variation reflects the continuing development of language across the decades and its interaction with experience and changes in health and cognitive status. Language changes in the elderly are also relevant to the crucial issue of the relationship between language and cognition (Ulatowska et al 1985). Due to better health and medical treatment, the ageing population has risen and will continue to increase rapidly. In the U.K., life expectancy at birth has increased from under 50 years for females and 45 years for males in 1900 to 72.7 years for males and 78.3 for females by 1989/90. The projections for 2028 are 76.2 for males and 81 years for females (Henwood 1992). 15.8% of the population were over 65 in 1994 and this is expected to rise by 31% in 2020 (Butler, Oberlink and Schechter 1998). To deliver appropriate services to this rising population, a more accurate description of their communicative status and a reliable representation of underlying explanatory mechanisms need to be determined.

Secondly, data on communicative differences due to ageing are vital to differentiate normal from pathological ageing. As Holland, (1990) states "...even the very definition of disordered depends upon the understanding of normality and normal variation" (p 37). The lack of and need for normative data and the range of normative values to provide appropriate assessment, treatment and prognosis for recovery in communicatively-disordered populations continues to be voiced (Brownell, Pincus, Blum, Rehak and Winner 1997, Cannito et al 1988, Garcia and Orange 1996, Kahn, Joanette, Ska and Goulet 1990, Lock and Armstrong 1997, Mackenzie 2000a, 2000b). Mackenzie (2000a) states

> *"Without appropriate knowledge of normality, communication behaviours that are really standard for the peer group may be considered as impaired, or conversely, low expectations for the elderly may lead to failure to recognise true deficit. Consequently intervention may be inappropriately recommended or not provided where it should be." (p 152).*

Similarly, Ska and Joanette (1996) consider it imperative to increase the knowledge in this domain in order to contribute to the diagnosis and treatment of communicative disorders that occur following acquired and degenerative diseases in the aged population. Discourse is considered to provide an instructive methodology for elucidating the potential dissociations either across or within clinical populations (Chapman and Ulatowska 1994, Ulatowska and Chapman 1994). To fulfil this need, investigations of the discourse of NBD subjects of varying age groups need to be undertaken or sufficiently large control groups selected on the basis of age and examined alongside neurologically-impaired subjects. Obler, Au, Kugler, Melvold, Tocco and Albert (1994) recommend that when any clinical population is studied, large control groups for each age cohort are selected so that the range of normal behaviour can be determined. The potential effect of age is often ignored when the discourse of clinical populations is examined. Coelho (1995) reported that in none of the seventeen studies of CHI discourse he examined was there any consideration of the impact of age on performance although the subjects represented a wide age range.

Acquired and degenerative language disorders appear more frequently in the ageing section of the population. Ageing is the greatest risk factor in stroke (Cannito et al 1988) and is also related to aphasia type. Individuals suffering from Broca's aphasia tended to be younger than the median age for aphasics and those with Wernicke's aphasia tended to be older (Holland and Bartlett 1985, Obler et al 1978). Furthermore, advanced age was a significant deterrent to full recovery following stroke-induced aphasia (Holland and Bartlett 1985). Dementia is primarily a disease of ageing and the language changes in early Alzheimer's dementia are similar to that of normal elderly subjects (LaBarge, Edwards, and Knesevich 1986).

4.3 Methodological considerations in ageing discourse research

The assessment of communication, particularly discourse, in the older person, involves particular methodological issues. Firstly, a theme that has been echoed repeatedly is that there is an increase in variability in communicative abilities, including discourse performance, with age (Mackenzie 2000b, Obler and Albert 1981, Rowe and Kahn 1987, Salthouse 1990, Shadden 1995, Shewan and Henderson 1988, Ulatowska and Chapman 1991, Ulatowska et al 1998). However this has not been unequivocally demonstrated. For example, older adults were not more variable in performance on discourse tasks (Kemper et al 1989) and only one measure (narrative length of descriptive discourse) demonstrated increased variability with age (Obler et al 1994, Mackenzie 2000b). Furthermore, individual variability has also been reported as a feature of younger age groups (Mackenzie 2000a, Obler et al 1994). The heterogeneity of communication skills observed in this population may reflect the effect of the multitude of variables relevant to ageing (see below). It may also be due to the type of communicative behaviour being investigated and its assessment (e.g. specific linguistic tests which may not relate to real life communication - Mackenzie 2000b). Specific aspects of discourse may be enhanced with age whilst others may be more vulnerable and thus may also demonstrate more variation with ageing. The lack of variability which has been reported may be due to the exclusion of outliers which may mask the range of behaviour (Obler et al 1994). If outliers are excluded from the data analysis, the number of exclusions from each group may be important to determine more accurately the nature and extent of variability ascribed to ageing. The lack of conclusive results on intra-subject variability in ageing needs addressing and it should be made an integral part of investigations into ageing discourse. Nespoulous (1996) has also emphasised the need for the investigation of intra-participant variability in older adults' conversational skills.

Secondly, the selection of subjects for research into normal ageing is problematical. Unless subjects are recruited from a care setting, any method of selecting these subjects still living within the community will involve self-selection to a greater or lesser extent. Thus it can be assumed that better educated, healthier, more financially sound subjects would volunteer. In addition, subjects who may have experience of public speaking (as part of their work or social organisation experience) and are more confident may be more willing to take part. Subjects investigated in longitudinal studies may be healthier (Labov and Auger 1993). Thus subjects will tend to reflect the upper end of the communicative competence continuum and will not be representative of their age group, thereby biasing the results of any research. As Shadden (1997) confirms, what would happen would be

> *"The use of healthy, highly educated, normal hearing, visually intact economically comfortable subjects leading to performance measures on what Ringel and Chodzko-Zajko (1990), refer to as 'geriatric supermen' " (p 145).*

The differences that are observed may be more pronounced in reality if a wider population could be sampled. De Santi and Obler (1991) recommend using a diverse sample of subjects, determining as many factors as possible and then reporting all pertinent variables.

Thirdly, the research methodologies used in investigating the discourse of older subjects may be problematic. The two major approaches are either cross-sectional or longitudinal and both these methods have positive and negative implications for research. The most informative approach for studying communication in the ageing is considered to be through longitudinal research (Ulatowska et al 1998). However this method may require lengthy periods of observation to detect statistically reliable decrements in performance and subjects may benefit from practice (Dixon, Hertzog, Friesen and Hultsch 1993). There is also more likelihood of subject attrition as the period of investigation increases. For these reasons, there is a dearth of longitudinal research. On the other hand, cross-sectional research confounds the effects of age and cohort differences (Pratt and Robins 1991). In this type of research, it is difficult to define appropriate comparison groups, although recommendations for selection have been made. For the lower age range, age 50 may signal the point from which these communication changes become apparent (Shewan and Henderson 1988). At the upper age limit, grouping all individuals over 65 into one group is felt to be inappropriate (Ulatowska and Chapman 1991) as this will not take into account the heterogeneity of the population and changes in the old-elderly (over 85). Language changes have been reported in the latter compared to the young elderly (60 to 75 years) (Ulatowska et al 1985, 1986). The number of groups is also problematical as it is considered preferable to use more than two groups to find linear changes with age which will reflect the true nature of age differences (De Santi and Obler 1991, Nicholas et al 1985, Obler et al 1994). However changes may not be linear; they may plateau rather than showing steady decrements with age (Shewan and Henderson 1988) or indeed may improve across the decades before decreasing in the old-elderly (e.g. over 85). Using more than two age groups would also provide data on the rate of changes of different aspects of discourse. Dixon et al (1993) has suggested that an individual's performance be compared to his own baseline performance as well as to inter-individual averaged norms (i.e. both cross-sectional and longitudinal research within one study).

Changes in communication performance using cohort studies may be affected by life experiences other than age or education e.g. trends in medical care, nutritional habits, environmental toxins and social customs (Bayles and Kaszniak 1987), as well as societal communication changes. As Tamir (1979) states

> *"Each successive cohort experiences the social structure and the process of development in a manner different from its predecessor. Each individual establishes fresh contact with the social environment at a time in history different from those before or after. World views differ not only with age and the cumulation of a developmental history, but with placement in historical time, and possessors of differing views of the world must work that much harder to establish mutual understanding in order to communicate with one another." (p 151).*

Successive generations may differ in language patterns, speaking and writing styles and problem solving styles (Albert 1981, Heaton et al 1996, Kemper et al 1989). Story telling may have been a more highly valued skill in earlier generations (Pratt and Robins 1991), providing adults with greater opportunities for rehearsal and increased knowledge of the skills that are important to producing appropriate and entertaining narratives. Reminiscing about past events also contributes to the maintenance of self-esteem, provides support for the validity of one's beliefs about the world and maintains one's unique self-identity (Garcia and Orange 1996, Tamir 1979).

The decision of whether to consider chronological or biological age when defining ageing is also controversial. Although chronological age is a straightforward measure to obtain, it may not be the most appropriate way to study communication in ageing (Ulatowska and Chapman 1991). Biological and chronological age are not necessarily synonymous with each other (Maxim and Bryan 1994). It may be more appropriate to relate ageing to health or mental status. Chronological age together with health measures have been considered in the investigation of fluency (Leeper and Culatta 1995) and speaking and reading rates (Ramig 1983).

In the fourth instance, there are a multitude of factors accompanying ageing which affect the communication status of these subjects. Older adults are considered to be at risk for communication deficits because of economic, sociocultural, psychological/cognitive, situational, psychosocial and physiological aspects of ageing that impact upon them and their communication partners (Leeper and Culatta 1995, Shadden 1988, 1995). These factors affect communication directly and indirectly (Armstrong 1993) and need to be addressed in terms of research planning and results interpretation (Bryan and Maxim 1996a). The heterogeneity of this population may be partly ascribed to the selection of subjects and the communication tasks and analysis used (Cannito et al 1988, Shadden 1995, Ulatowska et al 1998). Other factors and the difficulties in measuring them are discussed in Chapter 3. Bayles and Kaszniak (1987) conclude that:

> *"The study of possible age effects on the ability to communicate is extremely demanding because effects, when present, are generally subtle, and most tasks are influenced by the subject's intelligence, education, life history, motivation, sensory integrity, mental status and vigor. Few researchers have been able to control all of these variables in a convincing way." (p 152).*

Some aspects of ageing may also be of importance to intra-individual variability, e.g. the fluctuating effects of medication, changing access to attentional resources, etc. Life experiences can have an effect on varying cognitive ability evaluations (Salthouse 1990)[18]. Physiological changes may result in poorer articulation, less respiratory support for speech and hearing and visual problems. Chronic pain or illness (and the accompanying medication) may reduce the desire to communicate and can impede its success. Situational-environmental factors may involve retirement, physical relocation, increased leisure time in tandem with limited financial resources and mobility, institutionalization, etc. Lieberman (1975) reported that around half the ageing individuals experienced adaptive failure during changes in living arrangements. These health and environmental issues may increase isolation and reduce the opportunity for social interaction (see Maxim and

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[18] Changes in some aspects of cognition (e.g. working memory, attention) associated with ageing were discussed in Chapter 2.

Bryan 1994, Shadden 1997, Tamir 1979). Furthermore, not only is there a decrease in communicative opportunities but the nature of the interaction may change. The negative attitudes towards older adults from professionals and non-professionals alike and the misperceptions that are held regarding age can affect interaction when it does occur (Benjamin 1988, Kemper 1994, Kemper and Kemtes 1998, Kemper et al 1995). Tamir (1979) states that individuals from different generations "must work that much harder to establish mutual understanding in order to communicate with one another." (p 151). When addressing older adults, speakers have been found to use "elderspeak", a speech register which is syntactically simple, limited in vocabulary and with exaggerated stress and intonation (Kemper et al 1995). Although it has been reported that this is frequently helpful to older adults, it may contribute to feelings of lower self-esteem, particularly as it may occur regardless of their mental status (Kemper 1994, Kemper and Kemtes 1998). It has also been suggested that elderspeak constrains their opportunities to communicate and may further their cognitive and physical decline (Ryan, Giles, Bartolucci and Henwood 1986). They proposed the term "communication predicament of aging" for the impact of negative expectations on older adults. This cycle of change leads to older adults withdrawing from communication and thereby exacerbating their physiological, psychological and social decline. Dunkle and Kart (1991) observe that

> *"Our understanding of the complex interactions that make up the social world of the elderly is limited" (p 91).*

On the other hand, negative attitudes towards older adults may result in dysfluency in the aged to be thought of as understandable or "to be expected under the circumstances" (Yairi and Clifton 1972, p 718). Consequently listeners to the discourse did not tend to react adversely to nonfluencies in the speech of geriatric persons even though the feedback may have lead to some form of compensatory effort.

The appropriateness of discourse elicitation tasks to the ageing population is a factor which needs to be considered and this is an area which is under-researched (Maxim and Bryan 1994). Certain tasks (e.g. picture description or story retelling) may uncover subtle impairments but also require additional cognitive processing which may obscure other language deficits (Glosser and Deser 1992). In contrast, spontaneous narratives may be well-practised and the speaker can select the content and format so as to circumvent areas of difficulty. Mackenzie (2000b) reported that the effect of age was more apparent in conversation than in picture description. She interprets this difficulty to be due to the memory and attention measures needed in conversation. Ageing subjects may also be disadvantaged by having to perform communicative tasks which are more relevant to younger age groups and vice versa. Some topics may be of more interest and relevance to younger age groups (e.g. particular types of music). On the other hand, older subjects may be at an advantage in producing personal-experience narratives as they have a larger repertoire to choose from and they may have ready-made narratives which are well-practised. War-time experiences (either as a member of the armed forces or as a civilian) are relevant to most ageing subjects within Europe but not to younger subjects. Thus tasks need to be carefully selected to permit all age groups to participate on an equal basis. Certain stimuli that have been frequently used with the ageing and older pathological populations may be considered to be appropriate for their age group (e.g. Normal Rockwell pictures - Ulatowska and Chapman 1991 and Myers 1999) but the performance of younger subjects on this task cannot be compared to that of older subjects. Task selection must also take into account the difficulty of the task (de Santi and Obler 1991). However this has to be done in a sensitive way so that the tasks are not too simple to be considered as ecologically unsound, e.g. asking an adult to explain to another adult of the same language group and broadly similar background how to change a light bulb. This may result in stilted or over-simplified discourse because the task is unlikely ever to occur in everyday communication. On the other hand, instructions on a more complex procedural task (e.g. changing a car tyre) may feasibly occur. Armstrong (1993) states that certain tasks on aphasia batteries could be construed as insulting to ageing subjects.

It is not only the effect of other factors on ageing communication that needs to be considered but also the interaction of particular variables with age in relation to discourse performance.

> *"There has been no systematic evaluation of how dialect, education, sex and health interact with age to affect adults' speech" (Kemper 1992, p 232).*

The gender of subjects was found to interact with ageing in rates of speech with a less marked difference between aged and younger women than men and in quantity of output, with older men producing more than women (Ceccaldi, Joanette, Tikhomirof, Macia and Poncet 1996). In contrast no gender differences were observed in elderly subjects, on picture naming, language screening and shortened MTDDA (Armstrong and Walker 1994). An aspect that should be considered is the effect of educational levels on ageing communication. For example, ageing had no significant effect on communication in subjects with relatively high educational level (see Cooper 1990, Ulatowska et al 1998)[19].

Communication may be influenced by compensation for or adaptation to changes in health, cognition and lifestyle. Compensatory strategies (see Chapter 2) may have developed and been modified over time and can have a positive or negative effect. For example, normal elderly speakers may use strategies to overcome comprehension difficulties (Obler and Albert 1981) or employ apparently inappropriate behaviours (such as circumlocution and topic shift) which are an indicator of active compensation (Smith and Leinonen 1992). They may also use strategies to maintain specific aspects of discourse at the expense of others e.g. using simpler syntax because it is more useful in conveying ideas and easier to understand (Kemper et al 1989). However, the adaptive strategies used by ageing adults to increase communicative opportunities (e.g. by talking about themselves and their health) may have a negative effect on others' perceptions of them, resulting in reduced opportunities for communication (Shadden 1997). Salthouse (1990) has stated that different compensatory strategies may be used with different cognitive activities and this may also occur during communication. It is important to keep in mind the fact that some changes observed with ageing may be a reflection of strategies used to overcome deficits, rather than the deficits themselves.

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[19] This interaction is discussed more fully in Chapter 5.

A fifth factor which has affected the investigation of older adults' discourse is inconsistency and inconclusive research into the theories which underlie changes with age. Many theories have been suggested e.g. amongst others, cognitive slowing or decline in cognitive processing speed (Nicholas, Connor, Obler and Albert 1998), mechanism of suppression (Gernsbacher and Faust 1991a,b), degradation in frontal system function (Albert and Kaplan 1980, Milberg et al 1996), increased lateralization with age (Obler, Woodward and Albert 1984, Obler 1989), decreased cognitive demands resulting in a lack of maintenance of cognitive resources like memory (Ratner, Schell, Crimmins, Mittelman and Baldinelli 1987), etc. However, none of these appears to have been sufficiently elaborated or adequately supported by evidence.

A critical aspect of studies into the communication or discourse skills of ageing adults is that these studies "invoke a decrement continuum as their implicit rationale" (Coupland and Coupland 1990, p 455). These authors continue that

> *"The fact that only modest and sporadic evidence of suppressed performance levels has been produced does not seem to have challenged the work's ideological assumptions and its concern with elderly linguistic deficit" (p 456).*

The emphasis in much of this research is on negative results whilst positive results (possibly applying to the majority of the group) are underplayed or overlooked. Furthermore, there is a tendency towards not reporting or under-reporting the lack of differences between groups. This is considered to reflect the bias in research towards focusing on differences between groups, relating to the assumption that older subjects will perform worse than younger ones (De Santi and Obler 1991). Not reporting the lack of differences affects not only the research findings but also the choice of those aspects of communication to be investigated. Reports of "no difference" between groups are considered to be less interesting (Obler et al 1994) and are often not reported whilst changes in performance are (e.g. Ulatowska et al 1986). Reporting the lack of differences in ageing does occur (e.g. Glosser and Deser 1992, Obler et al 1994) but it is rare. Differences between groups which are non-linear may also go unreported because they are often hard to explain and researchers may not wish to publish findings which cannot be explained (Obler et al 1994). It is not only those communicative abilities which decline with age that are important; those that are preserved or enhanced are as critical. The combinatory configuration of those aspects that demonstrate a decrement with age and those that do not (or even improve) may be the only basis on which to make a differential diagnosis between normal and pathological performance. It cannot be assumed that ageing will affect all types or aspects of communication uniformly, if at all.

Some of the methodological difficulties in investigating the discourse of older subjects contribute to the negative stereotyping. Difficulties in recruitment (discussed above) may result in subjects more readily being selected from care settings. Their communication skills may be expected to be substandard and not comparable to the performance of independently-living individuals. Research into communication of community-living subjects have contradicted or elaborated earlier findings (Leeper and Culatta 1995).

Older subjects have the ability to compensate for many skills that may be declining and their everyday functioning often does not demonstrate the impairment seen on testing. Furthermore, they seem to perform well on real-life language tasks. For example, their theory of mind ability is preserved and even superior to younger participants (Happe, Winner and Brownell 1998). Furthermore, the quality of narratives produced by older subjects were rated by naive raters more as a "good" story (Kemper et al 1990) and as better in quality than a younger group (Pratt and Robins 1991). Stories by older adults were rated higher in terms of "interestingness" than younger controls (Kemper et al 1989), were preferred by listeners and were more memorable (James, Burke, Austin and Hulme 1998, Mergler, Faust and Goldstein 1985). A summary of discourse skills which are enhanced with age is provided by Kemper and Kemtes (1998) and similar findings on specific measures will be provided below. With regard to memory and perceptual motor performance, Rabbit (1977) asks

> *"how, in spite of growing disabilities, do old people preserve such relatively good performance?" (p 623).*

Perhaps this should be used as a guiding principle so that research into communication skills in ageing adults becomes more appropriate.

The results of studies into language change with age are inconclusive and do not form a cohesive body (Maxim and Bryan 1994, Ulatowska et al 1998). This may be the result of the paucity of normative data, heterogeneous sampling considerations, health status and demands of assessment as well as the other variables affecting the ageing (Cannito et al 1988, Leeper and Culatta 1995, Ramig 1983, Ulatowska et al 1998). Nespoulous (1996) has questioned whether age is really a crucial factor in the variability of communication or whether other variables such as motivation, situation and/or social environment should be examined. Similarly, Kemper et al (1989) suggested that motivation factors such as attentiveness may have contributed to the age-group differences observed in syntactic complexity.

The challenge of research into the discourse of older subjects is to isolate the factors affecting communication (Mackenzie 2000a, Ulatowska and Chapman 1991). Mackenzie (2000a) states that only with extended and improved normative data will diagnosis be carried out with confidence and credibility. Shadden (1997) cautions that

> *"Given the complex set of influences associated with aging that may determine discourse performance in any specific older adult at a given time, one may wonder if the search for normative data in both normal and communicatively disordered older persons is a futile one" (p 153).*

Although it may appear to be a futile quest, it may be possible to control some variables and manipulate others so that their effects on the discourse of older subjects can be determined (Chapter 2).

The preceding discussion has focussed on the methodological difficulties associated with research into discourse performance in older adults and the detrimental effect these can have on furthering discourse knowledge. Although previous studies have examined various aspects of ageing discourse, the findings of the research reported below are restricted to the seven discourse areas presented in Chapter 3.

4.4 Previous research relevant to this study's discourse measures

4.4.1 Relevance

Ratings of relevance or of global coherence have been used in the study of ageing discourse. Global coherence in the informal interviews of older subjects was rated as significantly lower than that of middle-aged subjects (Glosser and Deser 1992) and significantly lower relevance ratings in conversation of older (but similarly educated) subjects has been reported (Ulatowska et al 1985). Similarly, ageing subjects had more difficulty maintaining the topic (i.e. less relevant to the topic) than younger subjects during conversation (Mackenzie 2000b). Old-elderly subjects' (over 85) discourse elicited by a single picture was less relevant as they produced descriptive samples, attributed to the greater simplicity of the descriptive genre (Ulatowska and Chapman 1991). However it may be due to the nature of the discourse elicitation task rather than the simplicity of description. Ageing subjects produced more confabulation in a narrative recall task than younger subjects (Gardner et al 1983) and also related irrelevant prior knowledge (Cohen 1979). Verbosity (off-target, unfocused and irrelevant speech) is not reported to be a general characteristic of older adults (Arbuckle and Gold 1993). They consider verbosity to reflect a loss of inhibitory control over speech output and to be associated with frontal lobe impairments.

The relevance of a discourse sample is partly determined by the quantity of information provided. Again, results of previous investigations are inconclusive. Old-elderly subjects produced less information but more language than younger-elderly in picture-elicited narratives (Ulatowska and Chapman 1991) and less than younger controls in narrative recall (Gardner et al 1983). Age was found to have a significant effect on the efficiency of imparting relevant information on a picture description task, with the oldest age group (over 75) being less efficient (Mackenzie et al 1997b, Mackenzie 2000b). Similarly, Obler (1980) found a reduced number of themes and greater number of words per content units than younger adults. However, no differences were found in the amount of information or content units imparted by elderly and younger subjects on picture description tasks (Cooper 1990, Le Dorze and Bedard 1998, Shewan and Henderson 1988). In contrast, young normal subjects produced a significantly smaller amount of information statements (i.e. details about an event beyond the here and now) than middle-aged and older subjects in conversational discourse (Wambaugh, Thompson, Doyle and Camarata 1991).

It must be emphasised that group studies often obscure the fact that a large number of ageing subjects produce appropriately relevant discourse. For example, Mackenzie (2000b) points out that about 50% of the over 75s received maximum scores on a rating scale for topic maintenance during conversation. In addition, older subjects (78 to 90) maintained significantly more topics than younger subjects in conversation (Stover and Haynes 1989). These researchers state that their findings on topic manipulation can be construed as suggesting increased rather than decreased abilities in elderly subjects (greater topic maintenance and less topic shading).

In summary (bearing in mind the differing tasks and subject ages), older adults appear to provide less relevant discourse containing less information but their topic control skills seem adequate.

4.4.2 Discourse-grammar

The majority of studies concluded that overall story schema seems to be well preserved with age in narrative recall tasks, picture-sequences, story recall and in single-picture elicited narratives (North et al 1986, Trahan 1994, Ulatowska et al 1985, Wapner, Hamby and Gardner 1981). Mergler et al (1985) suggested that adults may become increasingly skilled in the use of narrative structures with age. Kemper et al (1990) has also reported significantly more complex narratives in older subjects than the middle aged, with more embedded episodes. Light and Anderson (1983) found no differences between young and old adults in the effectiveness of using scripts or stereotyped event sequences to aid in comprehension and retention. Macro level processing of discourse is considered to be preserved in normal advanced ageing in a fable recall task, although this was assumed to be "relatively low" in complexity (Ulatowska et al 1998). In complex tasks, a breakdown is seen for older adults, particularly older-elderly (Cannito et al 1988, Ulatowska and Chapman 1991). However, in narrative recall (both easy and complex), elderly female subjects exhibited poorer superstructure than younger ones (Ulatowska et al 1985). Older adults also gave poorer performances than younger subjects in processing argumentative and narrative discourse but not in descriptive discourse (Guimaraes Dos Santos and Nespoulous 1993), possibly due to the lack of a well-defined macrostructural network in the latter task. Ageing subjects made more sequencing errors in narrative recall (Gardner et al 1983) and in a single-picture narrative than in the retelling of a fairy tale or a picture-sequence narrative (Ska and Guenard 1993).

Although narrative schema/macro structure appears to remain mostly intact across the life span, variation with age in the production of certain information has been observed. Ulatowska et al (1985) reported that older subjects produced less setting information in story recall and picture-sequence narratives than younger subjects. However, on single-picture elicited narratives, older-elderly (over 85) subjects produced more setting information (Ulatowska and Chapman 1991). Furthermore, these subjects provided more temporal than locative setting information than younger-old subjects. Kemper et al (1990) also reported that elderly adults provided more evaluative codas in their narratives compared to a middle-aged group. Older adults produced personal-narratives showing a greater use of a high-point form[20] than younger groups resulting in more engaging and dramatic narratives which were rated higher in terms of story quality (Pratt and Robins 1991). These authors conclude that the use of the high-point form is a more fragile skill with which recent generations are less familiar.

On procedural discourse tasks, aging subjects have demonstrated deficits. Older subjects (60 - 75 years) provided fewer essential or appropriate steps than younger groups (Purdy and Loos Cosgrove 1990, Roman et al 1987, North et al 1986). Procedures with significantly fewer essential steps were elicited from older subjects (with similar education levels) (Ulatowska et al 1985). Older subjects (mean of 66.7 years) also had a higher proportion of unique acts in procedures than younger individuals (22.9 years) (Ross and Berg 1990).

By eliciting procedures by means of verbal instructions, the subject needs to provide the script from memory which may be compromised by age. However, despite the reduction in steps, general script knowledge is not considered to be affected by the processes of normal ageing (Roman et al 1987, Zelinski 1988). Nevertheless, the oral description of procedures may benefit from practice, thereby providing an advantage to older subjects.

It can thus be concluded that narrative structure is broadly unimpaired with ageing whilst procedural discourse demonstrates some reduction.

4.4.3 Clarity

On a broad level, impairments in the clarity of discourse produced have been noted in ageing subjects. However terminology and categories vary considerably, making comparisons difficult. Clarity ratings of language used by elderly females in conversational discourse were significantly lower than for a younger group with similar education (Ulatowska et al 1985). In contrast, older adults "oral admire descriptions" were rated higher for clarity than younger ones (Kemper et al 1989). No age effect was observed on the incidence of unnecessary additional material in a picture-description task (Mackenzie et al 1997b).

Regarding non-specific elements[21], an increased use of indefinite terms with ageing has been extensively observed (Cooper 1990, Cannito et al 1988, North et al 1986, Obler 1980, Ulatowska and Chapman 1991). Other elements which have been observed to increase with age are indefinite wording (Cooper

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[20] i.e. series of complicating actions leading to a high-point followed by a resolution.
[21] (empty phrases, indefinite and deictic terms) (Chapter 3).

1990), tag questions (Billions-Ivory 1984), vague or indefinite words (Obler and Albert 1981) and indefinite terms and filler phrases (Sandson, Obler and Albert 1987). Cooper (1990) concluded that increased indefinite wording with age reflects a word-finding difficulty. However Obler et al (1994) found fewer indefinite words on a picture description task in their younger and older groups than in their middle-aged group. Furthermore, no significant differences were found between elderly and middle-aged groups on the use of non-specific nouns or pronouns in informal interviews (Glosser and Deser 1992). No significant differences with age were noted in the use of fillers in a picture description task but there was a trend to more fillers as well as considerable variation (Obler et al 1994). Thus the research into the incidence of non-specific elements has yielded inconclusive results, depending on the discourse tasks, definitions of the elements and the effect of other factors.

Investigations into the second category of clarity disruptors (word-substitutions) in ageing do not lead to any clear-cut conclusions and the incidence in NBD adults appears to be low. On a picture description task, the percentage of paraphasias in all age groups was low and no significant effect of age was reported, although subjects in their 50s produced significantly more paraphasias than those in their 40s (Shewan and Henderson 1988). More semantic paraphasias were found in the picture descriptions of subjects in the 30s, 60s and 70s groups than those in their 50s (Obler et al 1994). Wapner et al (1981) stated that the elderly were more given to circumlocutions than the younger group in story recall. The incidence of this type of clarity disruptor may reflect word-finding difficulties which have been found to increase with age (Gardner et al 1983, Le Dorze and Durocher 1992, Nicholas et al 1985), particularly as the length of the stimulus increased.

Regarding content and fluency disruptors[22], an increased occurrence of repetitions and redundancy in older adults speech has been recorded (Obler and Albert 1985) and in old-elderly and younger groups than in the young-elderly (65-74 years) (Obler and Albert 1981). Le Dorze and Bedard (1998) also reported a significant increase with age in repeated content units on a picture-description task. However, there was no consistent trend across age groups on the percentage of repetition on picture description tasks (Shewan and Henderson 1988, Obler et al 1994).

Comments on the task and personalised comments have been reported in the elderly. Roman et al (1987) noted that the elderly group produced a somewhat elevated number of intrusions (defined as "opinions, jokes, tangential or unrelated remarks") than the younger group in procedures and also demonstrated a tendency to personalisation. Elderly discourse contained more comments and questions than young adults (Sandson et al 1987). In a story recall task, the elderly tend to make personal remarks and embellishments but do not tend to stray from the main point of the story (Wapner et al 1981). On a narrative recall task, Gardner et al (1983) reported that ageing subjects tended to make more personal remarks (particularly of a moralistic nature), embellishments and requests for help than younger subjects. On a picture-description task, age had no significant effect on the occurrence of extraneous material (including personal material or opinion) (Mackenzie 2000b) or on the range of comments ("judgements, personalization, unsureness and apologies") (Obler et al 1994). Obler (1980) found that picture-descriptions by elderly subjects were considered to contain more "elaborated empty speech" than younger subjects (i.e. which included interjections).

Although these content and fluency elements can be considered in a negative light, there needs to be a balance in a narrative between too much and too little elaboration if they are to be interesting and memorable. The use of elaborate speech makes a narrative effective entertainment (Obler 1989). This elaboration includes "not only details and connections between sentences and larger units, but also personalization and an ability to create rhythm" (p 288). This viewpoint is supported by Kemper et al (1989) who found that older subjects' discourse was rated as being clearer and more interesting than that of younger controls. Furthermore clarity and interestingness were highly correlated.

Word retrieval difficulties in discourse, which often occur with increasing age, may be indicated by the use of indefinite words and phrases, deictic terms,

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[22] (repeated words, phrases or ideas, comments on the task and personal value judgements).

more common words, hyponyms, circumlocutions, unnecessary comments, questions, requests for help, filler phrases or pausing (Blanken, Dittmann, Haas and Wallesch 1987, Cooper 1990). Empty speech may be seen as a stalling device to hold listener's attention while retrieval is attempted (Obler 1989, Au and Bowles 1991) and thus it may be easier to compensate for semantic retrieval deficits in discourse tasks than in naming tests (Au and Bowles 1991). Word-finding comments were observed only in the oldest group (over 65) on a picture description task (Le Dorze and Bedard 1998). More unsureness comments ("what is that called?") were recorded in the 60s group on a picture description task than older or younger groups (Obler et al 1994).

It can be concluded that older adults tend to use more non-specific elements (particularly indefinite words), circumlocutions, repetitions and comments which may indicate word-finding or formulation difficulties.

4.4.4 Productivity and syntactic analysis

As with many aspects of ageing discourse, the results of research into sample length are inconsistent. On the one hand, no effect of ageing was found in various discourse tasks e.g. on picture description tasks (Cooper 1990, Mackenzie et al 1997b), procedures (female subjects) (Ulatowska et al 1985) or conversation (Mackenzie, Beggs, Brady and Lees 1997a). Verbosity was not a feature of Russian-speaking adults of differing ages and education levels on descriptive and narrative recall tasks (Gubarchuk and Kemper 1997).

On the other hand, changes with age in sample length have been reported. Older adults produced longer samples than younger adults on a picture description task and demonstrated an increase in variability (Obler et al 1994, Sandson et al 1987, Shewan and Henderson 1988). Arbuckle and Gold (1993) described "talkativeness" as a dimension along which individuals vary. Older-elderly (over 80) produced a greater number of words in single-picture elicited narratives than younger-elderly (60 - 75) (Ulatowska and Chapman 1991). Older subjects were rated as more verbose than younger ones during conversation (Mackenzie 2000b) and responses to open and closed questions (more than three times the number), with more marked differences for males (Ceccaldi et al 1996). In some studies the opposite trend has been reported e.g. older adults (mean age 71) produced significantly fewer words than a younger group (mean age 24) on a picture description task (Lock and Armstrong 1997). The variation with age may not be linear. For example, the range of total words used in the Cookie Theft description is greater for the sixties and seventies groups (Obler et al 1994). Furthermore the group study methods used may obscure the adequacy of the length of samples in many of these ageing subjects. Mackenzie (2000b) reported that around 40% of the over 75s scored a maximum rating for verbosity in conversation.

A decline with ageing in syntactic complexity (assessed by differing measures) has been widely reported. Decreases were observed in a wide variety of discourse tasks[23]. Similarly, older Russian speaking adults rarely produced embedded clauses in narrative recall and descriptive tasks and produced fewer than younger adults (Gubarchuk and Kemper 1997). A similar decline with age was observed in oral narratives with a more precipitous decline for the most complex stories (Kemper et al 1990). Nevertheless, Bates, Harris, Marchman, Wulfeck and Kritchevsky (1995) concluded that whilst normal ageing reduced the overall frequency of complex syntactic structures, it had no effect on the range of structures used.

Conversely, more complex syntax with ageing has been recorded e.g. in picture descriptions (Obler 1980, Obler and Albert 1981, Sandson et al 1987) and in a fable recall task (in the over-eighties) (Ulatowska et al 1998). Although the latter finding is attributed to the naturalness of the tasks used, the subjects were highly educated (a mean of fourteen years) compared to their age cohort. Labov and Auger (1993), in their longitudinal study of conversational discourse over thirteen to seventeen years, observed a change towards greater syntactic complexity with age. However, of note is the fact that the topic affected the complexity used, e.g. greater subordination occurred

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[23] E.g. conversations (Walker et al 1988, Walker, Hardiman, Hedrick and Holbrook 1981), narratives (Cheung and Kemper 1992, Kemper et al 1990, Kynette and Kemper 1986, Kemper 1986, Kemper et al 1992), informal interviews (older group versus middle-aged group) (Glosser and Deser 1992), picture description tasks (Kemper et al 1989), picture elicited narratives (old

when discussing the French language than neighbourhood or television. In addition, there was less individual variation in the incidence of subordination. In contrast, no clear age differences in syntactic complexity were observed on tasks such as picture description (Shewan and Henderson 1988, Walker 1988) or informal interview (Glosser and Deser 1992).

Other syntactic measures have been found to demonstrate changes with ageing. Compared to younger subjects, ageing adults produced shorter T-units and clauses in conversation (Obler 1980, Walker, Hardiman, Hedrick and Holbrook 1981) and in descriptive discourse (Walker et al 1988[24]). However no difference with age was noted in utterance length in interviews (Kynette and Kemper 1986) or in single-picture elicited narratives (Ulatowska and Chapman 1991) (see Chapter 5).

Support for these findings of reduced complexity with ageing comes from the more direct assessment of syntactic complexity. Elderly adults performed significantly more poorly on syntactic complexity tests than pre-middle aged (mean age 36) (Emery 1988) and less well than younger subjects on a test of receptive grammar (Armstrong and Greig 1992). Kemper (1986) observed that elderly adults (over 70) were able to imitate short sentences correctly but were unable to imitate long sentences, particularly when there was left-branching embedding or when the sentence was ungrammatical.

A higher incidence of syntactic errors in ageing subjects has been observed in informal interviews (Glosser and Deser 1992, Kynette and Kemper 1986) and in tests of syntactic complexity (Emery 1985). Conversely fewer grammatical errors were recorded with increasing age on a picture description task (Shewan and Henderson 1988). No differences in errors were observed between the young and old-elderly subjects in conversation but a more variable mean error production (uncompleted sentences, grammatical errors and ambiguities) was observed in subjects in their eighties (Maxim and Bryan 1994).

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elderly versus young elderly) (Ulatowska and Chapman 1991) and film descriptions (Bates et al 1995).

[24]:The results of this study are confounded by educational levels (the younger group were students with higher educational levels).

A link between working memory capacity and the production of complex multiclause sentences has been suggested, with declining memory capacity correlating with decreasing syntactic complexity (Cheung and Kemper 1992, Kemper et al 1992, 1989). Furthermore, subjects who had better memory capacity produced longer utterances (Kynette and Kemper 1986). Armstrong and Greig (1992) suggested that the comprehension of syntactic complexity may be related to mental status in the elderly.

No clear conclusions regarding length and syntactic complexity in ageing adults can be drawn from previous investigations, although a reduction in syntactic complexity is indicated. Explanations for this reduction are discussed in Section 4.4.5.

4.4.5 Clausal structure

Although clausal structure has been relatively well investigated in ageing subjects, the results are not clear-cut. Ageing subjects were less likely to produce sentences with embedded clauses, especially left-branching clauses, in descriptions or narratives (Cheung and Kemper 1992, Kemper et al 1989,1990). The decline of left-branching clauses with age was found to be greater than for right-branching (Kemper 1986, Kemper et al 1989). In contrast, ageing did not affect the left-branching clauses in the descriptive and narrative recall tasks of Russian adults and a low incidence of such constructions was noted (Gubarchuk and Kemper 1997). Similarly, Labov and Auger (1993) concluded from their longitudinal study that there was no decline with ageing in the use of left branching clauses, although they tended (but not significantly) to vary with topic (e.g. more on "French language" and less on "games") and greater individual variation was also noted.

There was also a reduction with age in the incidence of right-branching clauses. This was noted in descriptions (Kemper et al 1989), in the imitation of complex sentences (Kemper 1986) and in narrative recall and descriptions of older Russian speaking (Gubarchuk and Kemper 1997). In contrast, an older group of subjects (70-80) used more right-branching clauses compared to a younger group (50 - 60 years) in an interview (Kynette and Kemper 1986). Labov and Auger (1993) observed no decline in these clauses in their longitudinal study. Corresponding to the decline of these clauses, an increase in the percentage of main clauses with age has been reported. This has been observed in narratives (Kemper et al 1990) and in the narrative recall and descriptions of Russian-speaking adults (Gubarchuk and Kemper 1997).

These findings are not only inconclusive but also not clear-cut. The increase of main clauses and decrease in left-branching clauses was related not only to age but also to the structural complexity of the oral narratives (Kemper et al 1990). Labov and Auger (1993) found genre differences in syntax, with a tendency to simpler syntax in narratives than conversation, regardless of age.

Factors other than ageing may at least partially account for these findings. Older adults who score poorly on the digit span test[25] are less likely to produce complex sentences such as those containing left-branching clauses (Gubarchuk and Kemper 1997, Kemper et al 1992, Kemper et al 1989). Another possibility is that the elderly may simplify their syntax to provide clearer, more interesting discourse. The reduction in complexity may relate to the possibility that the elderly may avoid more complex constructions because these are more difficult to understand (Kemper et al 1989). Support for this comes from the fact that left-branching clauses and clauses per utterance were significant predictors of ratings of interestingness and clarity in both oral and written discourse (Kemper et al 1989) and discourse with simpler syntax was rated as clearer and more interesting. Cheung and Kemper (1992) found that the comprehensibility and recall of utterances was negatively correlated with complexity as rated by judges.

An increase of main clauses and a decrease in branching clauses seems to be indicated by previous research, although this may depend on task complexity.

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[25] (used to assess attention/working memory)

4.4.6 Cohesion

Research into cohesive ties in ageing adults has focused on incorrect usage rather than their incidence, although some reports on incidence are available. In general, older adults used fewer cohesive ties of all types in narratives (Kemper et al 1990) and on picture description than in younger adults (Lock and Armstrong 1997) but the latter demonstrated a similar pattern of ties.

Of all the types of cohesion, only reference has been studied in any detail in the discourse of older adults (Shadden 1997). A reduction in referential ties with ageing was observed in narratives (Kemper et al 1990) and in conversation (Mackenzie 2000b, Stover and Haynes 1989) whilst no difference was recorded in informal interviews (Glosser and Deser 1992) or conversation (Mackenzie et al 1997a). No correlation between age and the incidence of pronouns (selected to quantify the use of indirect referencing) was reported (Bucks, Singh, Cuerden and Wilcock 2000). Few studies have investigated the incidence of other types of cohesion in ageing adults. Less ellipsis and conjunctions occurred in the narratives of ageing subjects (Kemper et al 1990). Older subjects tended to repeat lexicalisations significantly more frequently than younger subjects in a picture description task (LeDorze and Bedard 1998) but no differences were observed in the number of lexical ties in an informal interview (Glosser and Deser 1992).

Cohesive errors [26] have been widely noted in ageing discourse and increased referencing difficulties were found in the old-elderly on different discourse tasks[27]. In North et al's (1986) study, old- and young-elderly both performed more poorly than middle-aged on simple and complex procedures (Ulatowska et al 1986). Older adults made significantly more referential errors, predominantly ambiguities (unclear referents) and additions (new referent treated as already given) on story retelling tasks (Pratt, Boyes, Robins and Manchester 1989). On narratives and procedures, the observed impairment in

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[26] Ambiguous or incomplete reference and increased pronoun usage.
[27] in narratives, procedures and interviews (Ulatowska et al 1985), in picture descriptions (Ehrlich 1990), in single picture-elicited and simple picture-sequence narratives (Ulatowska and Chapman 1991, Ulatowska et al 1986), on complex narrative recall (Ulatowska et al 1986,

reference began to emerge in the younger elderly but was more pronounced in the older elderly (over 76 years of age) (Ulatowska et al 1986). Significantly less appropriate cohesion and proportionately more disrupted cohesion (but not significantly) was found in older adults on picture descriptions than in a younger group (Lock and Armstrong 1997). In the latter study, the disrupted cohesion category also included information errors, false starts and incorrect sentence structure. Furthermore, education level was not controlled as the young group were university students and may thus have had more education than the older group. In conversation, the greatest number of erroneous ties occurred in personal and demonstrative reference (Stover and Haynes 1989). No differences were observed in the number of lexical errors in an informal interview (Glosser and Deser 1992). An indication of possible task differences was noted by Ulatowska et al (1986). The old-elderly produced a significantly higher proportion of pronouns in complex than in simpler narratives than the middle aged or young-elderly group. However, they found that disruption of reference occurred irrespective of discourse types (narrative vs. procedural) and tasks (picture story retelling, procedures).

In conclusion, impaired referencing and increased cohesive errors have been widely reported in ageing subjects, although task effects are unclear. Other types of cohesion have not been extensively investigated.

4.4.7 Dysfluency

As with many aspects of ageing communication, data on dysfluency are sparse and inconclusive (Rosenfield and Nudelman 1991). Cooper (1990) reported that only one of the eight measures of dysfluency (viz. pause duration) used in a picture description task varied with age. It must be noted however that these subjects were of "above-average" SES. Leeper and Culatta (1995) concluded that most older speakers produce speech that is within normal fluency limits, although some intrasubject variability with age was recorded in the older-age group. Broad descriptions of increased dysfluency with normal ageing have

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North et al 1986), in a referential communication task (Kemper et al 1995), in conversation (Mackenzie 2000b) and in complex procedures (North et al 1986).

been made (Albert 1980). A greater number of dysfluencies in this population has been observed than high school students or young adults (Yairi and Clifton 1972, Walker et al 1981). As speech rate decreased with age, total dysfluencies increased (Leeper and Culatta 1995). In contrast, Gold et al (1988) reported a pattern of hyperfluency in discourse production in the elderly population.

The dysfluency rates in older subjects have demonstrated task differences. Three picture description tasks used with ageing subjects demonstrated that dysfluency may be affected by the particular stimulus used (Cooper 1990). Furthermore, three discourse tasks (reading and two spontaneous tasks) elicited different rates of dysfluency in older subjects (Leeper and Culatta 1995).

The differing terminology used and the variation in dysfluency types examined makes conclusions regarding the specific elements difficult. In conversations an increase with age was noted in hesitations (including false starts and repetitions) (Walker et al 1988) and hesitant interjections and fillers (Gordon, Hutchinson and Allen 1976). In descriptive and narrative recall tasks, more fillers ("you know") were used by older Russian speaking subjects (Gubarchuk and Kemper 1997). The most frequent types of dysfluency observed in the ageing group were interjections, followed by revisions and then repetitions (Leeper and Culatta 1995, Walker et al 1988, Yairi and Clifton 1972). Walker et al (1981) noted that the typical dysfluency pattern did not change significantly with age although more older adults revised their statements than young adults.

In contrast to reports of increased dysfluency with age, a lack of difference with age has been reported on a well rehearsed language task (Davis 1979) and during reading, picture description and conversation between young adult, middle-aged and older males (Duchin and Mysak 1987). Sentence fragments were similar for young and elderly adults in oral admire statements (Kemper et al 1989). No significant age effect on dysfluency was noted on a picture description task but longer pauses were taken by older speakers (Cooper 1990). In a study of speech monitoring, no age differences were observed in the rate of errors or error correction (repairs) for four age groups on a picture description task (McNamara, Obler, Au, Durso and Albert 1992).

The reported task differences in dysfluency have been evident regardless of age. More dysfluencies were present in conversation than in picture description (Duchin and Mysak 1987), whilst the least were observed on a reading task than a picture-sequence narrative and a monologue (Leeper and Culatta 1995). These researchers also found large standard deviations within age-groups and an overlapping range of scores between age-groups (Leeper and Culatta 1995). Males consistently produced more dysfluencies than females regardless of age or task (Leeper and Culatta 1995).

The disruption of fluency in ageing has been attributed to difficulties in formulating language (Shadden 1997). For example, the use of more filler phrases may indicate an increase in the processing time needed by ageing adults (Obler and Albert 1981). It may also reflect word-retrieval deficits (Yairi and Clifton 1972).

From the limited previous research it can be concluded that fluency may be impaired with ageing, although there may be a considerable task effect.

4.5 Conclusions

On many general or specific discourse measures it is often not possible to come to any clear-cut conclusions or trends. Studies have demonstrated that communication skills may be enhanced, deteriorate or remain unchanged with age. The results vary according to the analysis measure, the discourse genre or task, the delineation of the age groups, ideological stance of the investigators, etc. and may also reflect individual variation.

4.6 Summary

This chapter has reviewed the methodological difficulties inherent in research into the discourse of ageing adults and discussed the effects of ageing on the seven broad areas of assessment presented in Chapter 3. Ageing is obviously not the only demographic factor of importance in NBD subjects and, in the following chapter, the effect of SES on discourse performance will be considered.

CHAPTER 5
THE EFFECT OF SOCIO-ECONOMIC STATUS ON DISCOURSE

Variables relating to individuals which may affect discourse performance have been discussed in Chapters 2 and 4. In this chapter, another demographic factor, SES, is examined in general and with specific reference to the discourse measures used in this study.

5.1 Introduction

In addition to age, another demographic variable which needs to be taken into account in discourse assessment is the SES or educational level of the speaker. Although this variable has often been considered in formal language testing, its effect on discourse production has suffered from a similar lack of detailed and methodical investigation to ageing. However, its importance with regard to communicative behaviours has been stressed (Mackenzie 2000b, Milberg et al 1996, Snow, Douglas and Ponsford 1995, Taylor et al 1987). Snow et al (1995) state that more fundamental knowledge is required about the normal behaviour and normal variations of various sociolinguistic subgroups in a given community or population. In constructing groups to study discourse, age and educational level must be controlled (Kahn et al 1990), particularly for older lower-educated subjects (Speedie et al 1990). The amount of education is also considered to be important to neuropsychological test scores (Heaton et al 1996) and to cognitive performance across the adult life span (Pratt and Robins 1991). For example, considerable effects of education level on recall memory for discourse passages have been reported (Obler and Albert 1981). Without considering the effect of demographic variables on neuropsychological test scores, their interpretation "will continue to rely more on educated guesswork than on science" (Heaton et al 1996 p 160). This may also be applied to discourse performance.

5.2 Education level or socio-economic status?

To categorise subjects, educational level/years of education have been used more frequently but SES was employed in this study. Social status may combine the markers of gender, occupation, social class, educational level, income, etc. (Haslett 1990), thus providing a more encompassing group definition than level of education alone.

Delineating groups of subjects by means of educational level or years of education appears relatively simple (e.g. categories such as "minimum education level", etc., or determined by the number of school years). However, although this may be appropriate for younger subjects, it is problematical for ageing subjects who have suffered a stroke or dementia and had fewer years of formal education than today. The majority of population left school at 14 years of age (which was the minimum leaving age until 1947 in the UK). 63% of stroke patients over age 75 who were admitted into the acute stroke unit of a large city hospital had no formal education beyond the minimal school requirements (Mackenzie et al 1997a). Since 1947, compulsory school education has been extended to the age of 16. Thus education and training, which is now provided on a formal basis in longer compulsory school attendance, colleges of further education or universities were then provided in the workplace in the form of apprenticeships or workplace training. By considering only education level/years of education as a means of differentiating the population, comparisons are falsely being made from today's perspective where education has become more formalised and can therefore be more clearly defined.

A further consideration when taking years of education into account is that it is difficult to equate educational practices and their effect on language. Although subjects may have had equal time periods of education they may have had different kinds of education (de Santi and Obler 1991, Kemper et al 1989). Furthermore, many elderly subjects who were of school age during the war and subsequent depression did not have the opportunity for optimal education (Speedie et al 1990). In recent times, education has become more strictly controlled and regulated and thus more uniform. However, the nature and content of education may have varied substantially between schools.

In an era of less formalised education, perhaps the years of education on their own are not as important as the combination of education and work experience and how the individual has used this to advance himself. This combination is taken into account when using SES categories. For example, two non-brain-damaged subjects, N4 and N19, had both left school at 14. However N4 had worked his way up through a medium-sized company, with on-the-job training in various aspects of the business (e.g. manufacturing, accounting, management), to become the managing director. On the other hand, N19 had worked as a farm labourer throughout his life, certainly acquiring skills but these would have been predominantly manual. It is difficult to compare their on-the-job training and its effect on their communication skills but it could be proposed that the skills required in producing higher-level, more complex communication would have been in greater demand for N4 in his management role than for N19. Thus these two subjects with the same educational level would be expected to perform quite differently on certain aspects of discourse tasks.

The subjects investigated in this study were all male in order to obviate gender effects on discourse, reflect the greater incidence of strokes in males and provide more appropriate discourse tasks. This fact however is also relevant to the decision to use SES to categorise the subjects as older men have traditionally been the main (and often sole) bread-winner outside the home. Therefore they can be easily categorised in terms of their SES whereas this may be more difficult in the case of older female subjects.

An additional methodological difficulty in determining related to education level or SES in NBD subjects is the problem of subject recruitment. These subjects will be self-selected because they volunteer themselves as participants. They tend to be better educated or of a higher SES than the broad cross-section of society. They may be in better health and economically well-off. In the British geographic region in which this study took place, males in the two categories of professional and managerial only comprised 33-35 percent of the working population. Thus a representative sample of the population may be difficult to select. Mackenzie et al (1997a) found that almost two-thirds of stroke patients over 75 who were assessed had only the minimum level of education. This may reflect the educational level of the broader population of this age group and emphasises the need to determine the extent to which communication is affected by educational level/SES. Furthermore, as populations in many countries become more culturally and linguistically diverse, the effect of educational levels or occupational status in older individuals from minority cultures may be of particular importance[28].

Although SES takes into account more aspects of a speaker's life experience, using this for differentiating subjects also has its caveats. Most classification systems used are controversial and definitions of categories may not be sufficiently objective. It may also be difficult to separate the effects of the interaction between SES and other dimensions such as race, ethnicity and sex (Guy 1988). These must be borne in mind when delineating subject groups.

5.3 Rationale for the investigation of socio-economic status effects

The rationale for studying the effect of education/SES level on discourse is similar to those of ageing. Firstly, this is an area of interest in its own right. The level of education or SES that an individual attains is a critical factor in determining employment and lifestyle. This will in turn influence the nature of life experiences which the individual will have e.g. housing, leisure pursuits, organisation/club memberships, etc. Employment and lifestyle may also have an effect on the personality of the individual (e.g. levels of responsibility, authority etc.). As discourse reflects life experiences and personality factors, education or SES needs to be considered.

Education has been proposed to be of particular relevance to investigations of communication disorders involving lateralized brain lesions. Obler and Albert (1981) have stated that the effects of education on brain organisation must not

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[28] Payne (1997) observed a disparity in the education level of many elderly individuals from minority cultures compared to the US. population as a whole and this phenomenon may also

be ignored. More specifically, based on a study of literate and illiterate stroke patients, it has been suggested that education results in increased lateralisation of language representation in the brain (Lecours, Mehler, Parente et al 1988). Thus they conclude that there is increased ambilaterality of language representation amongst illiterate subjects and more left hemisphere lateralization for language among the school-educated. Although the possible relationship between education and lateralization cannot be ignored, it must be emphasised that the illiterate subjects investigated by these researchers were totally unschooled. Whilst these extreme cases may affect lateralization, once minimum educational levels are achieved, additional or further education may not affect lateralization of language functions. Joanette, Lecours, Lepage and Lamoureux (1983) concluded that RBD subjects with a lower educational level were more likely than subjects with a higher level to present with intense linguistic disturbances. Furthermore, literacy may not affect some aspects of communication (e.g. prosody) but may be significant in interpreting figurative meanings and performing complex or abstract language tasks (Tompkins 1995). As discourse is a high-level language task, the importance of education levels must be taken into account when examining any neurologically-impaired subjects.

Secondly, education/SES needs to be taken into account in the study of discourse in order to differentiate between its effects and pathology. As with ageing, the level and range of discourse performance in different socio-economic groups may overlap with pathological discourse resulting in erroneous attribution of impairment to individuals of lower SES. Most studies of the communication performance of specific groups utilise control groups with comparable education levels to the impaired group[29]. However these comparisons do not provide data on the effect of education on its own or on the interaction between education and age or brain-damage on communication and limited investigations have been reported. Furthermore, on verbal comprehension tasks, a smaller range of scores in subjects groups educated

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occur in other countries e.g. the UK.

[29] (e.g. for ageing:- Gubarchuk and Kemper 1997, Kemper et al 1990, Obler and Albert 1994, Pratt and Robins 1991, Shewan and Henderson 1988, Ulatowska et al 1986, 1998, for RBD:- Brownell et al 1997, Rivers and Love 1980, comparable socio-economic status :- Shewan and Henderson 1988, occupations:- Yorkston and Beukelman 1980).

beyond the minimal level was found, indicating that educational level is related to heterogeneity of performance (Mackenzie 2000). Mackenzie et al (1997a) concluded that

> *"Controlling for education is of equal importance for credibility. However a perspective on subject individuality must be maintained. Overlapping of scores from the three educational groupings was present and in some tasks, .., considerable between-subject variation was observed within each educational group" (p 941).*

Bernstein (1973) proposed two codes of communication, elaborated and restricted, which affect social interactions and relationships and relate to educational levels. Elaborated codes are characterised by a wide range of syntactic alternatives, less reliance on shared meanings, verbal elaborateness and explicitness and places importance on verbal communication. In contrast, the restricted code relies on gesture and intonation, has a narrow range of syntactic alternatives, is rigidly organized, relies on shared knowledge and is oriented toward group membership[30]. Of relevance here is that Bernstein (1975) argues that the educational system (in Great Britain) transmits the elaborated code, thereby systematically disenfanchising lower-class children. This code is carried over into adult communicative patterns.

It is not only SES itself which is of interest but also the interaction it has with other variables, e.g. age and RBD. Some investigations into aspects of ageing discourse have apparently ignored the effect of education (e.g. Shadden et al 1991, Walker et al 1988, Lock and Armstrong 1997). This effect is particularly important in ageing as most older adults received less formal education than is the situation now. Its effect is crucial for many neurologically-impaired subjects who tend to be older.

It has been suggested that a high level of education may compensate for or decrease the negative effects of ageing on cognitive performance (Heaton et al 1996). Support has been provided recently for this "reserve hypothesis" i.e. that education may protect against cognitive decline in later life. Coffey et al (1999) have demonstrated that, although cortical atrophy was significantly

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[30]For a more detailed discussion on this. refer to Bernstein (1973) and Haslett (1990).

greater in ageing subjects with higher education, they showed no clinical evidence of memory loss or other cognitive impairments. Age deficits in text memory are less evident in old people with high levels of verbal ability or education (see Cohen 1988). The "reserve hypothesis" needs further amplification to determine its applicability to communication disturbances. For example, education did not counter the effects of age on confrontation naming (Le Dorze and Durocher 1992) nor on the lexico-semantic content in a picture description task (LeDorze and Bedard 1998). Furthermore, in studies of ageing and discourse, verbal ability and educational level have been reported to exaggerate the difference between groups (Burke and Light 1981). On verbal comprehension tasks, a minimally educated group demonstrated a weaker performance than the two more educated groups (Mackenzie 2000) but a highly significant difference was found between the youngest more educated group and oldest least educated one. Speedie et al (1990) concluded that educational attainment should be considered when deciding that lesser-educated elderly patients have language deficits.

5.4 Previous research relevant to this study's discourse measures

Presented below are the effects of SES on those specific aspects of discourse relating to the multi-layered discourse framework used in this study (see Chapter 1).

5.4.1 Relevance

As far as can be determined, one of the few aspects of relevance which has been explored with respect to education/SES is the appropriateness of the quantity of information provided. Neither education nor SES had an effect on the efficiency of imparting relevant information in picture description tasks or conversation (Mackenzie et al 1997b, Mackenzie 2000b, Shewan and Henderson 1988). In contrast, the number of content units produced in a picture description task increased in accordance with education level (LeDorze and Bedard 1998). Furthermore, more educated subjects produced more abundant and detailed descriptions than subjects with little schooling (LeDorze and Bedard 1997).

The paucity of research and the problems of defining the term have thus not shed any light on the exact nature of SES effects on relevance.

5.4.2 Discourse-grammar

Data on the relationship between education/SES and discourse-grammar are limited. Mackenzie et al (1997a) found that higher levels of education were associated with better-organised picture descriptions whilst Labov (1972) concluded that "working class speakers seem to have a distinct advantage over more educated styles" (p 396) in providing evaluation in narratives.

On procedural discourse, subjects with more education provided one to two more steps for each task than subjects with less education (Purdy and Loos-Cosgrove 1990). However, more education did not counter the effects of age in procedures as older subjects produced fewer essential steps despite the fact that they were more educated than average (North et al 1986).

From these studies, more education may be related to better structured discourse depending on the discourse sampling method used.

5.4.3 Clarity disruptors

Variations in the definition of clarity disruptors and the types of discourse elicited may account for the contradictory results regarding education/SES which have been reported. On the one hand, an increased amount of unnecessary, additional material was found in the picture descriptions of higher educated adults (Mackenzie et al 1997b, Mackenzie 2000b). Subjects from higher SES were found to produce narratives characterised by a larger quantity of comments compared to subjects of lower SES who were more concise (Labov 1972). On the other hand, more vague terms and word-finding comments were found in a picture description task in less educated subjects

(LeDorze and Bedard 1998). Also subjects with less education produced fewer correct responses on a confrontation naming task than intermediate or high level of education and this effect was more pronounced as the stimulus increased in length (LeDorze and Durocher 1992). Furthermore, highly educated Russian adults used fewer fillers ("well", "you know") in descriptive and narrative recall tasks (Gubarchuk and Kemper 1997). In contrast to these two sets of results, no difference was found in the incidence of "mazes" (which included asides to the examiner) across three SES groups on picture description and story retelling tasks (Yorkston et al 1990).

These contradictory results mean that no conclusions can be drawn regarding this category.

5.4.4 Productivity and syntactic analysis

Research into the effect of education/SES on sample length has provided conflicting outcomes. Verbosity (in conversation) as rated on a five-point rating scale appeared to be unaffected by levels of education in NBD subjects (Mackenzie et al 1997a, Mackenzie 2000b). However, adults with higher levels tended to produce longer samples than the lower educated groups on story retellings and in picture descriptions (Gubarchuk and Kemper 1997, Mackenzie et al 1997b, LeDorze and Bedard 1997, Yorkston and Beukelman 1990).

Regarding syntactic complexity, no effect of SES on the number of complex sentences on a picture description task was noted (Shewan and Henderson 1988). Furthermore adults with higher educational levels were no different to those with lower education in grammatical scores in a description task (Speedie et al 1990) or in the amount of embedding in descriptive and narrative recall tasks of Russian adults (Gubarchuk and Kemper 1997). However, in an interview, better educated adults produced fewer clauses per utterance (Kemper et al 1989). In contrast, better educated adults produced sentences containing a greater variety of grammatical forms in narratives (Cheung and Kemper 1992). This may relate to Bernstein's elaborated code (see above). Higher educated adults tended to produce longer sentences in narratives (Cheung and Kemper 1992), in an interview (Kemper et al 1989) and in picture description and story recall tasks (Yorkston et al 1990), thereby producing utterances with greater phrase and clause complexity.

In conclusion, adults with more education tend to produce longer discourse samples but no clear-cut findings can be drawn on measures of syntactic complexity.

5.4.5 Clausal structure

Data regarding the incidence of main, left- and right-branching clauses are sparse. Better-educated adults used more right-branching clauses and fewer main clauses in an interview (Kemper et al 1989) whilst the incidence of main, left- and right-branching clauses in the descriptive and narrative recall discourse of Russian adults was found to be unrelated to education levels (Gubarchuk and Kemper 1997).

5.4.6 Cohesion

Research into the effect of education on cohesion has focused only on unclear or ambiguous pronoun usage. Educational level had no effect on ratings of unclear and ambiguous referencing in conversation (Mackenzie et al 1997a, 1997b). Less educated subjects tended to use more pronouns in a picture description task than more educated subjects (LeDorze and Bedard 1998). Education level was negatively correlated with pronoun rate in healthy elderly subjects in a semi-structured interview i.e. those with more education used fewer pronouns (Bucks et al 2000). Education did not counter the effects of ageing in North et al's (1986) study in which they observed more ambiguous pronoun usage with age in procedures despite the fact that the subjects had more education than average.

The effect of SES on the development of referencing has received some attention. Hemphill (1989) found that low-income children and adults frequently used unspecified pronouns whereas average-income speakers valued discourse in which all the information needed to make sense of a narrative is made explicit to the listener. Similarly, Bernstein (1973) noted that working class children's picture-sequence narratives were more closely tied to their context than children of average income homes, resulting in a greater use by the former of referents with no specified antecedent.

From these investigations, it would appear that speakers with less education or of lower SES produce more unclear pronouns.

5.4.7 Dysfluency

Limited details are available regarding the effect of SES on fluency measures. The incidence of mazes[31] was not found to differ significantly across three SES groups in picture description and story retellings (Yorkston et al 1990). Highly educated Russian adults produced more fragments and continuations (incomplete sentences that added new information to the previous utterance) in descriptive and narrative recall tasks (Gubarchuk and Kemper 1997). The results of dysfluency studies in other populations may be obscured because education and/or SES was not controlled. For example, Cooper (1990) stated that the results of her study into older adults' dysfluencies may reflect their above-average SES and education.

5.5 Conclusions

From this chapter it should be apparent that research into the effect of SES on discourse is limited, inconclusively investigated and this is exacerbated by comparisons to speakers of different languages. Thus it would appear that this aspect is in urgent need of in-depth examination to clarify its effects.

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[31] (defined by these researchers as "revisions, interjections, repetitions, false starts or asides to the examiner").

5.6 Summary

This chapter has considered the importance of taking SES, rather than educational level, into account in investigating discourse and discussed previous research into the effects it may on specific discourse measures. In the following chapter, the effects of RBD on discourse performance are considered.

CHAPTER 6
DISCOURSE AND RIGHT HEMISPHERE DAMAGE

This chapter describes the limitations of previous RBD discourse research as well as its findings. The various hypotheses which have been put forward to explain this impairment are presented. The relationship between attention and the RH is discussed and its role in the RBD discourse deficit is presented.

6.1 Introduction

> *"I do not believe my speech has been permanently affected apart from what the nurses in hospital and my wife dubs 'verbal diarrhea'. There's an O somewhere in that word I reckon." (Letter from RBD subject S1).*

Research over more than a century has documented the dominance of the left-hemisphere for linguistic functions (particularly phonology, syntax and semantics) and confirmed that lesions in certain areas result in language impairment or dysphasia. In contrast, the RH has traditionally been depicted as "silent". The increasing neurological interest in the capabilities of the RH and the burgeoning interest in discourse has provided the impetus for a more systematic investigation of its communicative functions. Nonetheless, it is only over the past two decades that the communication disorders following RBD have been subjected to closer examination but "has not been investigated as thoroughly as that of the LH." (Paradis 1998, p 3).

In contrast to the left hemisphere, difficulties at the linguistic level (word and sentence level) of RBD subjects is not usually their major difficulty. Investigations have generally concluded that they have little or no difficulty on this aspect of discourse (e.g. see Glosser 1993, Myers 1993, Tompkins 1995). Bloom (1994) has recently proposed a preliminary model where these subjects have a preserved linguistic form processor and are able to construct well-formed sentences. However researchers have concentrated on restricted aspects, stating that they have mild or no difficulty in confrontation naming or in using appropriate syntax (Diggs and Basili 1987, Joanette et al 1983, Wapner et al 1981) or that their basic linguistic functions such as phonology and syntax are typically intact (Gainotti, Caltagirone, Miceli and Masullo 1981, Leonard, Waters and Caplan 1997a, b, Myers 1999). Impairments at this level, if observed, are considered to be mild. For example, problems have been noted in naming, verbal fluency, syntax, sentence completion, definitions (for a review, see Joanette et al 1986, Myers 1994).

On a broader level, context-dependent language deficits have been observed in RBD subjects. These include both comprehension and production deficits in the use of presupposition, inference, cohesion, sarcasm, indirect speech acts, idioms, metaphors, humour, prosody, etc. (for reviews, see Brownell, Potter, Michelow and Gardner 1984, Brownell, Michel, Powelson and Gardner 1983, Bryan 1995, Myers 1999, Paradis 1998, Richards and Chiarello 1997, Tompkins 1995). In fact, Hellige (1998) concluded that

> *"there is growing evidence that the right hemisphere makes important contributions to the processing of language and may even be superior to the left for some language-related functions" (p 406).*

It is now widely agreed that the major domain of communication deficits in RBD subjects is manifested in their use of discourse (Paradis 1998, Tompkins 1995, Tompkins and Lehman 1998) which is considered to be "at the heart of the communication problems" (Myers 1999, p 101). Their problems are considered to exist at the structural and interactional dimensions of discourse (Stemmer 1999), with discourse and conversation being considered as one of their major categories of impairment (Tompkins and Lehman 1998). RH damage results "in a variable and sometimes puzzling collection of perceptual and behavioural disturbances that may seem subtle to casual observers but produce profound effects on a person's quality of life" (Curlee 1999 p 299). The consequences of impaired pragmatic skills are liable to be underestimated (Klonoff, Sheperd, O'Brien, Chiapello and Hodak 1990) because these deficits typically

> *"impair a person's participation in interpersonal, social, educational, and vocational activities, thereby restricting his or her ability to participate satisfactorily in many activities of normal daily living" (Curlee 1999, p 299).*

The impaired capacity by RBD subjects to adopt a "theory of mind" or theory about the internal mental state of other people, can result in what Myers (1999) terms "social disconnection".

6.2 Limitations of previous research

Research into the discourse of RBD subjects thus far has been fragmented and inconclusive for three reasons. Firstly, their discourse investigation has a relatively short history. Therefore, much of the previous research into RBD subjects' discourse has focused on isolated aspects such as word count, number of message units, sequence anomalies, informative content, number of intrusions, number of complete utterances, etc. (Diggs and Basili 1987, Joanette et al 1983, Moya, Benowitz, Levine and Winklestein 1986, Rivers and Love 1980, Trupe and Hillis 1985), although the more recent trend is towards multi-measure analysis. Some critical aspects of RBD discourse (e.g. narrative discourse-grammar, cohesion etc.) have only received attention from a limited number of researchers (e.g. Davis, O-Neil-Pirozzi and Coon 1997, Joanette and Goulet 1990, Leonard et al 1997a, 1997b, Uryase, Duffy and Liles 1990). However, research has become more sophisticated, incorporating linguistic principles into language assessment and this should increase the sensitivity of such measurement (McDonald 1993).

Findings of previous RBD research need to be approached with caution because subjects and methodology have varied widely, making comparisons problematic. Subjects have been included regardless of the aetiology, site, size or nature (focal or diffuse) of the lesion. McDonald (1993) concluded that the vast majority of studies used RBD groups that were heterogeneous with respect to lesion site. This can result in an overlap in the nature of the communication disorder observed with other pathologies, e.g. frontal lobe disorders, fluent aphasia, closed head injury. Furthermore, the size of lesion may be critical as more extensive lesions in the RH frontal, temporal and parietal cortex may be necessary for a full-blown communication disorder to occur (Alexander, Benson and Stuss 1989). Subjects exhibiting more dramatic disorders (which are the result of extensive lesions) (McDonald 1993) may be investigated more readily than those with smaller lesions and less dramatic language impairments. These findings would be further removed from "normal" performance and "normal" variation so that the actual overlap between normal and communicatively-impaired subjects does not arise and misleading depiction of the disorder is provided.

The method of selecting the subjects varies (consecutive admissions to hospital, referral for treatment) and the subject groups are often small. Factors relating to subjects (such as gender, educational level, age, handedness, time post-onset, etc.) also vary considerably across studies. Edwards and Linebaugh (1997) found that only eight subject description variables were consistently reported in 70% of RBD studies. Different discourse models have been used to determine aspects to be assessed and the type of discourse elicited, method of elicitation and analysis of the data have also differed widely. Operational definitions used by researchers have varied or been poorly delineated e.g. irrelevance, tangentiality, etc. Different methods of evaluation (e.g. objective vs. subjective rating scales) have been employed to assess similar phenomena. The inconsistent and conflicting results of RBD communication research may, in part, reflect the variability of these methodological issues, rather than the effect of brain-damage.

The gender of the subjects may be of particular relevance to the investigation of RBD. The incidence of CVAs amongst males is higher than amongst females (Office of Health Economics 1988). Differences in the lateralization of functions within the brain between males and females have been postulated (e.g. more lateralization in males than in females for linguistic processing but more lateralization of emotional processing in females than males) (Borod, Cicero, Obler, Welkowitz, Erhan, Santschi, Grunwald, Agosti and Whalen 1998, Crucian and Berenbaum 1998). However, the latter conclude that sex differences in spatial ability and emotional perception "are unlikely to be caused by sex differences in right hemisphere organization" (p 385). Although the gender-RBD relationship is thusfar unclear, the assessment of subjects of only one gender would circumvent the inclusion of an additional influence. For example, Brownell et al (1997) found an unexpected gender difference in the use of personal reference by RBD subjects.

As for discourse analysis in general, a shortcoming in many studies of RBD subjects is that the need to investigate multiple levels of discourse behaviour in the same RBD subject has been largely ignored and relevant evidence is lacking (Frederiksen and Stemmer 1993, Tompkins 1995). The importance of the relationship of one process to others must be taken into account and defined; otherwise it is difficult to pinpoint the impaired processes if the effect of other processes is not known. The dearth of investigations into the interaction of discourse processes is considered to be one of the reasons why no firm conclusion can be reached regarding RBD discourse impairments (Stemmer and Joanette 1998).

An additional relationship of particular salience to the RBD population is the interaction between impairments in discourse processing and cognitive deficits. This has suffered from a similar lack of interest to the interaction of processes. McDonald (2000) considers that although greater sophistication in task design and more analytical techniques in RBD discourse analysis are important, it is vital to describe these impairments within the context of concomitant cognitive deficits (discussed below).

Secondly, a lack of homogeneity amongst RBD subjects has been widely reported (Brownell et al 1997, Chantraine et al 1998a, Cherney and Halper 1994, Davis et al 1997, Lehman and Tompkins 2000, Roman et al 1987, Mackenzie et al 1997, McDonald 2000, Stemmer and Joanette 1998). Many of the experimental findings are both subtle and variable (McDonald 1993). No single pattern of impairment has been observed in RBD subjects and they display different patterns of behaviour (Joanette and Goulet 1990, Tompkins 1995), thereby supporting the notion of the RH communication deficit as being an umbrella term.

Unlike aphasia, RBD subjects are considered as a group purely on the basis of a lesion within the RH. The "best guess" is that only approximately one-half of patients with RBD will have communication disorders (Joanette et al 1986, Tompkins and Lehman 1998) and confirms that communication deficits are not always present among RBD patients (Chantraine et al 1998a). The functional organisation of the RH is considered to be more diffuse than the left and thus the localisation of functions may be less precise than in the left hemisphere (Luria 1973, Myers 1999). Thus, although localisation of functions has been the focus of left hemisphere research, the emphasis on the localisation of discourse functions in the RH may be limiting. Furthermore, brain-damage resulting from cerebrovascular accidents is not confined to carefully delineated areas of the brain. McDonald (1993, 2000) stressed that, due to the distribution of the right middle cerebral artery, it is even difficult to classify RH lesions purely in terms of anterior versus posterior damage. Although data on the localisation of functions within this hemisphere are increasing, at present knowledge about the localisation of communicative function is considered to be "precious little" (Tompkins 1995, p 14).

The heterogeneous nature of the RBD communication disorder may reflect the extent of existing knowledge. By examining the individual performance of RBD individuals who have been used in group studies, sub-groups according to different discourse performance deficits can be delineated, thereby enabling the true nature of RBD deficits to become apparent. Lehman and Tompkins (2000) suggest that if a heterogeneous group is assessed,

> *"we may be able to determine whether there are deficits common to all adults with RHD, and also to identify patterns of deficits that are more or less typical. Examination of performance within a diverse group may lead to identification of several distinct subgroups, which can be examined more closely ..." (p 496).*

RBD subjects have been differentiated into subgroups in a few studies in terms of their performance e.g. quantity of information (Joanette and Goulet 1990), content units (Trupe and Hillis 1985) and referencing and logical coherence (Davis et al 1997). Joanette and Goulet (1994) suggest that the distinctive patterns depicted by subgroups may reflect the extent and location of lesions.

Thirdly, a limitation of much research into the discourse deficits following not only RBD but all neurogenic populations is the lack of normative data for the communicative phenomena, the assessment tasks and measures of analysis (see Chapter 1). As Tompkins (1995) states, *"There are almost no normative data for the "higher level" skills we usually evaluate and target after RHD..... This makes it difficult to attribute abnormality, to assign prognoses, and to select remediation". (p 20).*

What may be seen as impaired discourse may reflect "normal socio-linguistic variations within the population as a whole" (Snow et al 1995, p 374). Unless the effect on discourse of variables other than RBD is determined, it is impossible to ascribe normality or the lack of it to the discourse of neurologically-impaired subjects. The effect of these variables[32] on discourse performance may be as, or nearly as, significant as the neurological disorder itself. Attention must also be paid to the individual variation of both normal and neurologically-impaired individuals. The difficulties in distinguishing normal variation and pathological dysfunction has been widely stated (Brownell et al 1997, Mackenzie et al 1997a).

6.3 RBD discourse deficits - general

RBD subjects' discourse has been described as copious, verbose, hyperverbal, rambling, tangential, digressive, disorganised, unintegrated, circumlocutory, irrelevant, confabulatory and bizarre (Bloom, Borod, Obler and Gerstman 1993a, Myers 1999, Wapner et al 1981). The terms which have been used are often imprecise and poorly delineated and are used to describe the discourse of other neurologically-impaired populations. Furthermore, some findings of early studies have been cited so often that they have come to be accepted as "givens" and therefore overlook the heterogeneity of the RBD population (Bloise and Tompkins 1993).

At an overall discourse level, they have been considered as significantly less competent on a communicative competence rating scale (Boyarsky 1985). In addition, RBD subjects' discourse performance was rated as having a significantly higher discourse error rating[33] than left hemisphere damaged or a normal group (Bryan 1988). On picture-sequence stories, they demonstrated

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[32] These are discussed in Chapters 2, 4, and 5.
[33] (in terms of content, style, interaction and overall coherence).

significantly reduced communication abilities on a rating scale[34] than normals (Rivers and Love 1980). RBD subjects were rated as significantly more impaired on emotionally-charged discourse stimuli than non-emotional (Bloom et al 1993a). However, this may be due to the different genres used (narrative for emotional and procedural for non-emotional).

6.4 RBD discourse deficits - specific

These general findings demonstrate that an impairment in discourse does seem to occur in RBD subjects. However, on specific measures, the conclusions regarding deficits may not be as clear-cut. The results of previous research into their discourse, relating specifically to the model-based measured used in this study (see Table 1.1), are presented and discussed separately below.

6.4.1 Relevance

Certain terms used by researchers to describe RBD discourse impairment have not been operationally defined and can appear imprecise and vague. Many of these adjectives are associated with the notion of "relevance", whilst verbosity may be the surface manifestation of their irrelevant output. Previous research into RBD discourse has focused on various aspects of relevance which, although often not directly defined as relevance, are nevertheless associated with it. Six aspects will be discussed here. Firstly, relevance has been directly assessed using rating scales. RBD subjects were judged less relevant on an emotionally-charged picture narrative (Bloom et al 1993a) and in sequence narratives, procedures and plans (Lojek-Osiejuk 1996). The amount and relevance of information (quantity-conciseness) provided by RBD subjects in conversation was rated as inappropriate (Prutting and Kirschner 1987).

Secondly, the notion of global coherence (i.e. the way discourse is organised with respect to an overall theme or topic) is closely related to relevance.

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[34] (measuring fluency, relevance, syntax, semantics and articulation).

Joanette et al (1990,1984) reported that about half of their RBD subjects produced errors[35] in coherence as defined by Charolles (1978). These errors are similar to those used in the present study (see Chapter 3). In contrast, RBD subjects were able to maintain global thematic coherence in informal interviews appropriately but were impaired in local coherence (i.e. contents and meanings shared between contiguous propositions) (Glosser and Deser 1992). Their ability to maintain coherence may relate to the unstructured nature of the interviews.

Thirdly, confabulations can contribute to the lack of relevance in discourse. These were not found in RBD narrative and procedural discourse (Myers 1979, Wapner et al 1981, Sherratt and Penn 1988). In contrast, more confabulations were reported in the retelling of delayed-theme than non-delayed theme paragraphs (Hough 1990) and in a narrative recall task (Gardner et al 1983). However the latter finding demonstrated no differences between RBD and ageing subjects. Localization of lesion may be pertinent here as confabulatory responses were found to be associated with right anterior lesions (Hough 1990, Joseph 1986) but rarely with right perirolandic lesions (Wapner et al 1981).

Fourthly, one of the reasons for irrelevance is "information which is new but unconnected to previous information" (Sperber and Wilson 1986). The new information given may be tangential or unrelated to the topic. Terminological differences in previous research make conclusions regarding RBD subjects' impairments on this aspect difficult. However, Wapner et al (1981) noted an "abundance of embellishments" (i.e. extraneous or unnecessary comments or additions to the story) in their story recall, particularly in those with large anterior lesions (Wapner et al 1981) or right prefrontal damage (Novoa and Ardila 1987). More embellishments were also observed in RBD subjects than normal or elderly subjects in procedures (Roman et al 1987), in the recall of emotionally-charged stories (Gardner et al 1983) and in recalling delayed-theme paragraphs than non-delayed (Hough 1990). Fewer elaborations but

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[35] Errors according to his model are the repetition of information without adding new information, contradictory information and relation errors (i.e. information given with relation to previously given information).

more unrelated information (i.e. irrelevancies, redundancies, off-topic and incorrect information) were noted in expository, procedural and narrative discourse (Cherney and Canter 1990) and in story recall (Cherney and Halper 1997). Stemmer and Joanette (1998) noted that the RBD subjects "repeatedly picked up one particular piece of previously given information and elaborated this information" (p. 343). In a related finding, RBD subjects judged tangential conversation as normal significantly more often than normal subjects (Rehak, Kaplan and Gardner 1992a).

Fifthly, another factor contributing to lack of relevance is the inclusion of additional information which provides too much detail. Brookshire and Nicholas (1984) reported that RBD subjects can produce main ideas and details in explicit tasks but they have difficulty determining which details are important (Wapner et al 1981, Bihrle, Brownell and Gardner 1988) and using an appropriate level of detail (Boyarsky 1985). Excessive and unnecessary detail not relevant to the overall theme of the narrative was found in RBD subjects (Eccles 1991, Mackisack, Myers and Duffy 1987, Myers 1993, Hobbs, Johnson-Emanuel, Molloy and Tonkovich 1989). Bloom et al (1993a) reported that RBD subjects showed a significant deficit in conciseness (i.e. informative without conveying excessive detail) on a two-point rating scale on an emotionally-charged picture story compared to left brain-damaged and normal subjects.

The sixth aspect relating to relevance is insufficient content (variously described as reduced information units, less core information, reduction in content), even though there is excessive detail (discussed above). This has been reported to be a feature of RBD in a variety of discourse tasks[36]. On three genres of discourse (narrative, descriptive and procedural), RBD subjects had a lower efficiency ratio (essential units per word) than elderly controls (Cherney 1990), specifically with decreasing cognitive status (measured on the MMSE). Deficits in both communicative efficiency and the proportion of major

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[36] e.g. in picture description (Cherney and Canter 1990, Diggs and Basilli 1987, Mackenzie et al 1997a, Hobbs et al 1989, Myers and Brookshire 1994), in picture-sequences (Bloom et al 1992, Davis et al 1997, Joanette and Goulet 1990, Lojek-Osiejuk 1996), retelling of video narratives (Uryase et al 1990), story recall (Cherney and Halper 1994, Lojek-Osiejuk 1996, Sohlberg 1990) and procedures (Cherney and Canter 1990).

concepts have been associated with persistent left unilateral neglect (Cherney and Halper 1997, Myers and Brookshire 1994). RBD subjects produced less information than younger controls but the same as ageing subjects in narrative recall tasks (Gardner et al 1983) whereas elderly stroke subjects conveyed information less efficiently than control subjects but similarly to younger stroke subjects in conversation and picture description (Mackenzie et al 1997b). The heterogeneity of RBD subjects has been demonstrated by a review of data from sixty-two subjects in which ten were found to be normal in the production of content units, ten deficient and ten verbose (Trupe and Hillis 1985). Not only has the information provided by RBD subjects in discourse been found to be reduced but also selectively reduced. Their performance on picture tasks was significantly affected by the level of inferential but not visual complexity (Joanette and Goulet 1990, Myers and Brookshire 1994, 1996).

Task differences affecting the quantity of information provided have also been noted. RBD subjects produced more essential units in story recall than picture description with procedures having the least (and therefore being less relevant) (Cherney and Canter 1990). More elaborations (additional relevant information) were found in procedures than in picture description or story recall but more unrelated information (i.e. irrelevancies, redundancies, off-topic information) on picture description than story recall (Cherney 1990). Myers (1993) has suggested that these subjects may have been less relevant when they have difficulties with macrostructure.

Whilst it is apparent from this research review that RBD subjects demonstrate an impairment in relevance in discourse, variations in definitions and discourse sampling methods prevent any additional clarity on this issue.

6.4.2 Discourse-grammar

RBD subjects' knowledge of the macrostructure of discourse has been derived from two different lines of research. Firstly, their ability to sequentially arrange pictures or organise sentences in paragraphs or narratives has been found to be impaired (Delis, Wapner, Gardner and Moses 1983, Gardner et al 1983).

They were found to have particular difficulty when the presentation of the narratives' theme was delayed (Hough1990, Hough and Pierce 1993) but this was not observed by Schneiderman et al (1992). However, Huber and Gleber (1982) noted that they are able to perform story arrangement tasks although they had more difficulty on pictorial than verbal versions of these tasks (particularly those subjects with retrorolandic involvement). Schneiderman et al (1992) interpreted the deficits of RBD as stemming from a more general impairment in formulating macrostructure as they appear capable of integrating elements into a narrative.

The second line of evidence for RBD subjects' macrostructure performance is their ability to formulate appropriately structured narratives, indicating an impairment in their knowledge of macrostructure. For example, they produced fewer complete episodes, more missing episodes and fewer complete target components in video retelling (Uryase et al 1990). They also demonstrated a deficit in essential structural and episodic elements in a picture-sequence task (Bloom, Carozza, Berg and Curran-Curry 1997). They also had deficits in logically organising the story elements into a cohesive narrative in a story recall task, particularly those subjects with anterior brain-damage (Wapner et al 1981). Particular components of RBD narrative production have been found to be reduced or inaccurate e.g. setting, complication, evaluation and resolution (Joanette et al 1986, Joanette and Goulet 1990, Lojek-Osiejuk 1996, Sherratt and Penn 1990, Sohlberg 1990). In contrast, RBD subjects performed better than normals in producing essential superstructure components in narrative recall (Osiejuk 1989).

Similar performances between RBD and control groups have also been noted with respect to the basic structure (beginning, middle, end) (Bloom, Borod, Obler, Haywood and Pick 1995a) and to the inclusion of appropriate narrative frame structure (Stemmer and Joanette 1998). A generally preserved knowledge of the discourse structure was observed but tangentiality and a tendency to terminate their task prematurely was also noted (Roman et al 1987). Investigation of the narrative and conversational discourse of a small sample of RBD subjects revealed that adequate narrative superstructure and simple conversational organisation was demonstrated (Sohlberg 1990). RBD and controls were similarly able to produce narratives from a picture story task judged as adequate on a simplified story schema framework (Joanette and Goulet 1990). Even if RBD subjects have difficulty in providing a discourse schema on an open-ended task, it would be hypothesised that the structure of a picture-sequence task would provide a sufficient framework for their narratives. However, on picture-sequence tasks, they produced significantly fewer complete stories (Rivers and Love 1980) and performed more poorly than normals in producing essential superstructure components (Osiejuk 1989). They produced significantly fewer complete episodes and more missing episodes in retelling of a video than normals (Uryase et al 1990).

The ability of RBD subjects to sequence narratives appropriately has been investigated. No differences between RBD and normal subjects were found on sequencing five major features of a story recall task (Cherney and Halper 1994) nor in narratives or procedures (Sherratt and Penn 1990). RBD narratives were rated as similar to normals on aspects of logical sequence (Bloom et al 1995a). However, more anomalies were reported in narrative sequencing in their picture-sequence stories (Joanette et al 1983, Osiejuk 1989) and in story recall tasks (Gardner et al 1983). They also obtained significantly higher scores on the total number of order errors in picture description, procedures and narrative recall (Lojek-Osiejuk 1996).

In procedures, RBD subjects have also demonstrated structural impairments. They produced fewer appropriate script elements (essential and optional) than normals (Osiejuk 1989, Roman et al 1987) and the essential, optional and target steps were considered inappropriate due to confused and insufficient information (Sherratt and Penn 1990). An increased need for prompting them to complete procedure was reported by Roman et al (1987) and Sherratt (1988). Roman et al (1987) related this difficulty to Bihrle, Brownell, Powelson and Gardner's (1986) observations that these subjects were impaired in their ability to complete non-verbal cartoons. Some of them have difficulty ending conversations and used an increased number of topic scenes in the termination phase of conversations (Kennedy 2000). Roman et al (1987) also found minimal sequencing errors on their production of two procedures but

Osiejuk (1989, Lojek-Osiejuk 1996) found that they were poorer at sequencing information in plans and procedures. In contrast, McDonald (2000) reported a similar number of essential and total procedural steps were produced by the RBD group, with no greater proportion of irrelevant steps (on a simple procedure).

The discourse structure provided by RBD subjects is reported to be differentially affected by task and topic. They have demonstrated greater difficulty in picture-sequence narratives than in procedures (Lojek-Osiejuk 1996). As stated above, it would be hypothesised that the structure and sequence of events on a picture-sequence task would provide a sufficient framework for their narratives, if no visual impairments were present. Roman et al (1987) found considerable variability in performance on two procedures but stated that it was not lack of knowledge of scripts but rather particular scripts. This reinforces the importance of selection of topic as well as task.

It has been hypothesised that familiarity processing or personal relevance is involved in the behavioural deficits associated with the RH (Van Lancker 1997). Rehak et al (1992b) found that the interest value of a story had an effect on RBD subjects' ability to predict story endings in that they tended to perform more poorly on dull stories. Furthermore, they were able to include the essential and optional superstructure of a memorable personal experience but not in retelling an unfamiliar narrative (Sohlberg 1990). Thus the personal relevance or interest value of discourse elicitation tasks may affect their ability to produce an appropriate discourse structure.

From this discussion, it would appear that RBD subjects have difficulty in appropriately structuring narratives and procedures. However, the discourse task, personal relevance and specific structural aspect have a variable effect.

6.4.3 Clarity disruptors

The subjective impression of RBD discourse as elaborated, imprecise, non-specific, personalised and repetitive may be considered as a reflection of elements which disrupt the clarity of the discourse. It is often problematic to compare these findings to previous research due to the different categories and operational definitions used.

Of the three categories of clarity disruptors assessed in this study, the first is non-specific elements[37]. RBD subjects have been found to produce more non-specific elements than normal controls in various discourse tasks, e.g. expository discourse, procedures, picture-sequence elicited narratives, self-generated narratives and narrative recall (Bloom et al 1993a,b, Cherney 1990, Cherney and Canter 1990, Sherratt and Penn 1990). However no difference between groups in the incidence of indefinite terms was found in informal interviews (Glosser and Deser 1992) nor in the number of imprecise words in narrative recall (Boyarsky 1985).

The incidence of indefinite and deictic terms may contribute towards the impression of uninformative and vague speech of the RBD subjects. Empty phrases (e.g. "you know", "and so on") can be considered as non-propositional elements that contribute to the continuity of the discourse but not to the continuity of meaning. Whilst a moderate amount may increase the continuity of the discourse, overuse disrupts the clarity of meaning conveyed. Their excessive use may reinforce the notion that RBD subjects are "hyperfluent" because they fill naturally occurring pauses. This would subsequently lead to the turn-taking difficulties already documented in these subjects (Kennedy, Strand, Burton and Peterson 1994, Prutting and Kirschner 1987).

Secondly, the substitution category[38] can impede the clarity of discourse and may also reflect word-finding difficulties. In both RBD and normal groups, very low levels of verbal paraphasias were found in an informal interview (Glosser and Deser 1992) and were virtually non-existent in narrative and procedural discourse (Sherratt and Penn 1990). Word-finding difficulties are rarely reported in RBD subjects during discourse and in confrontation naming (Gardner et al 1983, Myers and Brookshire 1995, Rivers and Love 1980) and

[37] (comprising indefinite terms, empty phrases and deictic terms).
[38] (neologisms, paraphasias and circumlocutions).

are considered mild when noted (Diggs and Basili 1987, Gainotti, Caltagirone and Miceli 1983).

The third type used in this study, content and fluency disruptors[39], have been widely reported in RBD discourse research but it is not always clear if the measures used are comparable due to differing terminology and category definition (which are often relatively non-specific e.g. "unnecessary", "embellishments"). In addition, in some studies, only a single aspect of this type is considered.

An increase in a variety of content disruptors has been reported in the discourse of RBD subjects. A higher incidence of irrelevant repetition was observed in a picture-sequence task (Joanette et al 1984) and in narrative recall (Boyarsky 1985). They produced significantly more inappropriate, unnecessary or personal comments than normals in expository discourse (Cherney and Canter 1990, Mackenzie et al 1997b), narrative recall (Boyarsky 1985, Lojek-Osiejuk 1996), (particularly if the theme was delayed - Hough 1990), procedures (Cherney and Canter 1990, Osiejuk 1989, Roman et al 1987) and plans (Lojek-Osiejuk 1996).

Other types of content and fluency disruptors have also been observed in RBD subjects on a variety of different tasks, e.g. narrative recall (Moya et al 1986), emotionally-charged narrative recall (Wechsler 1973), personal-narratives (Sherratt and Penn 1990), picture description (Mackisack et al 1987), conversation (Bryan 1988, Eccles 1991) and procedures (Cherney and Canter 1990, Eccles 1991, Lojek-Osiejuk 1996, Sherratt and Penn 1990).

The incidence of these clarity disruptors may be related to the site of lesion within the RH. In narratives, RBD subjects with large anterior lesions most frequently embellished their stories (Wapner et al 1981, Hough 1990), included more inappropriate pictorial rather than emotional verbal responses (Lorch, Borod and Koff 1998) and produced more stereotyped utterances (Kaczmarek 1984). However, Lojek-Osiejuk (1996) found no differences between anterior

[39] (comprising repeated words, phrases or ideas, semantic perseveration, comments on the task, personal value judgements and intrusive words or phrases).

and posterior subjects in the inclusion of irrelevant or personalised comments on narrative recall, procedures and plans. Cherney (1990) also noted that more off-topic utterances were found in those with decreasing cognitive status.

In contrast, a few studies have demonstrated conflicting evidence. No digressions, unauthorised interruptions etc. by RBD subjects were recorded in a conversationally based task (Chantraine et al 1998a) or in a picture description task (Mackenzie et al 1997a). The repetition of information was not considered to be a feature of RBD narrative recall (Stemmer and Joanette 1998). It is important to note that, in procedures, RBD subjects incorporated more personalizations than normal but fewer than elderly subjects (Roman et al 1987), whilst in emotionally-laden narrative recall the incidence was similar to ageing subjects but greater than younger ones (Gardner et al 1983). However, the personal remarks produced by the RBD subjects often caused them to drift away from the main point of the story and they almost never indicated a lack of confidence about their responses or asked for help. In contrast, no difference between RBD and control groups was found in the clarity of language used in picture-sequences (Bloom et al 1995a).

Some task differences in clarity disruptors by RBD subjects have been noted. They produced more in procedures and picture-sequences and reduced amounts in personal-narratives (Sherratt and Penn 1990). Similarly, Cherney (1990) found fewer non-specific clauses in story recall and picture description tasks than procedures but the greatest number of fillers and indefinite terms in procedures, with fewer in picture-sequences and the least in story recall.

Whilst word-substitutions do not seem to be a feature of RBD discourse, various types of non-specific elements and content and clarity disruptors are frequently reported depending on the discourse task used. On some measures, RBD subjects perform similarly to ageing adults.

6.4.4 Productivity and syntactic analysis

The description of RBD discourse as typically verbose and hyperverbal risks being considered accurate due to its frequent repetition. Investigations into the verbosity/paucity of RBD discourse samples have yielded inconclusive and conflicting results. This may be due to the heterogeneous nature of their impairment and methodological variations in the assessment of discourse. This may also reflect the variability of both normal and RBD subjects' performance e.g. within-group variations in picture description lengths were reported in the discourse of both normal and RBD subjects (Mackenzie et al 1997b).

Most of the previous investigations of RBD discourse have used picture-sequences to elicit narratives but these have produced anomalous results. Similar sample lengths in RBD and normal groups have been noted (Bloom, Borod, Obler and Gerstman 1992, Joanette and Goulet 1990) but longer samples by RBD subjects have also been observed (Rivers and Love 1980, Sherratt and Penn 1990). In contrast, reduced RBD samples compared to controls were noted (Bloom et al 1997, Joanette et al 1986).

On other constrained discourse tasks, such as picture description, the results have been similarly variable. Trupe and Hillis (1985) found extremes of copious digressive output and a paucity of speech in RBD subjects in picture descriptions but no difference in length was found between by Diggs and Basili (1987). In contrast, RBD picture descriptions were reported to be longer (Trupe and Hillis 1985) and reduced (Hobbs et al 1989, Mackenzie et al 1997a). RBD subjects' picture descriptions were significantly shorter than those of non-stroke subjects at the acute stage but no different at one year, emphasising the importance of time post onset (Mackenzie et al 1997b).

On less constrained discourse tasks the conclusions are also not clear-cut. Trupe and Hillis (1985) reported copious output and a paucity of speech in RBD subjects in recalling narratives. Longer samples were produced by RBD subjects compared to control subjects on narrative and procedural discourse tasks (Sherratt and Penn 1990) and narrative recall (Stemmer and Joanette

1998, Trupe and Hillis 1985). Their conversations (subjects under 75) were rated as more verbose than normal subjects at one year post onset but not acutely (Mackenzie et al 1997b). In a longitudinal study, Cherney et al (1997) found that most of their subjects produced longer narrative recall samples than the control subjects. In contrast, reduced length of samples has been reported in video-retelling (Uryase et al 1990), conversation (Mackenzie et al 1997a) and on creative thinking tasks (Diggs and Basili 1987).

A reduction in speech output following damage to the right frontal lobe has been clinically observed (Alexander et al 1989, Tompkins et al 1992). At the acute stage, shorter picture descriptions were noted in 67% of RBD subjects with anterior circulation infarction compared to only 18% of those with lacunar infarcts (Mackenzie et al 1997b). However by one year, no significant differences were present.

As stated above, investigations of the linguistic level of RBD subjects have generally concluded that they have little or no difficulty on this aspect of discourse. However researchers have usually investigated restricted aspects of syntax. Tompkins (1995) states that

> *"Syntactic deficits have not been prominent in this group (i.e. discourse production after RBD), suggesting that syntactic measures may not be very informative" (p 124).*

However the focus of previous syntactic investigations has meant that the complexity and range of syntactic structures used by this group has been overlooked. They may be able to produce well-formed sentences but their syntactic complexity or range of constructions may not be adequate or comparable to normal subjects. The relatively few studies which have examined complex syntax in the discourse of RBD subjects have been inconclusive and depend on the type of discourse assessed. They displayed less syntactically complex discourse (but not significantly) on the Cowboy picture story (Joanette et al 1984, 1986). However no differences in clausal-embedding between normal and RBD groups was found in narrative and procedural discourse (Sherratt and Penn 1990) or in informal interviews (Glosser and Deser 1992).

Kaczmarek (1984) also observed similar syntactic complexity to normal controls in right frontal lobe brain-damaged subjects' performance on story recall and picture description tasks. In contrast, Osiejuk (1989) found significantly more complex syntax in the narrative and procedural discourse of RBD subjects than normal controls. Clause-length[40] was longer in a RBD subject but T-unit-length was similar in narrative and procedural discourse (Sherratt and Penn 1990).

In conclusion, the extremes in sample length demonstrated by these studies may provide evidence for sub-groupings, possibly related to lesion localisation. The results of the limited investigations into syntactic complexity do not provide any definite conclusions.

6.4.5 Clausal structure

The incidence of main, right- and left-branching clauses does not appear to have been investigated in RBD subjects.

6.4.6 Cohesion

Cohesion in RBD subjects has been examined to a limited extent and referential cohesion (particularly incomplete or incorrect cohesive ties) has been the most common category investigated. In their recent study of cohesion, Davis et al (1997) could only find three previous studies of referential cohesion in these subjects and state

> *"...we have relatively little information based on systematic analysis of coherence concerning a clinical population presumed to have difficulties at the between-sentence level of language production" (p 189).*

[40] (which reflects both nominal and verbal complexity).

An investigation of all types of cohesive ties found similarities between a normal and an RBD subject on three types of discourse (narrative, procedural and conversation) but differences in distribution (Eccles 1991)

On the first type of cohesion delineated by Halliday and Hasan (1976), viz. reference, no deficit was found for RBD subjects in informal interviews (Glosser and Deser 1992) or self-generated narratives (Boyarsky 1985). Davis et al (1997) found a similarly low cohesion ratio (number of complete ties to clear elements) in both normal and RBD groups on three tasks (picture-sequences with pictures absent/present, story recall). During the comprehension of vignettes, RBD subjects were successfully able to use pronoun anaphora to link separate sentences together into a larger whole, although they did show impairments when they had to use disparate pieces of information (e.g. speaker mood, real-world plausibility) from the discourse context to construct their own scaffolding to support inferencing (Brownell, Carroll, Rehak and Wingfield 1992). From this, these researchers concluded that integration was not at risk in this population. Leonard et al (1997a) have reported that RBD subjects are capable of integrating information between clauses and sentences in the successful resolution of pronouns. They are also able to use contextual information based on general world knowledge to constrain antecedent choices (Leonard et al 1997b).

In contrast to these findings of similar referential cohesion, Bloom et al (1995a) found a higher incidence in the RBD subjects' samples than the control group in picture-sequence narratives containing visuospatial information. RBD produced more definite articles (part of the reference category) in picture-sequence tasks (Bloom, Borod and Obler 1993b). On the other hand, a reduction of referencing in their discourse compared to that of normals was noted in a narrative recall task (Cherney and Halper 1994), in the retelling of a video narrative (Uryase et al 1990) and in narrative and procedural tasks (Sherratt 1988). In addition, RBD subjects have been found not to use definite pronouns to refer to mutually known stimuli in a conversationally-based task (Chantraine et al 1998a), possibly reflecting an impairment in their comprehension of shared knowledge. The contrasting findings on the referential abilities of RBD subjects may be attributable to characteristics of the task.

Information regarding the incidence of substitution and ellipsis does not appear to be available for this population. For conjunctions, no significant findings or trends were observed in RBD picture-sequences (Bloom, Borod, Obler, Santschi-Haywood and Pick 1995b). Dipper, Bryan and Tyson (1997) ascribed their difficulties in inferencing to an over-reliance on encyclopaedic information which meant that the procedural information provided by certain connectives[41] was not accessible to RBD subjects. In procedures an RBD subject showed a smaller increase in temporal conjunctions than normal subjects (Eccles 1991). "And" can be considered as an error because it is the least marked conjunction and often used in place of other more appropriate conjunctions. Significantly more "ands" were noted in RBD subjects' expository, procedural and narrative recall tasks (Cherney and Canter 1990a) and procedures (Sherratt 1988). On a measure of causal connections, RBD subjects were found to be impaired in a picture-sequence with the picture visible (Davis et al 1997).

The incidence of lexical ties in RBD subjects has varied depending on the type of discourse analysed. They produced a significantly lower ratio of lexical markers to T-units than the control group in the retelling of a video narrative (Uryase et al 1990). This was explained in terms of less need to repeat key terms if the discourse sample was short. In contrast, single-case studies have found an increase in lexical ties in narrative and procedural discourse (Sherratt 1988) and conversation (Eccles 1991). The repetitiveness ascribed to RBD discourse may be related, at least partly, to increased lexicalization. A similar performance by RBD and control groups in appropriate lexical cohesion was observed in informal interviews (Glosser and Deser 1992).

A larger body of research has examined cohesive errors in this subject group and the conclusions drawn have been similar. Cohesive errors of all types[42] have been observed more frequently in RBD subjects in a variety of discourse

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[41] (those that strengthen, contradict or introduce a contextual implication)

[42] (variously described as incomplete, ambiguous, less clear referents, undetermined pronouns, pronouns without antecedents, inadequate lexical substitution)

genres and task[43]. Both younger and older (over 75 years) RBD subjects were rated as having more unclear or ambiguous referencing skills in conversation (Mackenzie et al 1997b). No differences have been noted between RBD and control groups in the cohesion ratio (the number of complete ties to clear referents) in a cartoon-elicited narrative (Davis et al 1997) or in unclear referent usage on narrative tasks (Boyarsky 1985).

Task differences in the incidence of cohesion and cohesive errors in RBD subjects' discourse have been reported. Davis et al (1997) found more referential ties in RBD narrative recall samples than in their picture-sequence narratives as well as variations with the topics of the picture-sequence narratives (Davis et al 1997). Compared to narratives and procedures, Eccles (1991) noted a higher incidence of lexical repetition and a reduced use of reference in conversation. The emotional, visuospatial or neutral content of picture-sequence narratives had no effect on discourse cohesion (connectives and anaphoric references) in the RBD group (Bloom et al 1995a). Regarding referential cohesive errors, no differences were observed in expository, procedural and narrative recall tasks (Cherney 1990, Cherney and Canter 1990).

There appears to be little doubt based on previous research that these subjects exhibit increased cohesive errors but their performance on the types of cohesion has been insufficiently investigated to draw any firm conclusion.

6.4.7 Dysfluency

RBD subjects have been described as hyperfluent although limited evidence has been provided to support or refute this. RBD subjects achieved a lower rating on a rating scale which included fluency (Rivers and Love 1980). Focal damage to the RH has been reported to lead to a slight tendency toward

[43] viz. video narrative retelling (Uryase et al 1990), narrative recall (Cherney 1990, Cherney & Canter 1990, Davis et al 1997, Moya et al 1986), personal-narrative (Sherratt 1988), picture-sequence narrative (Bloom et al 1993a, Bloom 1994, Joanette et al 1984, Joanette and Goulet 1990), conversation (Eccles 1991, Glosser et al 1992, Mackenzie et al 1997a), descriptive (Cherney 1990, Cherney and Canter 1990a) and simple procedural tasks (Cherney 1990, Eccles 1991, Sherratt 1988).

phonemic or syllabic repetition (Ardila 1984). Two single-case studies have reported severe dysfluency following lesions to the RH. Ardila and Lopez (1986) observed that phoneme and syllable repetition was the most common dysfluency. All types of dysfluencies occurred mostly in picture description, reading and repetition and least in counting and reciting. Horner and Massey (1983) also noted spontaneous speech to be significantly more dysfluent than oral reading and repetition. RBD subjects were found not to self-correct errors and did not seem aware of them (Cherney 1990).

From this review of the limited previous research, it would appear that RBD subjects have some difficulty with fluency.

6.5 Theoretical explanations for RBD discourse deficit

As has been the case for the effects of ageing and SES on discourse, the presence and exact nature of discourse deficits following RBD is not clear. Furthermore, it is not apparent if some of the reported impairments can be explained in terms of one or more underlying deficits or processes although a number of theoretical explanations have been proposed.

The RH communication disorder is considered to be strongly related to deficits in cognitive abilities. Pure language-based impairments have been reported in RBD subjects (see above) but they are mild and do not have much effect on communication ability. However, the underlying mechanisms of many RBD communication deficits are hypothesised to be cognitive rather than linguistic (Myers 1999). The effect on their discourse of these underlying cognitive impairments may be more readily observable as it will not be confounded by syntactic errors. Thus the interrelationship between language and cognition in the RH may be more transparent.

6.5.1 General explanations

Before considering the cognitive-communication relationship in this population, two generalised explanations of the RBD communication deficit will be presented. Firstly, ageing has been implicated in RBD deficits because it has been hypothesised that RH functions degenerate more rapidly than the left hemisphere (Kaplan 1977, Joanette et al 1986, Gainotti et al I983). However, although the cluster of linguistic deficits are similar in ageing and RBD, the nature of the impairment is qualitatively different (Gardner et al 1983, Roman et al 1987). Hiscock (1998) concludes that at present "inducing a general principle regarding differential decline of left- and RH abilities does not appear to be feasible" (p 366). Further research into the similarities and differences between the discourse of RBD and elderly subjects is necessary (Joanette et al 1990) but this needs to be approached with care (Hiscock 1998).

Secondly, a related interpretation is that the brain-damage in these subjects is responsible for a certain degree of overall cognitive deterioration which affects the processes necessary to produce adequate discourse. On the other hand, the RBD subjects who demonstrate discourse impairments may have some degree of premorbid overall cognitive deterioration (Joanette et al 1986). However this requires a comparison of the discourse performance of RBD, aphasic and early dementing subjects, correlated with assessments of cognitive integrity, taking into account the RBD subjects' possible difficulties with visually presented materials.

6.5.2 Cognitive deficits and the cognitive-communication relationship

The cognitive-communication relationship of this population can be differentiated into two categories. Firstly, this group may suffer from cognitive impairments that are manifested in aspects of their general functioning, as well as in their language. These include unilateral neglect, visuo-spatial deficits, prosopagnosia (facial recognition deficit) and anosognosia (a denial of or indifference to illness) as well as impairments in organisation and problem-solving, attention and memory (for reviews, see Myers 1999 and Tompkins 1995[44]). Although these are pure cognitive aspects, their impairment would affect the communicative abilities of the RBD subjects.

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[44] The potential impact of cognitive impairments on communication with relation to treatment is discussed by Boyle and Strikowksy-Harvey (1999).

Memory, an essential part of cognition, includes the semantic store which consists of the general store of our world knowledge (Hemp 1986). It would therefore also contain discourse schemata i.e. structures which organise and represent our knowledge of discourse (Warrington 1986). A semantic memory impairment has been implicated in RBD communication deficits and Joanette, et al (1988) have suggested that a malfunctioning of less automatic semantic memory retrieval processes may underlie the word naming difficulties in RBD subjects. Furthermore, the discourse deficit demonstrated by a RBD subject was also explained in terms of a semantic memory impairment, specifically when a more intensive directed search is needed (Sherratt 1988, Sherratt and Penn 1990).

A recent explanation for many of the communication difficulties exhibited by RBD subjects is a dysfunction of the executive functioning system (McDonald 2000, Sabbagh 1999). This system is conceptualised as a "superordinate cognitive system that mediates and regulates all other cognitive activity in a goal-directed fashion" (McDonald 2000, p 86). An impairment would lead to rigidity in thought processes, concrete and superficial responses, failure to think at an abstract level and poor regulation of behaviour (Lezak 1995). Some communication deficits manifested in these subjects are consistent with such damage although some predictions it makes are not borne out (Sabbagh 1999).

Secondly, the basis for their communication difficulties has been considered to lie at *the interface between language and cognition*. One hypothesis is that the expressive language difficulties reflect defects in visual information processing (e.g. Myers and Brookshire 1994, Rivers and Love 1980). Thus difficulties in visual integration are observable in higher level integration and have been extended to explain RBD language deficits (Kaplan, Brownell, Jacobs and Gardner 1990, McDonald 2000, Moya et al 1986, Myers 1999, Stemmer, Giroux and Joanette 1994). It has also been postulated that the RH serves a gestalt or holistic processing function (e.g. Gardner et al 1983, Wapner et al 1981). Thus RBD subjects have difficulties in acquiring a sense of the overall gestalt of linguistic entities. Gestalt processing suggests a single stage of processing but hierarchically organised stages may explain the nature of the RH communication deficit more adequately. It is felt that these hypotheses provide a superficial rather than specific explanation of the language-cognitive relationship.

Myers (1991,1993) has proposed that inference failure may represent a "central" deficit which underlies most RBD communication disorders. However, notions such as integration and drawing inferences are considered to be too vague if they are not investigated within a processing framework (Stemmer 1999) and no strong direct evidence for such a deficit seems to exist (Chantraine et al 1998b, Rehak et al 1992a). Tompkins (1995) suggests that deficits apportioned to integration may be traced to other difficulties e.g. greater demands on mental resources. Myers (1999) concluded that although integration deficits do not provide a comprehensive explanation, they may offer one viable clue to the mechanism underlying macrostructure deficits. Gernsbacher and colleagues (Gernsbacher, Varner and Faust 1990, Gernsbacher and Faust 1991a) have proposed that impairments in a suppression mechanism may explain deficits which have been observed in RBD subjects (e.g. irrelevant output, impaired cohesion, figurative language comprehension deficits). This explanation also strongly implicates impairments in attentional processes. The interaction of automatic and controlled attention processes are involved in selecting the appropriate meaning and the inappropriate information is then suppressed or discarded by the controlled attentional processes.

A more recent hypothesis proposed to explain RBD deficits is that their difficulties lie in a "theory of mind" deficit. In RBD research, "theory of mind" has come to mean that in order to interpret someone's external behaviour, an individual must have the ability not only to develop a theory about what someone knows but also about their emotional state (Myers 1999). The theory of mind deficit also relates to these subjects having problems making inferences i.e. inferences about other person' beliefs and intentions (Stemmer and Joanette 1998). Winner, Brownell, Happe, Blum and Pincus (1998) concluded that

"At best, they seem to have a fragile ability to determine what one person thinks another person knows" (p. 100).

However, the level of impairment varied and some subjects demonstrated no such deficit. In a further study Happe, Brownell and Winner (1997) found that the theory of mind deficits were due specifically to right hemisphere rather than to brain-damage in general. However doubts have been raised for theory of mind being the underlying deficit of these subjects as they were found to retain significant theory of mind capacities (Ostrove, Simpson and Gardner 1990) and were not impaired at solving theory of mind tasks (Bara, Tirassa and Zettin1997).

Although a number of these explanations appear promising in general, the specifics still need to be detailed and investigated before any of them can be adequately applied to the RBD population. Tompkins (1995) has concluded that none of the proposals in their current forms provide adequate accounts of RBD communicative difficulties.

As stated, deficits in attention have been frequently observed in the RBD population (see Eviatar 1998, Foster, Eskes and Stuss 1994, Murray 2000). Attention is a complex process and is fundamental to all cognitive processing including communication. It can be defined as "the directivity and selectivity of mental processes, the basis on which they are organised" (Luria 1973, p 256).

The RH is considered to be of predominant importance in attention (Geschwind and Galaburda 1987). It has been specifically associated with certain types of attention. It has a particular role in controlling arousal and vigilance, specifically the right frontal lobe (Coslett et al 1987, Beaton 1985, Heilman, Valenstein and Watson 1985, Mesulam 1981, Posner 1994). The RH, specifically the pre-frontal and superior parietal cortex, is implicated in sustained attention (Bub, Audet and LeCours 1990, Pardo, Fox and Raichle 1991, Posner and Peterson 1990). It is also dominant for directed or selective attention (Heilman et al 1984, Mesulam 1985). Other aspects of attention which have been implicated are disengaging and shifting covert attention (see Myers 1999). Unilateral neglect is commonly associated with damage to the RH (Cherney and Halper 1994, Myers 1993), particularly the parietal lobe

(Posner 1994). These can result in deficits such as inattention, hemiakinesia, allesthesia, extinction and prosopagnosia (Heilman et al 1983). It is thus not surprising that the RBD communication deficit is believed to result from an underlying deficit in attention or facets of attention (Tompkins 1995).

Their attentional impairments have been implicated in certain specific communication difficulties. Word retrieval deficits in RBD subjects are secondary to impairments of attention and other cognitive functions (Myers 1997, Tompkins 1995). Murray (2000) reported significantly poorer accuracy in word retrieval tasks by RBD subjects during focused and divided attention conditions. Glosser and Goodglass (1991) also attributed idiosyncratic lexical associations in these subjects to an attentional disorder. Stemmer et al (1994) noted that RBD subjects with attention or neglect impairments were more impaired in comprehending figurative and language and non-conventional indirect requests. However, the effect of attention or aspects of attention on discourse processing is limited and has not been systematically investigated.

Another aspect of RBD subjects' behaviour that supports the hypothesis that an attentional deficit underlies their communication is their emotional indifference. This is manifested in a deficit in the comprehension and production of emotional expression as conveyed by means of facial expression, verbal content, body language and the prosodic features of oral speech (for reviews see Borod 1993, Gainotti 1999, Lorch et al 1998, Myers 1999, van Lancker and Pachana 1998). It has also been noted that emotional content suppressed the pragmatic performance of the RBD group and that emotionally positive topics elicited poorer performance (Bloom et al 1993a, Borod et al 2000). Furthermore RBD subjects produced discourse with less emotional intensity than normal subjects (Borod et al 1996) and demonstrated a specific reduction in the production of emotional content in discourse (Bloom et al 1992). Evidence to date demonstrates that the RBD patients' flat affect is more likely to be the result of a decrease in arousal and attention, inference deficits or theory of mind impairments than of an underlying emotional disturbance (Myers 1999). It is suggested from research that the RH is

> *"critically involved not only in tasks of emotional communication, but also (and probably above all) in the generation of the vegetative components of the emotional response and of the concomitant subjective experience of emotions" (Gainotti 1999, p 627).*

Limitations of a mental resource such as attention may be used to explain deficits in any communicatively-impaired group but may risk being "too seductive" (Tompkins 1995, p 80).

> *"In everyday language, the organization of the communication process requires the coordination of both left- and right-lateralized attention/memory systems" (Luu and Tucker 1998, p 171).*

It would seem that a more detailed analysis of the attentional deficits exhibited by RBD subjects, correlated with their performance on a variety of discourse tasks, would provide support for the extent of the role of attention in their communication deficits. Their attention impairments may represent a significant contributor in their cognitive, communication and behavioural difficulties and might provide a cohesive framework for the explanation of their deficits. If the level of attention or its facets operating in RBD subjects could be ascertained, more appropriate assessment and treatment for these patients could be developed.

The descriptions and explanatory accounts of RBD discourse need to be grounded in psychological theories and models of discourse processing if the underlying processing mechanisms are to be uncovered (Stemmer 1999). Myers (1999) has reiterated that the lack of information about the underlying nature of their disorders has led clinicians to attempt to manage them without a theoretical base and to focus solely on symptoms rather than on underlying processes. Tompkins (1995) has stated that our lack of knowledge of their core deficits mean that "we can only guess about how to target our effort" (p 224). It should be noted that there are no efficacy data available for any type of treatment for RBD communication deficits and that there are almost no treatment studies in the literature at this time (Burns, Schneider, Buth, Eisenberg, Kelly, Litwin, Sonin, Buckley and Glass 1999, Myers 1999,1999b, Tompkins and Lehman 1998, Tompkins, Lehman, Wyatt, Schulz 1998).

6.6 Conclusions

From the above discussion it can be concluded that RBD communication, particularly discourse, has not been adequately investigated. In addition it would appear that the linguistic rather than the cognitive level has been emphasized and the inter-relationship between impairments has been largely ignored. The lack of research linking the discourse deficit to specific lesions, to specific cognitive impairments or to a general communication disorder has limited progress in this area. Research has also been hampered by the overall lack of a methodical and comprehensive approach to discourse in general, as demonstrated in research into the discourse deficits of other impaired groups. The RH damage studies so far have not provided a clear picture of the nature of the disorder nor the relationship between cognition and language in this hemisphere, although there is a pressing need.

> *"It is important, not just for clinicians but also for the general public, to become aware of (RBD communication deficit) as a social handicap at least as significant as aphasia". (Paradis 1998, p 7).*

In this study, the effects on discourse of demographic variables and discourse sampling techniques will be systematically investigated using a multi-level discourse processing model. Within this, an examination of the relationship between the discourse measures and attentional status will be undertaken. This should provide a rigorous basis for the detailing of the discourse deficit demonstrated by RBD subjects and any associated attentional deficits.

6.6 Summary

This chapter has discussed the limitations of previous research into RBD communication deficits and provided a summary of the discourse deficits in this population which relate to the discourse model described in Chapter 1. Proposed explanations for the RBD discourse deficits were presented. The method of investigation of the discourse of the NBD and RBD subjects is presented in Chapters 7 and 10 respectively.

CHAPTER 7
NORMAL DISCOURSE PERFORMANCE: METHODOLOGY

This chapter describes the methodology for the investigation of the effects of age, SES and discourse sampling on the discourse of NBD subjects. It sets out the aims and details of the subjects, task selection, procedure for the collection of data, discourse analysis measures and of the attention assessments.

7.1 Aims

The aims of this stage of the study are

- To determine the effects of ageing on the narrative and procedural oral discourse of NBD males
- To determine the effects of socio-economic class on their discourse
- To determine the effects of discourse genre (narrative and procedural), method of narrative discourse elicitation and topic selection on their discourse performance.
- To correlate the results of the attention measures with the discourse measures as well as inter-correlating the results.
- To select the discourse elicitation tasks to be used to assess the RBD subjects.

7.2 Subjects

7.2.1 Size of sample

Thirty-two adult males were selected for assessment. This sample size is sufficiently large to enable statistical procedures to be carried out on the data.

7.2.2 Criteria for subject selection

The subjects were selected according to the following criteria:-

a) The subjects should be adult males. Only male subjects were selected as there is limited and inconclusive information regarding the specifics of male-female discourse differences/similarities (see Chapter 2).

b) The subjects should be living independently in the community. This would reflect the individual's level of functioning and eliminate the negative effect of institutional living on communication (see Chapter 4).

c) The subjects should have no history of neurological, psychological or substance abuse disorders, the effect of which may confound the results.

d) The subjects should have a minimum of eight years of formal education as this presupposes adequate language and literacy skills.

e) The subjects should be equally distributed between the following four age groups:-

Group A	50 to 59	8 subjects
Group B	60 to 69	8 subjects
Group C	70 to 79	8 subjects
Group D	Over 80	8 subjects.

f) Within each age band, the subjects should represent the following socio-economic categories (OPCS 1992) equally, i.e. two subjects per category.

I	Professional (8%[45])
II	Intermediate and technical (27%)
III	Skilled non-manual and manual (46%)
IV	Partly skilled and unskilled (18%).

The subjects were categorised according to their current occupations (if still employed) or their final occupations (if already retired).

g) The subjects were required to be native language English speakers.

h) They should have sufficient visual acuity (corrected or uncorrected) to read a newspaper and hearing (aided if necessary) adequate for conversation in a quiet room.

7.2.3 Description of subjects

Thirty-two community-living male subjects participated in this study. The subjects were contacted by means of local voluntary, community, sports and religious organisations. They were self-selecting in that they volunteered to participate (see Chapter 4). They were all English-speaking drawn from the same general population i.e. a medium-sized English town.

Details of the subjects' ages are given below:-

Group	Average Age	(Range)
A	55	(50 - 59)
B	64.3	(60 - 67)
C	73.4	(70 - 79)
D	84.5	(80 - 94)

In each age group, two subjects from each of the four socio-economic categories were selected and assessed.

[45] The figures given in brackets denote the percentage of men in each SES category in Great Britain (1991).

7.3 Assessment of Discourse

7.3.1 Discourse elicitation materials

a) Rationale for selection of tasks

The rationale for the selection of the two genres and the type of tasks used in this study is discussed in Chapter 3.

b) Selection of discourse elicitation tasks

(i) Self-generated personal-narratives

The topics which can be used to elicit personal-narratives are drawn from a relatively small pool of possible experiences. The four examples used here were selected on the basis of previous research into types of memorable narratives (Black, Wilks-Gibbs and Gibbs 1982, McCabe and Peterson 1990), the discourse assessment of neurogenic populations, and research into human emotions (see Gainotti 1999, Van Lancker and Pachana 1998). Due to the effect of emotional valence (positive or negative emotions) on discourse performance in RBD subjects (see Chapter 6), particular importance was placed on those emotional experiences investigated in the RBD population (Borod 1993, Borod et al 1996, 2000, Bloom et al 1992, 1993a, Van Lancker and Pachana 1998).

(ii) Picture-sequence narratives

A pilot study was carried out to select the picture-sequences to be used. The source of these sequences is a manual aimed at English-speaking adult learners of German (Plauen 1952). Due to the fact that they were adult-oriented, their content and style made them more relevant and appropriate for use with this group. They were also considered particularly relevant to older males because the two main characters were a father and his son. By selecting the sequences from the same source, specific details of the pictures themselves could be controlled (e.g. the number of picture frames, the style of the artist, amount of detail, size, medium, clarity, etc.). Ten picture-sequences were chosen from the manual after examining the number and gender of the characters involved, changes of setting and time and the number of events/episodes depicted. These ten sequences were presented to ten NBD male adults (ranging in age from their twenties to their seventies and of varying occupations). They were instructed to select from a list the emotion which accurately described the feelings evoked in them by each sequence. These picture-sequences were ultimately intended for use with RBD subjects who have known difficulties in the comprehension and production of emotions (see Chapter 6). Therefore, the predictability with which the stimuli elicited specific emotions was considered to be crucial. For each sequence, the percentage of male subjects selecting the same evoked emotion was calculated. Four of the picture-sequences which achieved agreement amongst the majority (70% or greater) of the male adults were selected for this study. Details of the sequences are provided in Section 7.3.1c below and the pictures are presented in Appendix A2.

(iii) Procedural discourse

The selection of topics for the procedural tasks was based on a number of criteria. On the basis of a previous research (Sherratt 1988), procedural tasks which were simple and learnt early in life (e.g. making a sandwich, making tea, posting letters, etc.) were not included in this study. Although these have been used frequently to elicit discourse from the neurogenic population, these tasks produce brief samples, often syntactically simple and using telegrammatic language. This is possibly due to the fact that they are not ecologically valid as it is not normal practice for NBD adults to explain basic procedures to other NBD adults (see Chapter 2).

The topics selected in this study were considered to be similar in that they were relatively complex procedures performed infrequently and learnt later in life. The explanation of how to carry out more complex procedures may occur in everyday life. In addition the topics were chosen to be male-oriented as the age groups being assessed had grown up in an era where delineation of work was more clearly defined by gender. Furthermore the procedural topics used were age related in that some of them (e.g. changing a car tyre, fixing a pane of glass in a window) would have been tasks carried out by older men throughout their lives. Younger men may rely on trained specialists (e.g. car recovery services, double-glazing window fitters).

c) Specific discourse elicitation tasks

Four topics for each narrative elicitation method and six for procedures were selected so that comparisons between the different stimuli could be observed and a more careful choice of tasks for presentation to the RBD subjects could be made.

The specific tasks used were as follows:-

i) Narrative discourse

(a) Four samples were elicited by means of the six-picture-sequences selected on the basis of the pilot study (Section 7.3.1b). The sequences themselves can be found in Appendix A2. They depicted a father and his son involved in the following activities:-

- throwing stones together ("stones")
- capturing a burglar ("burglary")
- dealing with a wasp at a mealtime ("wasp")
- completing homework together ("homework").

Each picture-sequence was presented to the subjects on a card which remained in full view of the subject throughout the discourse elicitation to minimise memory effects. The seating arrangements ensured that the picture-sequence was not visible to the examiner. This layout attempted to produce a less artificial task and to encourage narrative rather than descriptive discourse as more oral and less elaborated narrative may be elicited by means of material visible to speaker and interlocutor (Westby 1984, Ulatowska and Chapman 1989). Chapman et al (1998) reported that maintaining the stimulus in view encourages less paraphrasing and less inferencing.

The subjects were instructed to

> "Tell me the story about the father and son that you see in the pictures".

Mentioning the identity of the father and son provided clarity to the subjects, particularly regarding referential skills.

(b) Four samples of personal-experience narratives were elicited by means of an oral request to

"Tell me about a
frightening
embarrassing
happy
funny
experience that you have had at any time in your life".

No visual stimuli were provided.

ii) Procedural discourse

Six procedural discourse samples were elicited from the subjects by means of an oral request to

"Tell me how you would ...
.... change the flat tyre on a car
.... replace a broken pane of glass in a house window
.... buy a new jacket or coat
.... borrow a book from the library
.... go shopping in a supermarket
.... teach someone to ride a bike (push bike)".

No visual cues were provided.

A maximum of fourteen discourse samples (two narrative discourse elicitation methods x four topics=eight narratives + six procedural tasks) could be elicited from each subject. This would potentially provide a total of four hundred and forty eight (448) samples.

7.3.2 Channel of production

All samples were elicited orally from each subject.

7.3.3 Procedure for the collection of data

The discourse samples were elicited from the subjects during individual sessions which took place in the living rooms of the subjects' own homes. A familiar home situation was used to encourage a more informal, relaxed environment in which more spontaneous discourse could be produced. The length of assessment varied from two to three hours and each assessment was arranged to suit the individual needs of the subjects. Appropriate breaks were recommended and provided to overcome the effects of fatigue. The subjects were informed both by letter and verbally of the details of the research and any additional requests for information or explanations were supplied during the discourse sampling session. All assessments were carried out by the researcher to obviate the effect of different interlocutors on the discourse samples.

Each discourse sample was elicited as per the instructions given above. The order of eliciting the samples was systematically varied for all subjects for type of discourse, method of elicitation and topics of the tasks to eliminate order effects. If subjects were unable to produce a particular narrative or procedure, the researcher continued with the next task.

To minimise verbal participation during sample production, the researcher demonstrated non-verbally her interest in the subject's output (e.g. leaning forward, eye contact, facial expression, etc.) whilst confining verbal responses to backchannel communication (e.g. yeah, uh, mm) or stereotyped phrases (e.g. oh gosh, really). These verbalisations, called the "perverse passive" (Jefferson 1984) have been found to elicit further talk from the speaker and allow the interlocutor/recipient to avoid speaking. When a silent pause of five seconds occurred at a probable end-point to the discourse topic, the researcher commented "OK. then?" to determine if indeed this was the end of the sample.

Introductory and final comments and queries produced by the subjects were included in the samples as these were considered as part of their discourse performance. It is problematic to separate these from the body of the sample and they also provide information regarding the frequency of the extraneous comments which are made by all subjects, regardless of neurological impairment.

The discourse sampling, which took place in relative quiet, was recorded on a Sony Stereo Cassette-Corder TCS-450.

As stated above, a maximum of fourteen discourse sample could be elicited from each subject, resulting in a possible total of four hundred and forty eight samples. However, due to the fact that not all subjects produced each personal-narrative or procedural discourse sample (e.g. inability to remember an appropriate relevant experience or provide a procedure), a total of *three hundred and ninety four samples* (394) were collected.

The number of subjects producing each discourse topic samples is indicated in Table 7.1

DISCOURSE TOPIC	NO. PRODUCED
Personal-narratives	
Frightening	28
Embarrassing	10
Happy	30
Funny	27
Picture-sequences	
Stones	32
Burglary	32
Wasp	32
Homework	32
Procedures	
Tyre	31
Window	31
Jacket	30
Book	26
Supermarket	24
Bike	29
TOTAL	**394**

Table 7.1: Quantity of each topic sample elicited

7.3.4 Transcription of discourse samples

The discourse samples of all subjects were orthographically transcribed by the author. The transcription of each sample was checked by the author two to six months after collection.

7.3.5 Analysis of data

Each discourse sample was analysed in terms of seven broad areas, viz.:-

- relevance/irrelevance
- structure or discourse-grammar
- clarity of language
- productivity and syntactic analysis
- clausal structure
- cohesion
- dysfluency.

Each of these incorporate a variable number of individual measures and will be discussed separately below.

a) Relevance ratings

As discussed in Chapter 3, the notion of relevance is a difficult concept to evaluate in any objective manner. To evaluate the relevance/irrelevance of each sample to the discourse topic supplied, a four-part Likert scale was developed (see Table 7.2). On this, the global relevance (i.e. at the macrostructural level) of the sample is scored from "inappropriate" to "appropriate" with a higher score indicating less relevance. A four-part scale was used to overcome the problems of central tendency (i.e. a tendency for raters to score in the most neutral category and thereby avoid extremes).

In addition to the scale, four categories indicating an impairment in relevance (Table 7.2) as well as an "other" category for unclassifiable irrelevance were provided so that the assumptions underlying the irrelevance of the sample can be noted. In an attempt to determine the quantity of the sample which is considered irrelevant for a particular reason, raters were asked to categorise it on a three part frequency scale of "mostly" to "rarely". This would provide additional information regarding samples in which more than one reason for irrelevance was applicable.

b) Discourse-grammar

As discussed in Chapter 3, the evaluation model of narrative discourse developed by Labov (1972) was used in this study. His six-part narrative structure with sub-categories provided by Peterson and McCabe (1983) is provided in Table 7.3 .

The major parts of Labov's narrative structure can be viewed as answers to listeners' questions (Labov 1972), viz.:-

- what was this about? (abstract),
- who, when, what, where? (orientation),
- then what happened? (complication),

- so what? (evaluation),
- what finally happened? (result).

Additional questions suggested by Lahey and Launer (1986) and explanations of the categories were provided to the raters (Appendix A1).

RELEVANCE PROFILE

	Mostly Inappropriate	Inappropriate	Mostly Appropriate	Appropriate
Relevance				

Did you consider the sample as irrelevant because:

	Mostly	Sometimes	Rarely
a) although the information given was new, it was unconnected to previous information?			
b) the information was already present in the context?			
c) the information was inconsistent with the context?			
d) the additional information gave too much detail to be relevant to communication?			
e) for another reason(s) (please describe below)			

Table 7.2: Profile for rating discourse relevance

NARRATIVE DISCOURSE-GRAMMAR				
	PRESENT		ABSENT	
	Appropriate	Inappropriate	Appropriate	Inappropriate
Abstract				
Orientation:				
Participants				
Time				
Location				
General Conditions				
Ongoing events				
Tangential Information				
Imminent Events				
Features of Environment				
Complicating action				
Evaluation				
Onomatopoeia				
Stress				
Elongating particular Words				
Repetition				
Exclamation				
Compulsion words				
Similes and Metaphors				
Gratuitous items				
Attention-getters				
Words per se				
Exaggeration + Fantasy				
Negatives				
Intentions, Purposes, hopes				
Hypotheses, Predictions				
Results of high Point action				
Causal Explanations				
Objective Judgements				
Subjective Judgements				
Facts per se				
Internal emotional States				
Tangential Information				
Result/resolution				
Coda				

Table 7.3: Profile of narrative discourse-grammar

To determine the appropriateness of the discourse-grammar of the samples, a two point rating scale was used to capture the appropriateness or lack of it and also the presence or absence of the element. Certain features of the discourse-grammar can be appropriately present or absent (e.g. abstract and coda) whilst others (e.g. orientation) can only be rated as appropriate if they are present.

Procedural discourse structure was examined using Ulatowska et al's (1981, 1983a) modification of Labov's narrative analysis and its features are presented in Table 7.4.

PROCEDURAL DISCOURSE-GRAMMAR				
	PRESENT		ABSENT	
	Appropriate	Inappropriate	Appropriate	Inappropriate
Introduction/Orientation				
Sequence of steps				
Essential steps				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Optional steps				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Target				
Coda				

Table 7.4: Profile of procedural discourse-grammar

These features were analysed in a similar manner to the narrative discourse tasks (presence/absence and appropriateness/ inappropriatenes). The essential and target steps in each procedural task based on the frequency with which they occurred in the individual procedures were provided to the raters

(Appendix A1). The questions suggested by Ulatowska et al (1983a) regarding the appropriateness of the optional elements and the structural coherence of the procedures were also supplied

c) Clarity disruptors

CLARITY DISRUPTORS	Number	Percentage
Non-specific components		
Empty phrases	______	
Indefinite terms	______	
Deictic terms	______	
Total		______
Word-substitutions		
Neologisms	______	
Paraphasias	______	
Circumlocution	______	
Total		______
Content and Fluency Disruptors		
Repeated words or phrases	______	
Repetition of ideas	______	
Semantic perseveration	______	
Comments on the task	______	
Personal value judgments	______	
Intrusive words or phrases	______	
Total		______
TOTAL OF ALL DISRUPTORS		______
Total no. of words		______
PERCENTAGE		=======

Table 7.5: Profile for clarity disruptor analysis

The development of the clarity disruptors profile (Table 7.5) is described in Chapter 3. It comprises twelve clarity disruptors divided into three categories: non-specific components, word-substitutions, content and fluency disruptors. Firstly, non-specific components incorporates three elements which provide quantity of output without content. Although elements such as empty phrases may impair the clarity of discourse, they are devices which are used to monitor and attempt to control the flow of information (e.g. anyway, OK, by the way) (Chafe 1985).

Secondly, the word-substitutions category contains those elements which are either incorrect or unintelligible word substitutes (neologisms or paraphasias) or circumlocutions (a descriptive phrase when the specific word cannot be produced). Substitution elements (i.e. neologisms, paraphasias and circumlocution) do not appear to be a substantial component of the discourse of NBD males.

Thirdly, content and fluency disruptors comprise six features which impede the fluency of communication and/or do not contribute to the content e.g. the repetition of words, phrases, sentences or ideas which are not for effect and fall beyond the requirements of the discourse sample (Andreasen 1979). This category also contains words, phrases or sentences which are judged to be extraneous to the discourse task for various reasons (e.g. personal judgements on the task or performance, elements unrelated to the topic, comments on the task).

The definitions of these features including examples are provided in Appendix A1. Their incidence was calculated by means of a frequency count of the disrupting elements (in words), determined as a percentage of the total sample length in words.

d) Productivity and syntactic analysis

This profile (Table 7.6) is concerned with two aspects of the discourse sample, viz. the productivity of the discourse task and its syntactic level. The productivity of the sample was determined by its length in total words produced.

To determine the syntactic complexity or level of the discourse produced, the samples were segmented into syntactic units known as T-units (minimal terminable unit) which are considered to be thought units, consisting of one main clause and all subordinate clausal and non-clausal elements embedded in it (Hunt 1970). The samples were also segmented into clauses.

From this analysis three ratios were calculated:-

- the number of words per clause (clause-length)
- number of words per T-unit (T-unit-length)
- clauses per T-unit (index of clausal-embedding).

PROFILE OF PRODUCTIVITY AND SYNTACTIC MEASURES	
	Number
Total number of words (No. W)	_______
Total number of T-units	_______
Mean number of words per unit (W/T)	_______
Number of clauses	_______
Mean number of words per clause (W/Cl)	_______
Mean number of clauses per T-unit (Cl/T)	_______

Table 7.6: Profile of productivity and syntactic measures

Instructions on word count and examples of the syntactic complexity measures are provided in Appendix A1.

e) Clausal structure

Although the syntactic level measures presented in the previous section capture the syntactic structures used in the discourse samples, the specific nature of the subordinated sentence structures was also examined using the method of analysis developed by Kemper and her colleagues (see Chapter 3).

The frequency of the left- and right-branching clauses as well as main clauses was determined (Table 7.7). Each specific type of embedded clause (gerunds, relative clauses, that clauses, infinitives, Wh-clauses, subordinates and co-ordinates) was examined and the nature of their embedding (i.e. left/right-branching) was scored. The percentage of total clauses and the proportional amounts of main, left and right-branching clauses were then calculated.

PROFILE OF CLAUSAL STRUCTURE	Frequency
Main clauses	________
Gerunds	
Subject embedded (L)	________
Predicate-embedded (R)	________
Relative clauses	
Subject-embedded (L)	________
Predicate-embedded (R)	________
That clauses	
Subject-embedded (L)	________
Predicate-embedded (R)	________
Infinitives	
Subject-embedded (L)	________
Predicate-embedded (R)	________
WH-clauses	
Subject-embedded (L)	________
Predicate-embedded (R)	________
Subordinates	
Noun Phrase (L)	________
Verb Phrases (R)	________
Co-ordinates	
Noun Phrase	________
Verb Phrase	________
Total clauses	________
% Left branching	________
% Right-branching	________
% Main clauses	________

Table 7.7: Profile of clausal structure measures

f) Cohesion

PROFILE OF COHESION

	CODE	NO.	TOTAL
REFERENCE			____
Pronominals	R1	____	
Demonstratives and definite article	R2	____	
Comparatives	R3	____	
SUBSTITUTION			____
Nominal substitutes	S1	____	
Verbal substitutes	S2	____	
Clausal substitutes	S3	____	
ELLIPSIS			____
Nominal ellipsis	E1	____	
Verbal ellipsis	E2	____	
Clausal ellipsis	E3	____	
CONJUNCTION			____
Additive	C1	____	
Adversative	C2	____	
Causal	C3	____	
Temporal	C4	____	
Other ("continuative")	C5	____	
LEXICAL			____
Same item	L1	____	
Synonym or near synonym	L2	____	
Superordinate	L3	____	
"General" item	L4	____	
Collocation	L5	____	
ATTEMPTS			____
TOTAL COHESIVE TIES			=====
TOTAL T-UNITS			____
TOTAL NO. OF TIES PER T-UNIT			____
ANDS:-			

Table 7.8: Profile of cohesion analysis

As discussed in Chapter 3, the cohesion analyses developed by Halliday and Hasan (1976) was used to analyse the cohesion of the samples. This analysis contains five primary categories of cohesion, i.e. reference, substitution, ellipsis, conjunction and lexicalisation (Table 7.8). Each cohesive tie was coded according to these cohesive categories and recorded on the cohesion profile. In addition, each incorrect or incomplete tie (classified as an "attempt") was noted and included in the analysis. The ratios of each category of cohesive ties to the number of T-units was calculated as well as the ratio of total number of cohesive ties to T-units.

g) Dysfluency

From an examination of previous research (see Chapter 3), five types of dysfluency were selected to be employed in this study and are listed in Table 7.9. Details of each type are provided in Appendix A1.

Each type of dysfluency was counted and a percentage of dysfluencies per sample was calculated. In the measurement of dysfluency, some researchers include “comments”, “personal, irrelevant or clarifying comments” (Cooper 1990, Feyereisen et al 1991). These have been separately catalogued in this study (see Clarity Disruptors profile).

PROFILE OF DYSFLUENCIES

	No. of words	
False starts	____________	
Incomplete mazes	____________	
Repetition	____________	
Nonword fillers	____________	
Part-word production	____________	
Total dysfluencies	============	
Total words	____________	
Percentage dysfluencies of total words		==========

Table 7.9: Profile of dysfluency analysis

7.3.6 Reliability of scoring

The 460 discourse samples (NBD: 394 + RBD: 55) were analysed on the seven broad areas of assessment by the author. A systematically selected representative sample of the transcripts (57/459 = 12.5% of the samples) were used for assessing reliability of scoring. These transcripts were selected to reflect the relative incidence of NBD and RBD subjects as well as each genre, task and topic. Each of the selected transcripts was analysed on the seven assessment profiles by another speech-language therapist. In addition, these transcripts were analysed by a third speech-language therapist on the two profiles using ratings scales (Relevance and Discourse Grammar). Interjudge agreement was calculated using the following formula:

{total agreements/total agreements + total disagreements} x 100

Interjudge reliability was 90.14% (83, 85, 88, 95, 96, 89, 95) for the seven profiles and 86.15% (84.9, 87.4) for the additional rating scales scoring.

7.4 Assessment of Attention

Attentional impairments have been reported both in normal ageing and following RBD (Chapters 3, 4 and 6) and have been proposed to be the, or one of the, mechanisms which could account for the deficits in their discourse. By assessing the attention status of these subjects, an examination of the relationship between impairments in discourse and attention can be made.

Three tests were selected for the assessment of attention in this study, based on their capacity to assess those components which are common to most theories of attention. Their perceived utility and frequency of usage in the investigation of discourse impairment was also considered. The three tests selected were:-

- Digit Span Test (Wechsler 1987)
- FAS Word Fluency Test (Benton and Hamsher 1976)
- Trail-Making Test (Reitan 1958).

7.4.1 Digit Span Test

This test (WAIS 1987) assesses concentration span or focused attention and is also considered as a measure of auditory short-term/working memory (see Chapter 3). It consists of two parts viz. forward digit span (direct repetition of the numbers) and backward digit span (repetition of the presented numbers in reverse order). In addition to these two scores, the mean Digit Span score was calculated (for comparison to previous studies).

7.4.2 Benton Oral Controlled Word Association Test

The second measure of attention was verbal fluency, a continuous performance test, which evaluates attention and vigilance. The Benton Oral Controlled Word Association Test (Benton and Hamsher 1976), a controlled word-association test (known as the FAS test) was selected. It is considered to be a naming test of great value and an excellent measure of verbal fluency (Albert and Kaplan 1980, Cummings and Benton 1983). This test supplies a single score, comprising the mean of the three fluency sub-tests.

7.4.3 Trail-Making Test

The third measure of assessment was the Trail-Making Test (Reitan 1958). It consists of two parts which each produce a single score. Part A is used as a test of sustained attention whilst Part B assesses alternating attention (Tompkins 1995, Myers 1999).

7.5 Statistical treatment of results

The results of the discourse and attention measures were statistically analysed using SPSS Versions 7 and 10. Due to the distribution of the results, non-parametric statistical tests were employed (Cramer 1998). Although these tests are usually considered to be less powerful than parametric tests, this has been widely debated (see Howell 1997). Non-parametric tests have been shown to be as powerful as their parametric counterparts (Doehring 1996, Howell 1997). In addition, non-parametric tests (particularly those employed in this study which use rankings) are not affected by a few outliers (Howell 1997).

Due to the large number of comparisons in this study, the Bonferroni procedure was used to control the inflated alpha error rate which is associated with multiple comparisons (Howell 1997, SPSS 1999). Thus the significance level of 0.05 is adjusted by dividing it by the number of comparisons being made (Cramer 1998). The adjusted alpha levels are indicated when necesssary.

To determine the rarity of performance of the RBD subjects compared to the control group, the modified t-test (Crawford and Howell 1998) was used (see Chapter 13).

7.6 Summary

This chapter has described the subjects, selection of discourse tasks and the assessments (of communication, discourse and attention) relating to the performance of NBD subjects. The results of these assessments will be presented in the following chapter.

As discussed in Chapter 1, the combination of quantitative and qualitative research can provide additional insights into discourse production. Therefore, in the age, SES and discourse task sections below, the significant results are provided for each measure, followed by the trends that are demonstrated by the data.

CHAPTER 8
NORMAL DISCOURSE PERFORMANCE: RESULTS

This chapter will provide details of the results of the analysis of the discourse of the NBD subjects in terms of the effect of age (Section 8.1), SES (Section 8.2) and discourse sampling (Section 8.3). The selection of discourse tasks for use with the RBD subjects will then be presented (Section 8.4). Finally, the results of the attention assessments will be set out together with the correlations between these and the discourse measures (Section 8.5) and the inter-correlations between discourse measures (Section 8.6).

8.1 Effect of age

8.1.1 The effect of age on the combined discourse samples[46]

(Table 8.1)

a) Relevance ratings

No significant effect on the ratings of *relevance*[47] of all discourse samples elicited (H=1.654, p=.647)[48] was found, although the two upper age groups tended to produce less relevant discourse.

---

[46] The effect of age was examined on the combined discourse samples to determine if these two variables have any overriding effects on each discourse measure.

[47] For ease of reading, the specific analysis measures within each of the seven broad areas are indicated within the text by means of italics.

[48] Graphs for those measures which demonstrated significant differences are provided within the text. For the remaining graphs, refer to Appendices A3 to A13.

DISCOURSE MEASURE	AGE.
RELEVANCE	
All	
DISCOURSE-GRAMMAR	
All	
SYNTAX MEASURES	
No. of Words	
Words per T-unit	
Words per Clause	
Clauses per T-unit	
CLAUSAL STRUCTURE	
Main Clauses	
Left-branching clauses	
Right-branching clauses	
CLARITY DISRUPTORS	
Non-Specific elements	
Word-substitutions	
Content and Fluency	
Total Clarity Disruptors	
COHESION	
Reference	*
Substitution	
Ellipsis	*
Conjunction	
Lexical	
Attempted cohesion	?*B<C *B<D
Ands	
Connectives	
Total Cohesive ties	
DYSFLUENCY	
All	

=significant[49] ?=approaching significance
A=50s Group C=70s Group
B=60s Group D=Over-80s group

Table 8.1: Effect of age on combined discourse samples

b) Discourse-grammar

The appropriateness of the *discourse-grammar* produced was not significantly affected by age (H=6.533, p =.088), although the discourse provided by the youngest age group was rated as more appropriate than the older age groups.

[49] The effect of age was determined using the Kruskal-Wallis test with the significance of 0.05. The significance of the comparisons between age groups was determined by the Mann-Whitney Test. Using the Bonferroni correction, the significance level was set at 0.0083 (four age groups: 0.05 divided by six comparisons=0.0083).

c) Clarity disruptors

The total percentage of *clarity disruptors* in all samples did not differ significantly across the four age groups studied here (H=1.639, p=.651), apart from a higher incidence in the seventies group.

Age did not have any significant effect on the three types of clarity disruptors, viz. *non-specific elements* (H=6.162, p=.104), *word substitution* (H= 3.300, p=.348) and *content and fluency disruptors* (H=1.009, p=.799). The use of *non-specific elements* increased linearly with age in the total discourse samples.

d) Productivity and syntactic analysis

Although the over-80s group produced longer samples in total than other groups, age did not produce significant differences in the *sample length* (H=.628, p=.89).

On the combined discourse samples, there were no significant differences between age groups on *words per T-unit* (H=2.321, p= .509), *words per clause* (H=1.588, p=.662) or *clauses per T-unit* (H=1.831, p=.608). However, the over eighty group provided less phrasal and clausal-embedding than the younger three groups. The sixties group had considerably more clausal-embedding than other age groups.

e) Clausal structure

The percentages of *main clauses, left-* and *right-branching clauses* on all samples did not differ significantly with age (H=1.690,p=.639; H=.455, p=.929; H=3.048, p=.384 respectively). The three types of clauses occurred in similar proportions in all age groups.

f) Cohesion analysis

The *total cohesive ties* on all discourse samples was not significantly affected by age (H=6.589, p=.086). However, the two younger groups produced more cohesive samples than the two older groups.

An examination of the five individual types of cohesion demonstrates that two types of cohesion (viz. *reference* and *ellipsis*) were significantly affected by age (H=8.130, p=.043, H=8.762, p=.032). The incidence of two categories of cohesion viz. *substitution* and *ellipsis* was extremely low in all subjects groups and samples. Age had no significant effect on the other types of cohesion (*substitution* H=4.908, p=.179, *conjunction* H=2.256, p=521, *lexicalisation* H=5.943, p=.114). *Reference* and *lexicalisation* demonstrated a decrease with age. In all age groups, *referential* and *lexical cohesion* were the most commonly used cohesive types. No significant differences between age groups were demonstrated in the production of *"and"* (H=6.690, p=.082). The youngest age group produced fewer *"ands", conjunctions* and *connectives* than the older groups.

The number of *attempted cohesive ties* per T-unit was significantly affected by age (H=10.220, p=.017) with the sixty-plus group producing significantly fewer attempted ties than the oldest group (z=-2.645, p=.007) and approaching significance compared to the seventies group (z=-2.558, p=.010). The two older groups produced similar amounts of cohesive errors.

g) Dysfluency

There was no significant effect of age on *dysfluency* in the discourse samples combined (H=.866, p=.834), with a trend to increasing dysfluency with age.

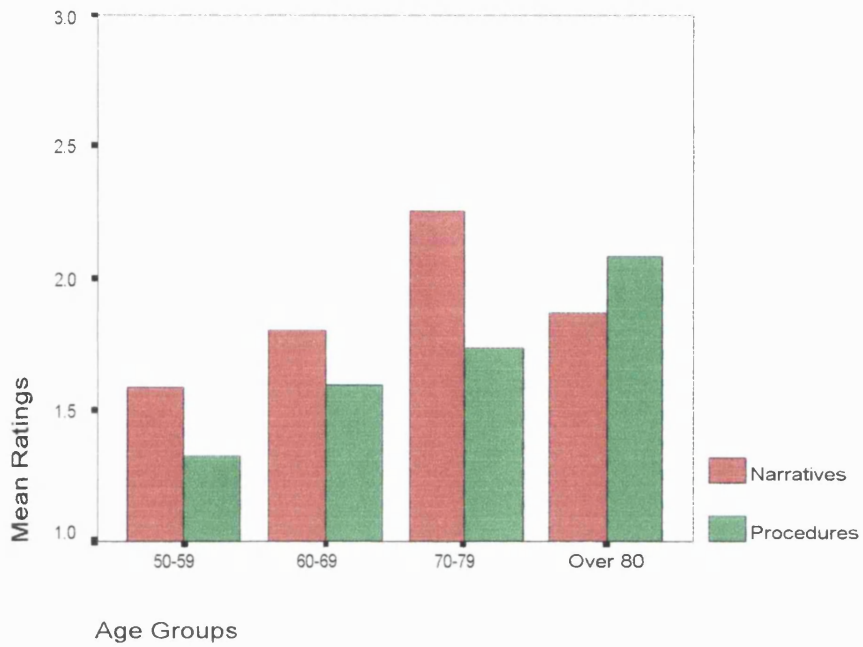
8.1.2 The effect of age on discourse genre

(Table 8.2)

a) Relevance

Age had no significant effect on the *relevance* ratings achieved by the two discourse genres (narrative: H=4.427, p=.219; procedural: H=2.389, p=.496). The sixties and eighties groups produced less relevant procedures than narratives whereas the other two groups performed equally well on both genres.

b) Discourse-grammar



Graph 8.1: Effect of age on discourse-grammar of genres

Age did not significantly affect the appropriateness of *discourse-grammar* ratings for narratives (H=5.281, p=.152) but the discourse-grammar ratings of procedures was significantly affected by age (H=9.836, p=.020) (Graph 8.1). For both genres, an increasing inappropriateness with age was observed. In the youngest three age groups, procedural discourse was rated as more appropriate than narrative discourse.

c) Clarity disruptors

Age had no significant effect on the *clarity disruptors* occurring in the narrative or procedural genres (H=2.753, p=.431; H=.989, p=.122). The clarity disruptors occurring in procedural discourse samples tended to increase linearly with age. Across all age groups, clarity disruptors were more common in procedures than in narratives.

None of the three types of clarity disruptors measured in narrative and procedural discourse were significantly affected by age (*non-specific*:

H=3.134, p=.371; H=6.519, p=.089; *word-substitutions*: H=3.908, p=.272; H=2.370, p=.499;*content and fluency*: H=2.668, p=.446; H=.411, p=.938). The occurrence of *non-specific elements* tended to increase linearly with age in both genres but no clear pattern was discernible in the other two types. More *non-specific elements* but fewer *content and fluency disruptors* were observed in narrative discourse than in procedures in all age groups.

DISCOURSE MEASURE	NARRATIVES	PROCEDURES
RELEVANCE		
All		
D/GRAMMAR		
All		*
CLARITY DISRUPTORS		
Non-Specific		
Substitution		
Content and Fluency		
Total Clarity Disruptors		
PROD. AND SYNTAX		
No. of Words		
Words/T-unit		
Words/Clause		
Clauses/T-unit		
CLAUSAL STRUCTURE		
Main Clauses		
Left-branching clauses		
Right-branching clauses		
COHESION		
Reference	App. Sig.	
Substitution		
Ellipsis		
Conjunctions		
Lexicalisation	App. Sig.	
Attempted cohesion	*2<4	
Ands		
Connectives		
Total cohesive ties		
DYSFLUENCY		
All		

*=significant[50]

2=60s group 4=Over-80s group

Table 8.2: Effect of age on two discourse genres

[50] The effect of age was determined using the Wilcoxon Signed Ranks Test (significance set at 0.05). The significance of the comparisons between age groups was determined by the Mann-Whitney Test (significance set at 0.0083)

d) Productivity and syntactic analysis

The *length* of the narrative and procedural discourse samples was not significantly affected by age ($H=.247$, $p=.970$; $H=.983$, $p=.805$). Apart from the over-eighties group which produced longer narratives, the age groups produced similar length samples of narratives and procedures.

Age had no significant effect on the number of *words per T-unit, words per clause* or *clauses per T-unit* (narratives: $H=2.628$, $p=.453$; $H=1.834$, $p=.608$; $H=3.034$, $p=.386$; procedures: $H=.961$, $p=.811$; $H=.293$, $p=.961$; $H=1.787$, $p=.618$). There was a trend in the oldest group to decreased clause-length in the narratives but not in the procedures. The narratives produced consistently more words per clause than procedures in all age groups. This reflects the greater phrasal complexity (modifiers, prepositional phrases) of this genre. Clausal-embedding in narratives was increased in the sixties group compared to the other three groups. Although most subjects demonstrated less clausal-embedding in narratives than in procedures, the sixties group showed the reverse pattern.

e) Clausal structure

The percentage of *main clauses, left-* and *right-branching clauses* in narratives and procedures was not affected by age (narratives: $H=3.648$, $p=.302$, $H=1.605$, $p=.658$, $H=6.918$, $p=.075$; procedures $H=1.287$, $p=.732$, $H=1.753$, $p=.625$, $H=1.588$, $p=.662$). With age, there was a trend to fewer left-branching clauses in procedures and fewer right-branching clauses in narratives.

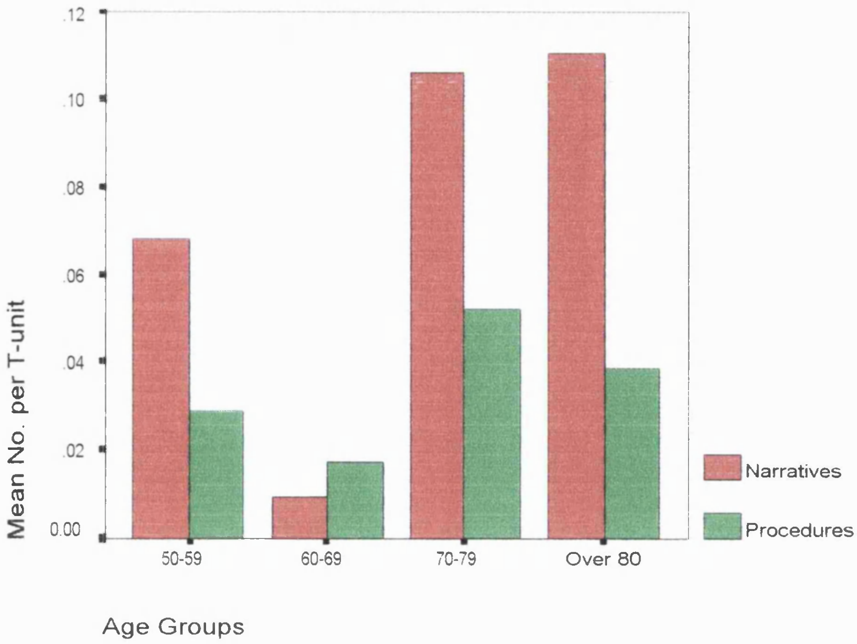
f) Cohesion analysis

The number of *total cohesive ties* occurring in narrative and procedural discourse genres did not differ significantly between age groups ($H=5.858$, $p=.119$; $H=2.530$, $p=.470$). Both genres demonstrated a linear decrease with age and narratives were more cohesive than procedures in the older three age groups.

None of the five types of cohesive ties in the narrative and procedural genres was significantly affected by age (narratives: reference H=7.714, p=.052; substitution H=2.441, p=.486; ellipsis H=6.342, p=.096; conjunction H=2.089, p=.554, lexicalisation; H=7.715, p=.052; procedures: reference H=2.731, p=.435; substitution H=4.951, p=.175; ellipsis H=7.157, p=.067; conjunction H=3.411, p=.333; H=4.495, p=.213). However the effect of age on *reference* and *lexicalisation* in the narratives approached significance. Referential and lexical cohesive ties tended to decrease with age in both genres. The incidence of reference in narratives was consistently greater than in procedures in all age groups with fewer occurring in narratives than procedures.

Age had no significant effect on the production of *"and"* or *connectives* in narratives (H=4.780, p=.189; H=6.350, p=.096) and procedures (H=4.780, p=.189, H=4.774, p=.189). The incidence of *"and"* in the procedures increased with age with more in the sixties group's narratives than the other age groups. Similar amounts of *"and"* were produced by the fifties and seventies groups regardless of genre. The sixties groups produced considerably more *"ands"* in the narratives than the procedures with the reverse in the eighties' group. *Connectives* demonstrated an increase with age. The youngest group produced a smaller number of *connectives* in the narratives whilst the greatest amount occurred in the narratives of the sixties group. In all groups apart from the sixties, procedures contained more connectives than narratives.

Age had a significant effect on the incidence of *attempted cohesive ties* in narratives (H=10.616, p=.014) (Graph 8.2) but not in procedures (H=2.904, p=.407). On both genres, the sixties produced the fewest cohesive errors and, in the narratives, significantly fewer than the eighties group (z=-3.147, p=.002). In the youngest and two older groups, more errors occurred in the narratives than the procedures



Graph 8.2: Age effect on attempted cohesion of genres

g) Dysfluency

Age had no significant effect on *dysfluency* in the narratives or procedures (H=1.122 , p=.772; H=2.509, p=.474). Non-fluencies remained low in number in the narratives of the youngest three age groups but increased in the over-eighties. In the procedures, non-fluencies remained limited in the youngest two age groups but increased in the two oldest age groups. The seventies group showed the most variability in the two genres.

8.1.3 The effect of age on three tasks[51]

(Table 8.3)

a) Relevance Ratings

Age had no significant effect on the *relevance* ratings of the three discourse tasks (personal; H .5199, p=.9145, picture: H=6.0526, p=.1091). The greatest

[51] Exact statistical results for procedures were not repeated in this section and can be found in Section 8.1.2.

variation in ratings with age occurred in the sixties where the picture-sequences were rated as more relevant than the other tasks.

b) Discourse-grammar

Age had a significant effect on the ratings of appropriateness of *discourse-grammar* of the procedures, with a trend to increasing inappropriateness with age. An increase to the seventies group was observed in the personal (H=1.3885, p=.7082) and picture narratives (H=6.7869, p=.0790).

DISCOURSE MEASURE	PERSONAL	PICTURE	PROCEDURE
RELEVANCE			
All			
DISCOURSE-GRAMMAR			
All			*
CLARITY DISRUPTORS			
Non-Specific elements		*	
Substitution			
Content and Fluency			
Total Clarity Disruptors			
SYNTAX			
No. of Words			
Words/T-unit			
Words/Clause			
Clauses/T-unit			
CLAUSAL STRUCTURE			
Main Clauses			
Left-branching clauses			
Right-branching clauses			
COHESION			
Reference	App. Sig.	App. Sig.	
Substitution			
Ellipsis			
Conjunction			
Lexicalisation			
Attempts		*2<4	
Ands			
Connectives	*		
Total cohesive ties			
DYSFLUENCY			
All			

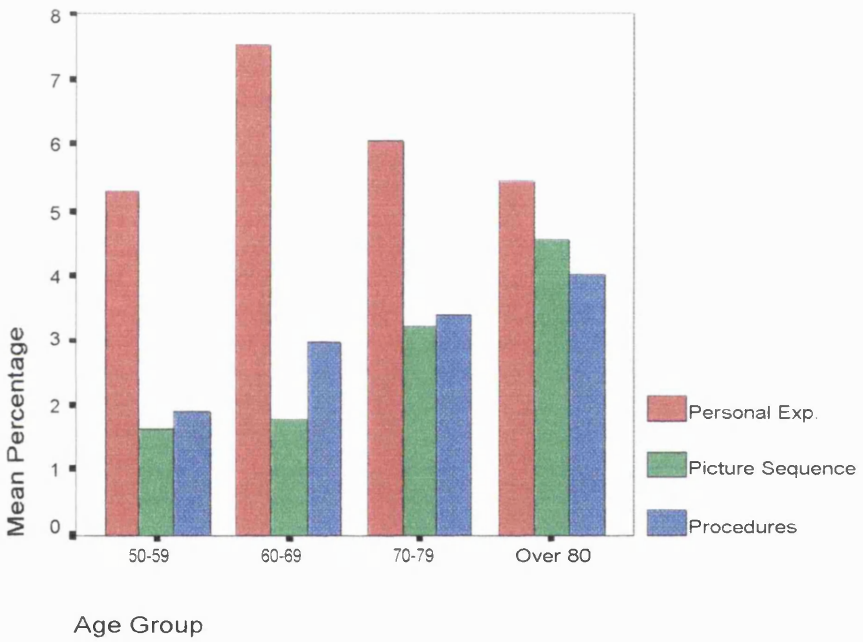
*= significant[52] App.Sig=Approaching significance
1=50s group 3=70s group
2=60s group 4=Over-80s group

Table 8.3: Effect of age on three discourse tasks

[52] The effect of age was determined using the Kruskal-Wallis test with the significance of 0.05. The significance of the comparisons between age groups was determined by the Mann-Whitney Test (significance set at 0.0083 as previously).

c) Clarity disruptors

Age had no significant effect on the percentage of *total clarity disruptors* occurring in each task (personal H=.622, p=.8913, picture H=3.6357, p=.3036). In all age groups, personal-narratives tended to elicit a similar amount of clarity disruptors and this was consistently less than in picture-sequences and procedures. The picture-sequences elicited an increased disruption with age to the seventies group.



<u>Graph 8.3: Effect of age on non-specific elements in tasks</u>

Regarding the types of clarity disruptors, *non-specific elements* occurred in personal-narratives to a greater degree in all groups than the other tasks and were relatively unaffected by age (H=.4915, p=.9208). Age had a significant effect on these in picture-sequence tasks (H=8.409, p=.038) (Graph 8.3). In picture-sequences and procedures, a trend to increasing amounts occurred with age. *Word-substitutions* occurred infrequently in the samples and none were recorded in the personal-narratives (pictures: H=1.000, p=.8013). A low incidence was noted in the two younger groups in the picture-sequences and the three younger groups in the procedures but none in the over-eighties. The proportion of *content and fluency disruptors* on each task was similar within groups with small numbers occurring in the personal-narratives in all groups (H=4.6534, p=.1990). The incidence in procedures increased with age to the over-eighties groups and in the picture-sequences to the seventies (H=4.0746, p=.2535).

d) Productivity and syntactic analysis

The *length* of sample elicited by the three discourse tasks was not significantly affected by age (personal: H=.0710, p=.9951, picture: H=1.5732, p=.6655). The ratio of the tasks to each other in each age group tended to remain similar in the three younger groups (i.e. the personal-narratives were the longest and the picture-sequences the shortest) but the over-eighties produced considerably longer personal-experience samples.

Age had no significant effect on the measures of *T-unit-length, clause-length* and *clausal-embedding* in the three discourse tasks. *T-unit-length* on all tasks tended to decrease with age from the fifties (in the procedures) or the sixties (personal: H=2.0544, p=.5612; picture: H=1.7138, p=.6339). The longest T-units were observed in the procedures of the fifties group with the smallest in the personal-narratives of the over-eighties group. *Clause-length* remained relatively constant with age, apart from an increased length in the picture-sequences of the seventies group (personal: H=1.4382, p=.6966; picture: H=1.4226, p=.7002). The clause-length of procedures was consistently shorter in all groups than the narrative tasks. Little variation in the incidence of *embedding* was observed with age in the personal-narratives (H=.9957, p=.8023) and procedures. Picture-sequence narratives (H=1.9673, p=.5792) demonstrated a substantially greater incidence in the sixties group. In most age groups, clausal-embedding tended to show a similar pattern with more embedding in procedures and fewer in picture-sequences and personal-narratives.

e) Clausal structure

No significant age effect was observed on the percentage of *main, left-* and *right-branching* clauses in each discourse task. In all groups, personal-narratives produced most *main clauses* (personal: H=.6335, p=.8887; picture:

H=6.7898, p=.0789). The greatest percentage of main clauses was measured in the personal-narratives of the seventies group and the smallest in the picture-sequences of the sixties group. The percentage of *left-branching clauses* tended to decrease with age in procedures and increase in personal-narratives (H=1.9631, p=.5801) but remain relatively constant in picture-sequences (H=.2450, p=.9700). The largest amount occurred in the over-eighties on personal-narratives. The percentage of *right-branching clauses* tended to remain constant with age in all tasks, with personal-narratives consistently producing fewer such clauses (personal: H=2.5859, p=.4600; picture: H=6.9801, p=.0725).

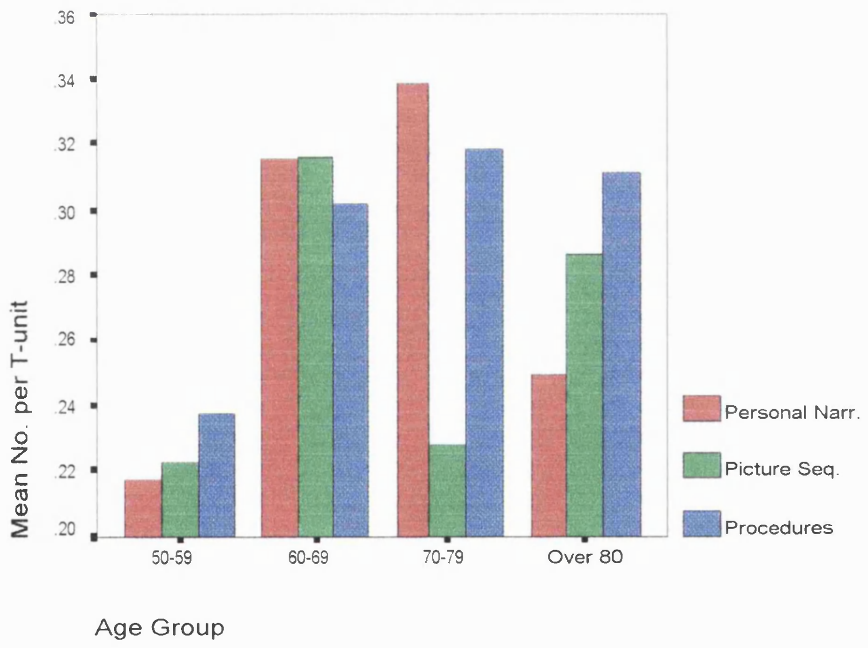
f) Cohesion analysis

The number of *total cohesive ties* in personal-narratives, picture-sequences and procedures did not differ significantly with age (H=5.9020, p=.1161; H=5.4119, p=.1440) but demonstrated a decreasing trend. Picture-sequence tasks elicited the greatest amount in all groups and personal-narratives the least.

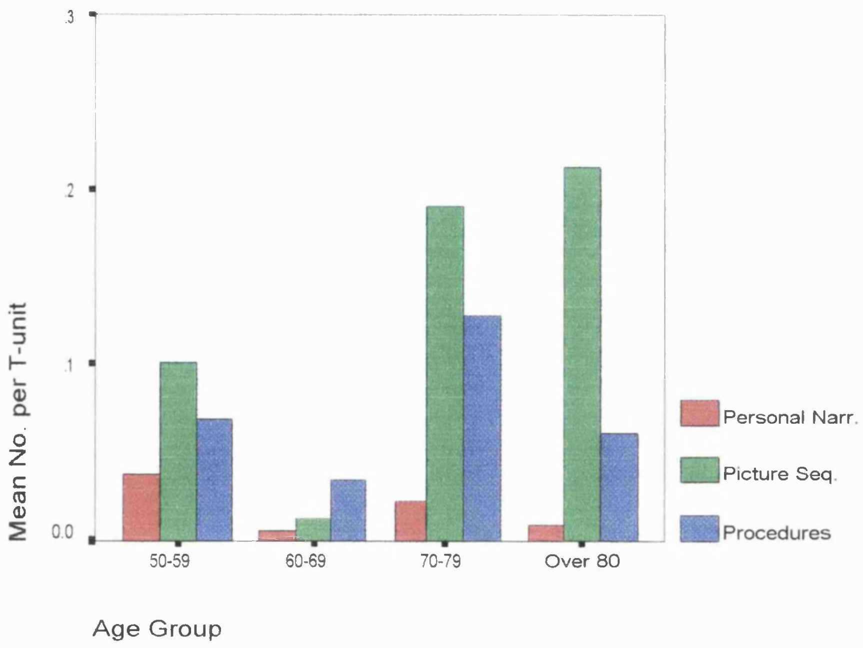
The effect of age on the amount of *reference* used in personal and picture-sequences approached significance (H=7.6072, p=.0537, H=7.5817, p=.0552), with a decreasing trend with age. In all groups, picture-sequences elicited higher numbers of referential ties than the other tasks with the sixties group's performance demonstrating the highest. No significant effect of age was demonstrated in *substitution* (personal: H=1.7692, p=.6217, picture: H=5..7684, p=.1234); *ellipsis* (personal: H=6.1996, p=.1023; picture: H=3.885, p=.2738), *conjunctions* (personal: H=5.3771, p=.1462; picture: H=.7060, p=.8718) or *lexicalisation* (personal: H=6.6860, p=.0826; picture: H= 5.1328, p=.1623). Substitution and ellipsis occurred infrequently in all age groups. *Substitution* remained unchanged with age, apart from an increased incidence in the procedures of the three youngest groups. In *ellipsis,* some decline with age on all tasks was observed. In all age groups (except for the seventies), personal-narratives tended to elicit the fewest *conjunctions* and procedures the most. No linear age trends for conjunctions were observed. The occurrence of *"and"* was highest in the personal-narratives of the three youngest groups (personal:

H=4.856, p=.2322; picture: H=7.3120, p=.0626). The *connectives* demonstrated a significant effect of age in the personal tasks (H=9.406, p=.024) (Graph 8.4) but not the picture-sequences (H=2.916, p=.405). The fifties group had fewer connectives on all tasks compared to the other groups and no clear trends could be established. The greatest variation occurred in the seventies group. *Lexicalisation* decreased with age on all tasks and occurred less frequently in personal-narratives than the other tasks in all groups.

The number of *attempted* cohesive ties was significantly affected by age only in the picture-sequences (H=.11.2635, p=.0082) (personal: H =1.8026, p=.6144) (Graph 8.5). The incidence of attempts in picture-sequences in the sixties group was significantly less than in the over-eighties (U=1.0, p=.008). The amount in each group was consistently the least in the personal-narratives and usually the greatest in the picture-sequences.



Graph 8.4: The effect of age on connectives on discourse tasks



Graph 8.5: The effect of age on attempted cohesion of discourse tasks

g) Dysfluency

Age had no significant effect on *dysfluency* in the personal (H=2.327, p=.507) or picture-sequences (H=.779, p=.854). There was a trend towards increasing dysfluency with age in the personal-narratives but not the picture-sequences. The latter elicited fewer errors than the personal-narratives and procedures in each group. The highest number of these errors was found in the over-eighties' personal-narratives and the least in the sixties group's picture-sequences.

8.1.4 The effect of age on topics

(Table 8.4)

Due to the small number of subjects who were able to provide an embarrassing personal-narrative (10/32), this topic was not incorporated into the results analysis. Therefore only three personal-narrative topics were considered.

	PERSONAL			PICTURE SEQ.				PROCEDURES					
	Fr	Ha	Fu	St	Bu	Wa	Ho	Ty	Wi	Ja	Bo	Su	Bi
REL													
All							*						
D/GRAM													
All				*				*					
SYNTAX													
No Word													?*
W/T-unit													
W/Clause													
Cl/T-unit													
CLAUSE													
Main Cl.													
Left Cl.													
Right Cl.													
CLAR.													
Non-Spec					?*								
Substitut.													
Content													
Total Cl.						*							
COH													
Ref.					*3<2	*4<2							
Substit.								*					
Ellipsis													
Conjunct	*												*4<3
Lexical								*4<1 *4<2					
Attempts						*							
Ands									*1<2 *1<4 ?*1< 3				
Connect	*1<3								*1<3				
Total Cohesion					*3<2								
DYSFLU													
All													

=significant[53] ?=approaching significance
Fr=Frightening Ha=Happy Fu=Funny
St=Stones Bu=Burglary Wa=Wasp Ho=Homework
Ty=Tyre Wi=Window Ja=Jacket Bo=Book
Su=Supermarket Bi=Bike
1=50s Group 3=70s Group
2=60s group 4=Over-80s group

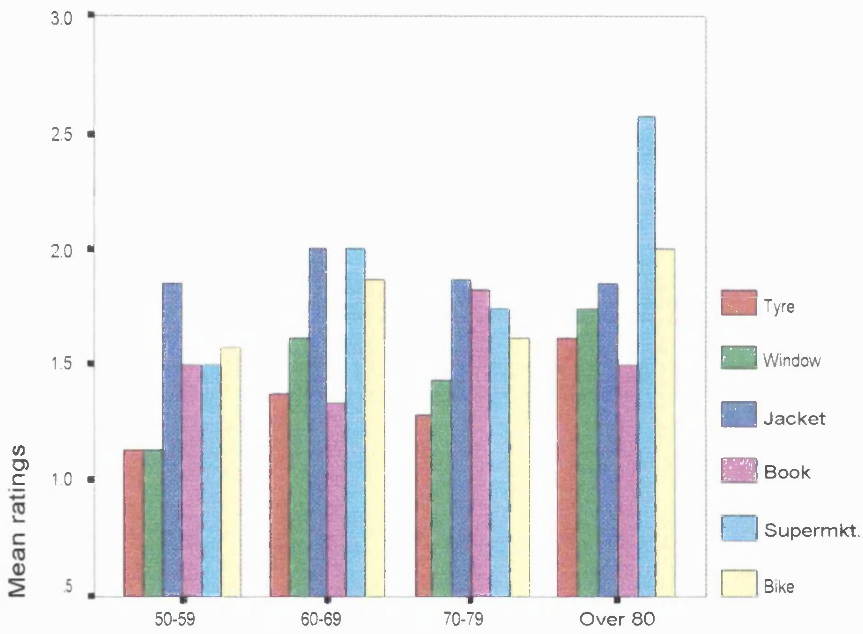
Table 8.4: Effect of age on topic samples

a) Relevance

The *relevance* ratings of the personal-narrative topics was not significantly affected by age[54]. The happy experience elicited samples with poorer ratings

[53] The effect of age was determined using the Kruskal-Wallis test with the significance of 0.05. The significance of the comparisons between age groups was determined by the Mann-Whitney Test (significance set at 0.0083).

than the other two topics in the three younger groups. Generally, age had little effect on the ratings of the picture-sequence except for the significant effect on the homework topic (H=11.957, p=.008) (Graph 8.6). The samples of this topic were considered to be least appropriate in the seventies group than in the others. Age had no significant effect on the relevance ratings of procedural topics. The most inappropriately rated sample was the supermarket procedure in the eighties group with the tyre and window procedures in the fifties groups being rated the most relevant.



Graph 8.6: Age effect on relevance ratings for procedural topics

b) Discourse-grammar

No significant effect of age was found on the discourse-grammar of the personal-narrative topics. The happy experience tended to elicit the least appropriate discourse-grammar in all groups and the frightening experience the most. The over-eighties group demonstrated the least effect of personal-narrative topic on this measure.

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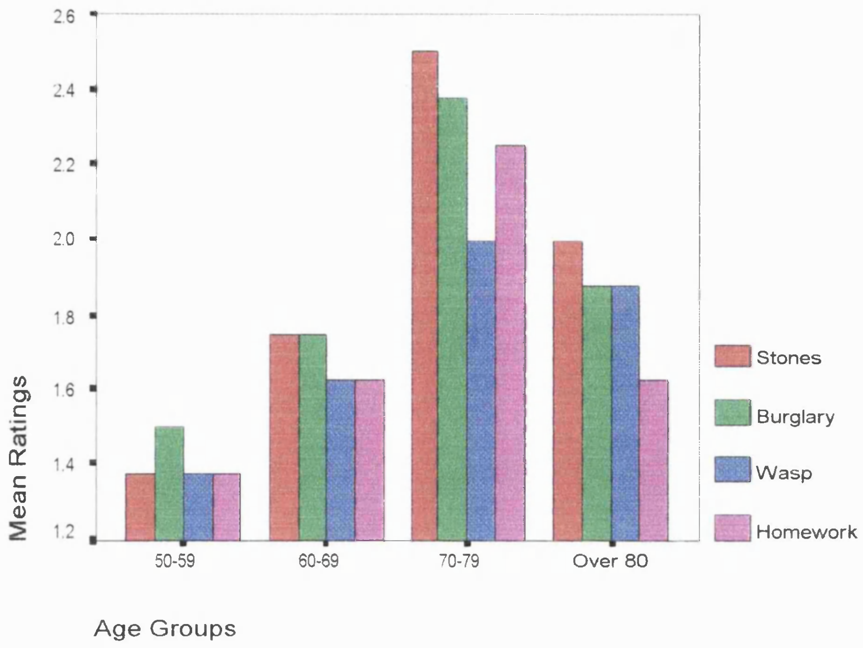
[54] Only the significant topic effects are given in the text. For a complete list, see Appendix A14.

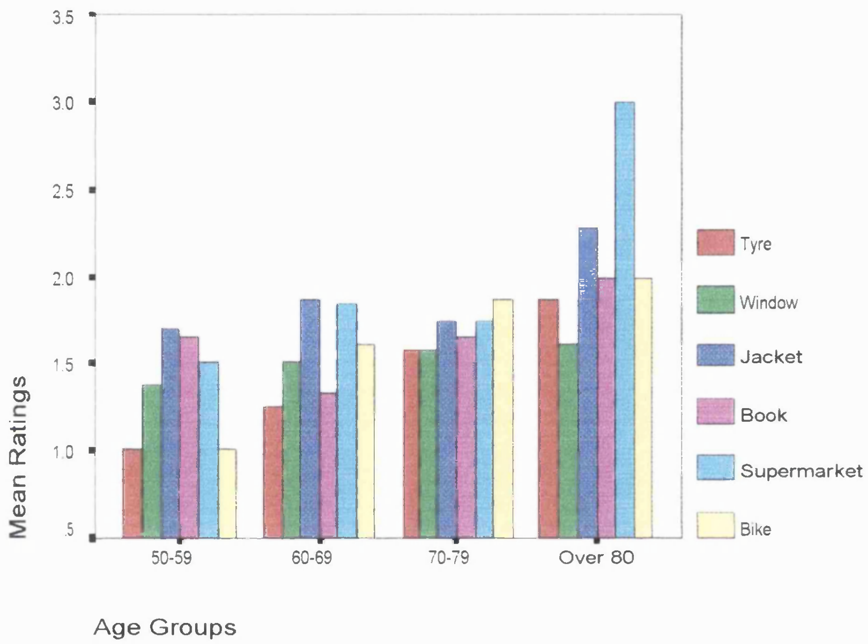


Graph 8.7: Age effect on discourse-grammar ratings in picture-sequence topics

A significant effect of age was found on the discourse-grammar ratings of the stones picture-sequence (H=7.846, p=.049) (Graph 8.7). The rating of all picture-sequence topics became less appropriate with age from the fifties to the seventies groups. The fifties and sixties groups demonstrated little effect of picture-sequence topic on their ratings. There was a significant effect of age on the discourse-grammar ratings of the tyre procedure (H=7.932, p=.050) (Graph 8.8). The discourse-grammar of the procedures tended to become less appropriate with age on all topics. The supermarket procedure of the eighties group was rated the least appropriate.

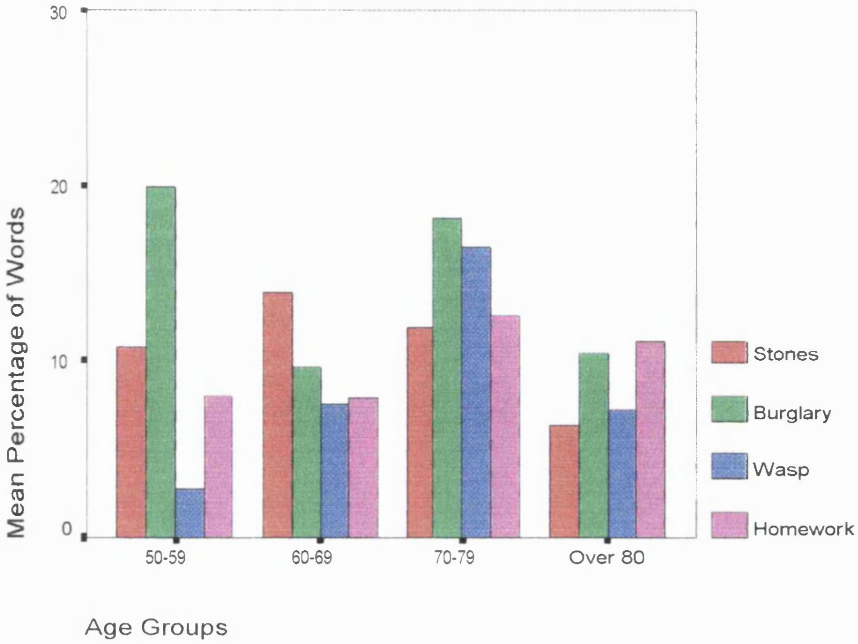
c) Clarity disruptors

The effect of age on the *total clarity disruptors* of the personal-narrative or procedural topics was not significant. On the personal-narratives, the incidence remained relatively static with age apart from an increase on the happy experience in the sixties and eighties groups. On the picture-sequences, the percentage of clarity disruptors was not substantially affected by topic and age except for the wasp sequence which exhibited a significant effect of age (H=8.733, p=.033) (Graph 8.9). The most and least disruptors on any picture-sequence topic were observed in the same age group (burglar and wasp sequence in the fifties group). The effect of age on clarity disruptors of the procedural topics did not demonstrate any consistent trends. Whilst the disruptions in some topics (e.g. jacket) decreased with age, they increased in others (e.g. tyre, supermarket, bike). One of the highest and lowest percentages was observed in the over-eighties group (supermarket and jacket).



Graph 8.8: Age effect on discourse-grammar ratings on procedural topics

None of the types of clarity disruptors occurring in the topic samples was significantly affected by age. In the personal-narratives, the incidence of *non-specific elements* in the happy topic was considerably higher than the other two in the two younger groups but topic had little effect on the number of non-specific elements occurring in the two older groups. In contrast, the topic of the picture-sequences had little effect in the two younger groups, with greater variation occurring in the older groups, particularly in the wasp and burglar sequences where greater numbers occurred. The age effect on the burglary topic approached significance (H=7.672, p=.053). No consistent effect of age could be determined on the production of non-specific elements in the procedures. More occurred in the tyre procedure of the oldest group and the smallest in the same procedure of the fifties group.



Graph 8.9: Age effect on total clarity disruptors on picture-sequence topics

The amount of *content and fluency disruptors* was small in the personal-narratives and little effect of age was demonstrated, apart from a higher incidence in the happy experiences of the over-eighties group. In the picture-sequences, the greatest effect on the topics was in the fifties group which had the greatest (burglary) and smallest (wasp) percentages of any picture-sequence topic. The homework sequence was least affected by age. In the procedures the fifties and sixties groups demonstrated the least effect of topic on this measure. Some procedures (tyre, book, bike) demonstrated an increase with age, whereas others (window, jacket) demonstrated a decrease. The most and least of these disruptors occurred in the same age group (supermarket and jacket samples of the eighties group).

d) Productivity and syntactic analysis

The *length* of the topics did not vary significantly with age but the effect on the bike procedure approached significance (H=7.646, p=.054). On the topics of the personal-narratives, the happy topic samples increased were longer with age whilst the other two remained constant (except for over-eighties group's longer frightening narrative which was the longest of all topics). On the picture-sequences, length was less variable by topic in the younger two groups than in the older two groups. All picture topics except the burglar sequence exhibited a decreasing trend with age. The longest picture sample was the burglar sequence elicited from the fifties group and the shortest the homework sequence in the eighties group. Within each age group, procedural topic had no significant effect on the length of the samples. Three topics (tyre, window and supermarket) tended to remain similar in length with age whilst the other three (jacket, book and bike) tended to produce shorter samples in the over-eighties group. The bike topic often produced the shortest samples.

T-unit and *clause-length* and *clausal-embedding* of the topics were not significantly affected by age. In personal-narratives, *T-unit-length* was fairly consistent with age on the three topics apart from the longer happy topic of the sixties group. *Clause-length* of the frightening and funny topics remained relatively similar in the two younger age groups and the oldest but was longer in the seventies group. The happy topic demonstrated longer clauses in the two younger groups before declining with age. The effect of age on *clausal-embedding* of the personal topics was more marked. The happy experience elicited the least embedding of all topics in the youngest and two older groups but the most in the sixties group. Embedding in the other two topics tended to remain relatively constant with age.

Age had a variable effect on the *T-unit* and *clause-length* on the picture-sequence topics and no clear trends were observable. On both measures the over-eighties group appeared to have the most consistent performance across topics. The greatest T-unit and clause-length was produced by the seventies group on the homework sequence and the lowest on each measure by the fifties group on the burglar sequence. *Clausal-embedding* showed little variation across topics and groups, except for more in the sixties group's stones sequence.

Most procedural topics demonstrated little effect of age on *T-unit-length*. The tyre procedure in the eighties group produced the shortest and the bike procedure of the sixties group the longest. Considerable variation in *clause-length* was observed in each age group. The window and bike procedures tended to elicit longer clauses in all groups. *Clausal-embedding* remained fairly constant across groups and procedural topics. The bike topic elicited the most embedding in the fifties group and the tyre the least in the eighties group.

e) Clausal structure

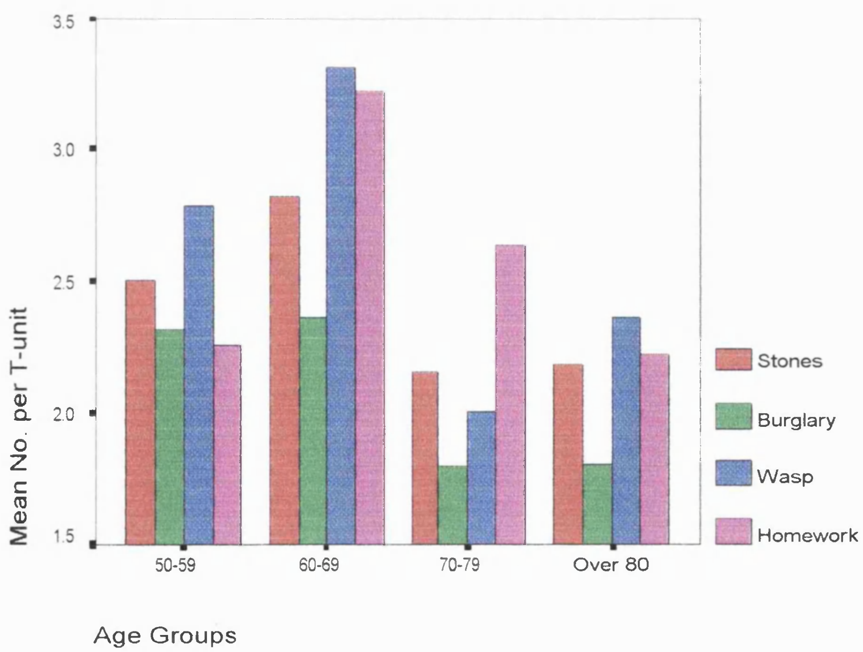
Age did not have a significant effect on the production *of main, left-* or *right-branching clauses* of the different topics. In the personal-narratives, the happy experience produced most *main clauses* in the fifties and the least in the seventies group. The frightening topic demonstrated the least variation in these clauses with age. The production of main clauses remained constant on picture-sequence topics within groups but most demonstrated an increase across age groups. The greatest number occurred in the burglar sequence (eighties group) and the least in the wasp topic (sixties group). Little variation in the number of main clauses with age was observed in most procedures. The tyre topic demonstrated the greatest number in the eighties and the supermarket in the seventies.

The incidence of *left-branching clauses* varied with age and personal-narrative topic but the percentages were small. The frightening topic elicited the highest percentage in three age groups and the least in the sixties group. The age effect on the incidence of these clauses in the picture-sequences was variable. The stones sequence elicited the highest percentage (in the seventies group) and one of the lowest (in the over-eighties group). Certain procedural topics (tyre, jacket) demonstrated a decrease with age whilst other ones (book, bike) showed an increase to the seventies or eighties groups. The other topics did not show any clear trend with age. Some of the highest and lowest percentages of these clauses occurred within the same group (e.g. supermarket and tyre procedures in the sixties group and the book and tyre procedures in the seventies group respectively). The left-branching clauses produced by the eighties group appeared least affected by topic.

The percentage of *right-branching clauses* demonstrated a decrease with age in the happy and funny personal experiences but little variation on the frightening experiences. The happy experience produced the most and the least such clauses in two different age groups (fifties and sixties groups respectively). In the picture-sequences and procedures, these clauses remained stable in most topics with age. Some procedures (e.g. the bike topic) demonstrated an increase with age from the fifties to the seventies groups whilst others decreased in the eighties (tyre, window). The least and the most of these clauses occurred in the eighties group's tyre and book topics respectively.

f) Cohesion analysis

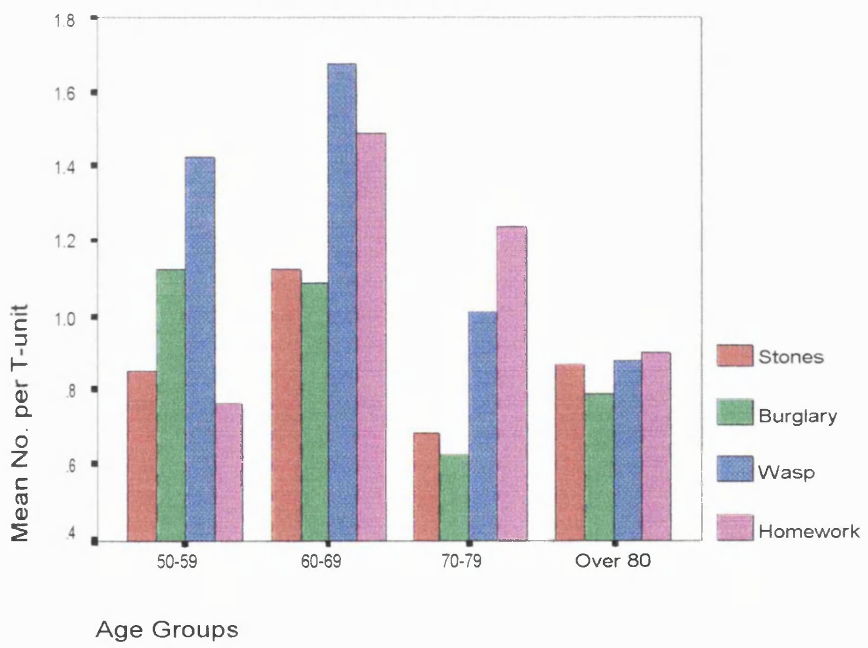
Age did not have a significant effect on the *total cohesive ties* of the personal-narrative and procedural topics with all topics demonstrating a decline with age. On the picture-sequence topics, age had a significant effect on the wasp sequence which elicited more cohesive samples in the sixties than the seventies group (H=8.832, p=.032) (Graph 8.10). The most cohesive topics were produced by the sixties group for the wasp and homework sequences and the least for the burglar sequence for the seventies and eighties groups. The least cohesive procedural topic in each age group was the supermarket topic whilst the tyre and bike topics were often the most cohesive.



Graph 8.10: Age effect on total cohesion in picture-sequence topics

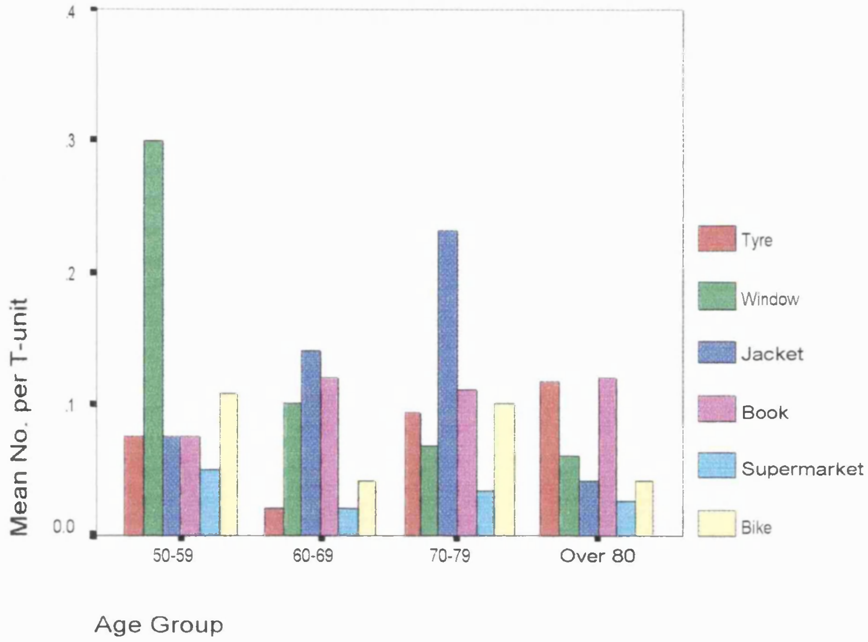
No significant effect of age was found on the *referential ties* used in personal-narrative topics. These ties decreased to the seventies group in the frightening and funny topics and to the eighties group in the happy topic. The greatest referential cohesion was observed in the fifties group's happy topic and the least in the seventies group's funny one.

In the picture-sequences, age had a significant effect on the amount of *referential cohesion* in the burglar and wasp sequences (H=8.575, p=.036, H=10.203, p=.017) (Graph 8.11). Significantly greater use of reference was observed in the sixties group's burglary topic than the seventies group's (z=-2.702, p=.005) and in the sixties group's wasp sequence than in the eighties group's (z=-2.581, p=.007). The picture-sequence topic had little effect on the use of reference in the over-eighties group whilst topic had a varying effect on the production of reference in the other groups. No effect of procedural topic was observed across age groups with the bike eliciting most of these ties in each age group.



Graph 8.11: Age effect on reference in picture-sequence topics

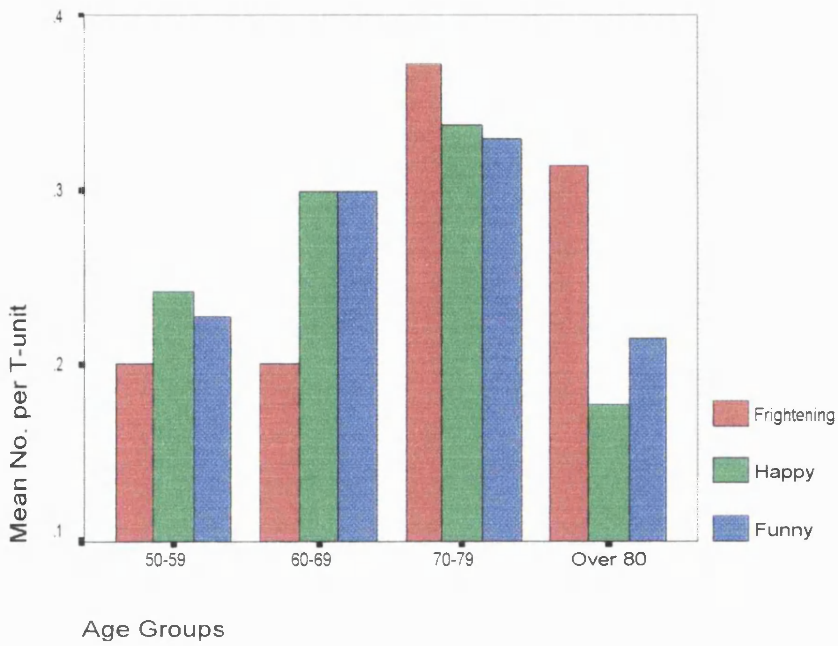
Age has a significant effect on *substitution* in the tyre procedure (H=8.366, p=.039) with the sixties group producing less than the other groups (Graph 8.12)



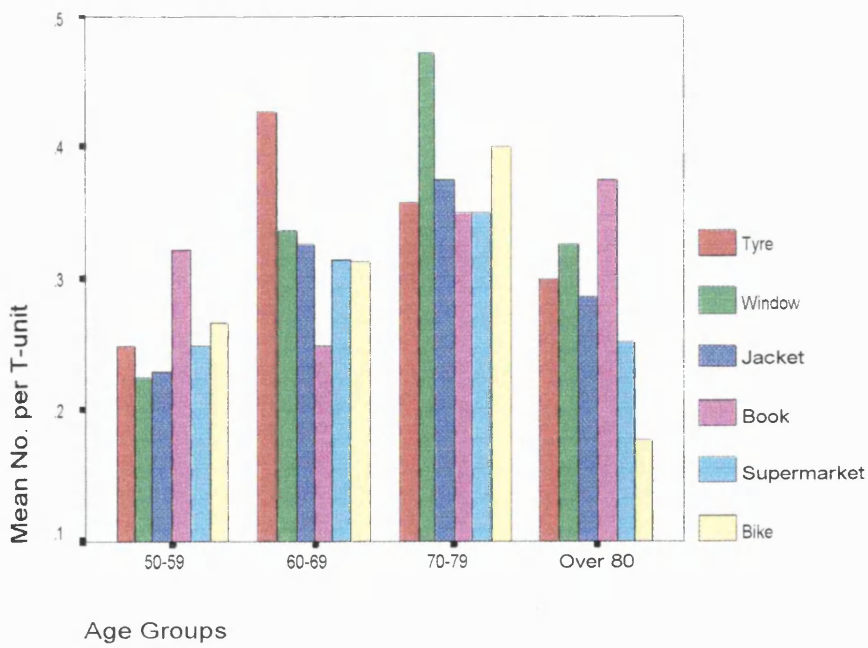
Graph 8.12: Age effect on substitution cohesion in procedural topics

Regarding the use of *conjunctions* in personal-narratives, age had a significant effect on the frightening experience (9.200, p=.027) (Graph 8.13). The seventies group produced the highest number of conjunctions on this narrative topic than any other topic in any age group and this age group was least affected by topic. No significant effect of age was noted in conjunctions in picture-sequence topics. The highest or one of the highest incidences occurring in each age group was on the stones sequence, whilst the lowest in most age groups was on the burglary sequence. The incidence of conjunctions in the samples of the seventies group appeared to be least affected by the picture-sequence topic. In the procedures, the number of conjunctions in all topics tended to increase with age from the fifties to the seventies groups with a fall-off in the eighties group. Age had a significant effect on conjunctions in the bike topic (H=9.630, p=.022) and the seventies group produced significantly more than the over-eighties group (z=-2.557, p=.008) (Graph

8.14). The least and most conjunctions occurred on the bike procedure of the eighties and seventies groups respectively.

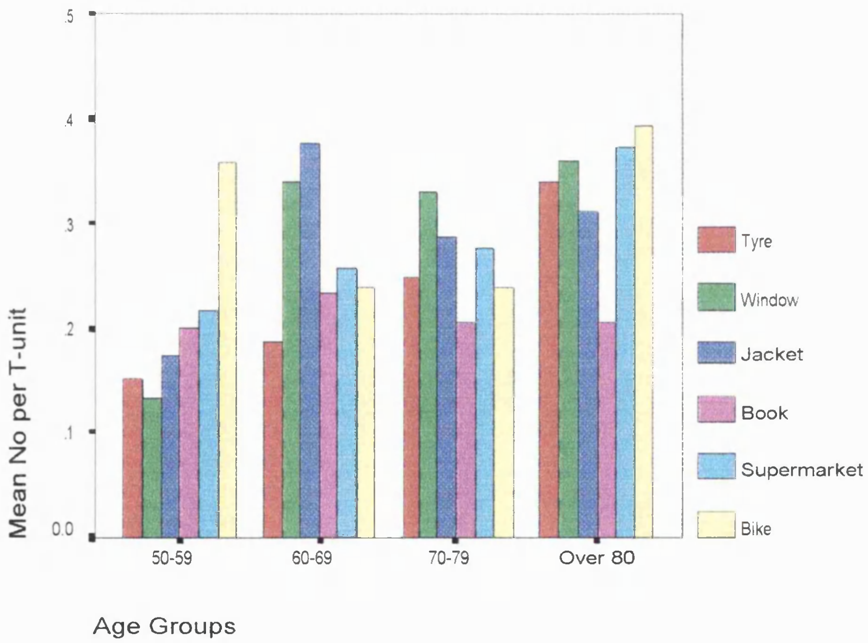


Graph 8.13: Age effect on conjunctions in personal experience topics



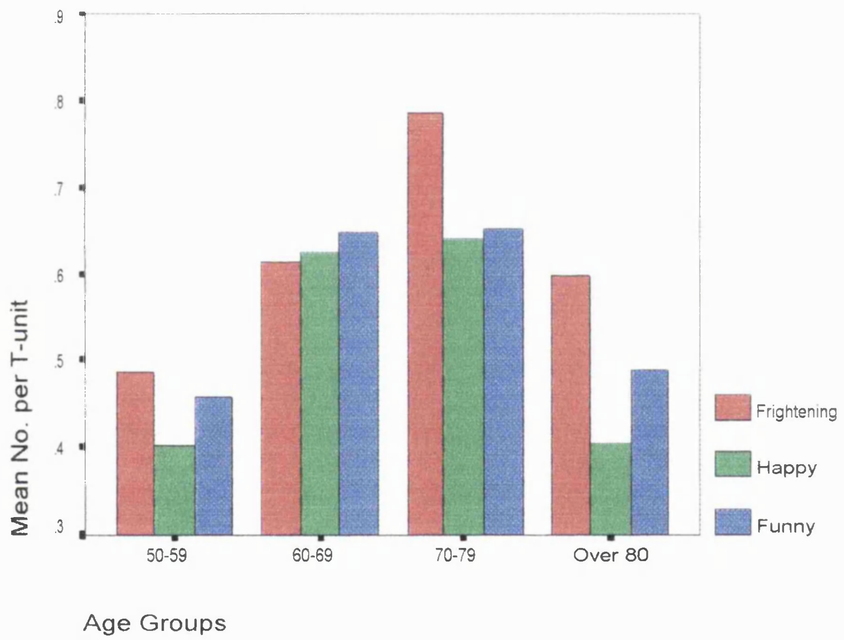
Graph 8.14: Age effect on conjunctions in procedural topics

The production of *"and"* was not significantly affected by age in the personal-narrative or picture-sequence topics. The frightening experience tended to elicit the most "ands" in the personal topic and also the highest number in each age group. More "ands" were found in all topics in the middle two age groups. In the picture-sequences, different topics elicited the highest and lowest number of "ands" in each age group and no patterns of age effect were observed. The production of "and" in the fifties and seventies groups seemed to be the least affected by picture-sequence topic, whereas in a number of procedural topics (e.g. tyre, window, book) it increased linearly with age. A significant effect of age on "and" in the window topic was found (H=11.325, p=.010) and the fifties group produced significantly fewer "ands" than the sixties and over-eighties groups (z=-2.733, p=.005; z=-2.706, p=.005) and the difference between the fifties and seventies group approached significance (z=-2.607, p=.009) (Graph 8.15). The sample with the highest and lowest number of "ands" occurred in the bike procedures of the eighties groups and the window topic of the fifties.



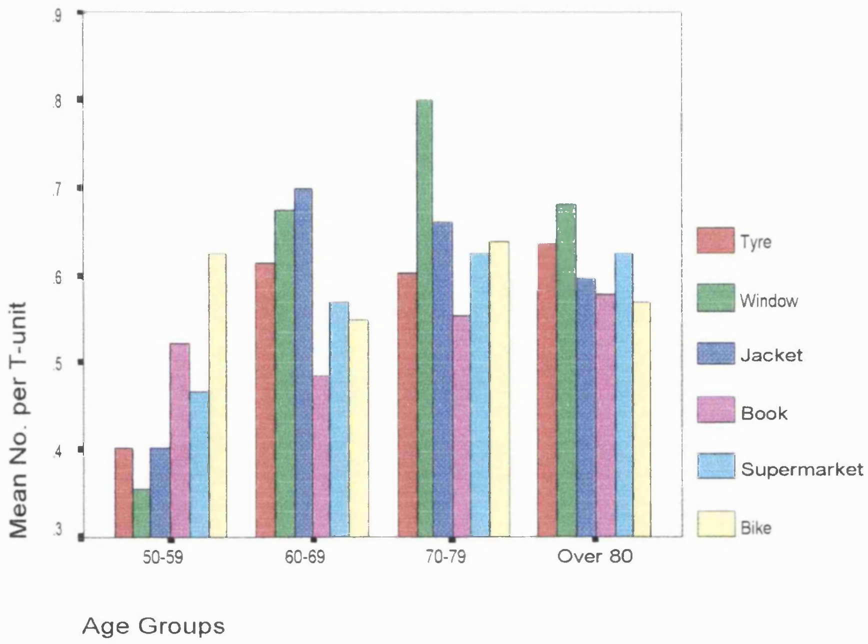
Graph 8.15: Age effect on "and" in procedural topics

Regarding *connectives,* a significant effect of age was found on the frightening topic (H=7.980, p=.046) (Graph 8.16) with the fifties group producing significantly fewer connectives than the seventies group (z=-2.658, p=.007). The two middle groups produced more connectives than the oldest. No significant effect of age was observed in the production of connectives in the picture-sequences. Apart from the seventies group which demonstrated very little effect of topic, the stones sequence elicited the greatest number per age group. A significant effect of age occurred in the window topic of the procedures (H=9.665, p=.022) (Graph 8.17), with the fifties group producing significantly fewer connectives than the seventies group (H=-2.734, p=.006). The highest and lowest number of connectives was elicited by the same procedural topic (window) in the seventies and fifties group respectively. All procedural topics demonstrated a rising trend from the fifties to the seventies.



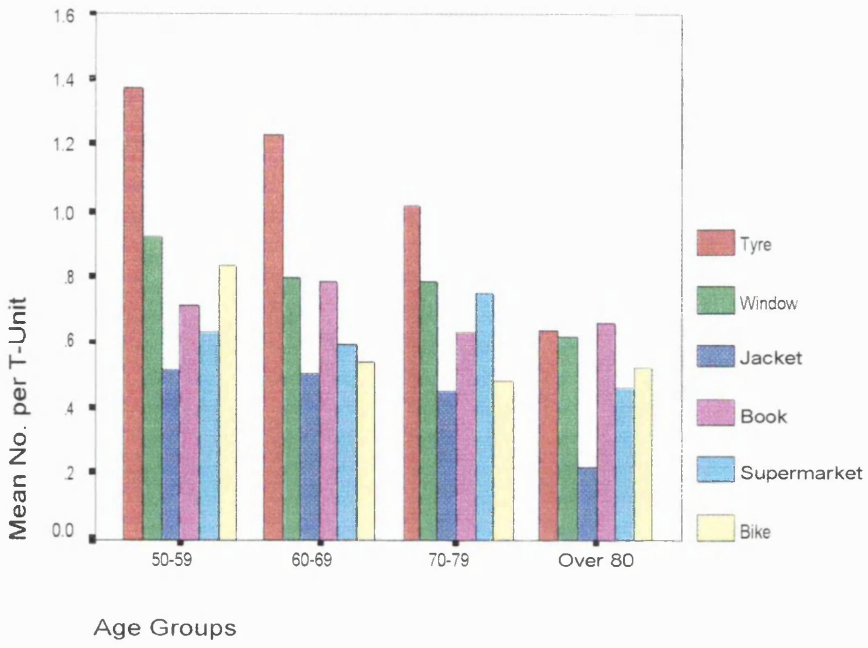
Graph 8.16: Age effect on connectives in personal-narrative topics

Lexicalisation in the personal experiences and picture-sequences was not significantly affected by age. The frightening narrative tended to elicit the most lexicalisation in all age groups and these ties decreased with age in all topics. On all the picture-sequences, the sixties group demonstrated the greatest amount of lexicalisation of all groups. There was a decrease in lexicalisation on all topics in the older two groups. A significant effect of age on the procedures was found in the tyre topic. (H=11.584, p=.009) (Graph 8.18) with the fifties and sixties groups producing significantly greater lexicalisation than the eighties group (z=-2.912, p=.004, z=-2.894, p=.004). Most procedural topics demonstrated a decrease in lexicalisation from the fifties to the eighties groups. The tyre produced the highest amount in the first three groups and the jacket the least.

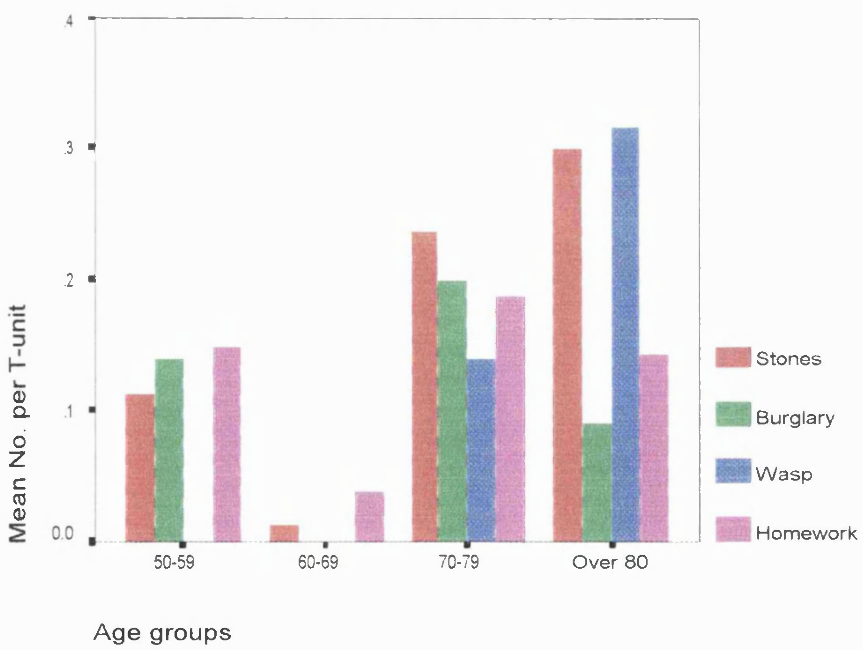


Graph 8.17: Age effect on connectives in procedural topics

The incidence of attempted cohesion was not significantly affected by the personal-narrative or procedural topics and the number in all age groups on these topics was extremely low. The frightening topic elicited few if any instances of attempted cohesion in the any age groups. The happy experience elicited the greatest number in the personal-narratives. On the picture-sequences, a significant effect of age was observed on the wasp sequence (H=14.835, p=.002) (Graph 8.19). The fifties and sixties group produced few if any errors on this sequence compared to higher scores on the two older age groups. The sixties group produced the smallest number of errors on all topics. The procedural topics mostly elicited samples with few cohesive errors but the bike and jacket topics were exceptions with higher cohesive errors in each age group.



Graph 8.18: Age effect on lexicalisation in procedural topics



Graph 8.19: Age effects on attempted cohesion in picture-sequence topics

g) Dysfluency

Age had no significant effect on the incidence of *dysfluencies* in any of the samples. On the personal-narrative topics there was an overall trend to increasing non-fluency with age. The happy topic samples of the oldest group elicited the most errors and the frightening topic in the seventies group the least. The picture-sequence topics did not demonstrate any clear trends with age. The greatest number occurred in the seventies group on the burglary topic and the least in the sixties group on the homework sequence. On the procedural topics, age had a varying effect. Whilst some topics (tyre, bike, supermarket) demonstrated increased non-fluency with age, others remained relatively constant. The tyre sample in the oldest group elicited the most and the window topic in the sixties group the least.

8.1.5 Summary of ageing effects

Table 8.5 presents a summary of the significant results and trends on each task and topics as affected by age. As can be observed from the three tasks, certain measures (e.g. clause-length, clausal-embedding, main and right-branching clauses) remained relatively unchanged with age. A declining performance with age occurred on other measures (e.g. relevance and discourse-grammar ratings, T-unit-length, total cohesive ties and lexicalisation). On the remaining measures, a differential effect with age was found, depending on the task used. On most measures, the effect of ageing on the individual topics varied substantially.

VARIABLE	TOTAL	NARR	PER	PIC	PRO	TOPICS
Relevance					*	1 PIC *
Discourse Gr.						1 PIC * 1 PRO *
Clarity						1 PIC *
Non-specific				*		1 PIC App Sig
Substitution						
Content and fluency						
Prod/Syntax						
Length						1 PRO App Sig
T-unit length						
Clause length						
Embedding						
Clausal struc						
Main Clause						
Right-branching clauses						
Left-branching clauses.						
Cohesion						1 PIC *
Reference	*	App Sig	App Sig	App Sig		2 PIC *
Lexical		App Sig				1 PRO *
Substitution	*					1 PRO *
Ellipsis						
Conjunction						1 PER * 1 PRO *
"And"						
Connectives			*			1 PER * 1 PRO *
Attempts	*	*		*		1 PIC *
Dysfluency						

* = significant App* = approaching significance NARR = Narratives
PER = Personal narratives PIC = Picture sequences PRO = Procedures

Table 8.5a: Summary of significant effects of age on discourse performance

VARIABLE	PERSONAL	PICTURE	PROCEDURE	TOPICS
Relevance	Decreased	Decreased in 70s and 80s	* Decreased	1 PER increased * PIC 2 PRO stable
Discourse-grammar	Decreased	Decreased in 70s and 80s	Decreased	2 PER stable 1 PIC * 1 PRO * 1 PRO stable
Clarity Disruptors	Stable	Increased to 70s, decreased in 80s	Increased	1 PER increased in 60s and 80s * PIC 1 PRO decreased 2 PRO stable
Non-specific	Stable	* Increased	Increased	1 PER decreased from 60s 2 PER stable
Substitution	None	Few in 50s and 60s, none in other groups	Stable to 70s, none in 80s	None in 2 PIC 1 PIC only in 50s None in 3 PROs
Content and fluency	Stable	Increased to 70s, Decreased in 80s	Increased	1 PER increased only in 80s 1 PIC decreased 2 PRO stable 1 PRO decreased
Prod/Syntax				
Length	Increased in 80s	Stable	Stable	1 PER stable 1 PIC decreased to 70s, increased in 80s 2 PRO decreased (1 app*) 2 PRO increased to 70s, decreased 80s
T-unit length	Decreased	Decreased	Decreased	1 PER increased in 60s 2 PIC stable 1 PIC increased in 70s, decreased in 80s 1 PRO stable 1 PRO decreased 1 PRO increased to 70s, decreased in 80s
Clause length	Stable (increase in 70s)	Stable (increase in 70s)	Stable	1 PER increased in 50s and 60s then decreased 2 PIC increased to 70s, decreased in 80s 2 increased to 70s, decreased in 80s
Embedding	Stable	Stable	Stable	1 PER and 1 PIC increased in 60s 1 PRO increased to 70s 2 PRO decreased
Clausal struc				
Main Clauses	Stable	Increased	Stable	1 PER decreased in 60s 1 PER increased in 70s and 80s 1 PRO increased 1 PRO decreased 2 PRO decreased in 70s, increased in 80s
Right-branching clauses	Stable (increased in 60s)	Stable (increased in 60s)	Stable	1 PER decreased 1 PIC increased to 70s 1 PRO decreased 2 PRO increased to 70s, decreased in 80s

Continued on next page

VARIABLE	PERSONAL	PICTURE	PROCEDURE	TOPICS
Left-branching clauses.	Decreased to 70s, increased in 80s	Stable	Decreased	1 PER decreased in 60s 1 PIC increased in 70s, decreased in 80s 1 PIC decreased in 70s increased in 80s 1 PRO increased 1 PRO increased to 70s 2 PRO stable
Cohesion	Decreased	Decreased	Decreased	*1 PIC 2 PIC decreased from 60s to 80s 2 PRO stable
Reference	Decreased (app *)	Decreased (app *)	Stable	2 PER decreased to 70s, increased in 80s *2 PIC decreased from 60s to 80s 2 PIC decreased to 70s, increased in 80s 1 PRO in 50s
Lexical	Decreased	Decreased from 60s to 80s	Decreased	1 PER stable 3 PRO stable *1 PRO decreased
Substitution	Stable	Stable	Decrease in 80s	1 PER increased 2 PIC increased in 50s * PRO
Ellipsis	Decreased	Decreased	Decreased to 80s but minimal in 70s	1 PER stable 1 PIC only in 60s 3 PRO stable
Conjunction	Increased to 70s, decreased in 80s	Stable	Stable	* PER 1 PRO decreased from 60s 3 PRO increased to 70s, decreased in 80s (1 *)
"And"	Decreased	Variable	Increased	3 PER decreased from 60s 3 PIC increased in 60s and 80s 1 PRO stable *1 PRO 1 PRO inc in 50s and 80s
Connectives	Increased to 70s, decreased in 80s	Variable	Increased	1 PER * 1 PIC stable 3 PIC increased in 60s and 80s *1 PRO 2 PRO stable 2 PRO increased to 60s then stable
Attempts	Stable	* Increased	Stable	2 PER decreased 1 PIC stable 1 PIC * 2 PRO increased 2 PRO decreased in 60s
Dysfluency	Increased	Stable	Increased	1 PIC increased in 70s 1 PIC increased in 70s and 80s 1 PIC increased in 50s and 80s 3 PRO stable

=significant App=approaching significance
PER=Personal-narratives PIC=Picture-sequences PRO=Procedures

<u>Table 8.5: Summary of ageing effects on task and topic</u>

8.2 Socio-economic status effects

8.2.1 The effect of SES on the combined discourse samples

(Table 8.6)

DISCOURSE MEASURE	SES
RELEVANCE	
All	*SES3<SES4
DISCOURSE-GRAMMAR	
All	
SYNTAX MEASURES	
No. of Words	
Words per T-unit	
Words per Clause	
Clauses per T-unit	
CLAUSAL STRUCTURE	
Main Clauses	*SES1<SES4
Left-branching clauses	
Right-branching clauses	*
CLARITY DISRUPTORS	
Non-Specific elements	
Word-substitutions	
Content and Fluency	
Total Clarity Disruptors	
COHESION	
Reference	
Substitution	
Ellipsis	
Conjunction	*
Lexical	*SES4<SES2 *SES4<SES1
Attempted cohesion	
Ands	
Connectives	*
Total Cohesive ties	*SES4<SES1
DYSFLUENCY	
All	

*=significant[55]

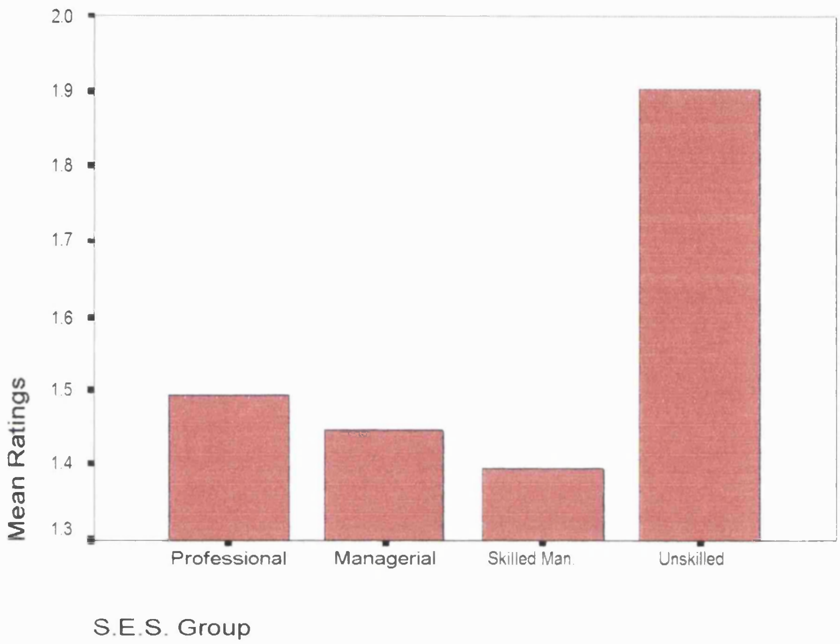
SES1=Professional SES3=Skilled
SES2=Managerial SES4=Unskilled

Table 8.6: Effect of SES on combined samples

[55] The effect of SES was determined using the Kruskal-Wallis test with p=0.05. The significance of the comparisons between SES groups was determined by the Mann-Whitney Test with the significance set at 0.0083.

a) Relevance ratings

An analysis of *relevance* revealed that SES had a significant effect on the discourse samples combined (H=8.507, p=.037) (Graph 8.20) with a reduction in the least skilled group. Furthermore the discourse of SES4[56] was rated significantly less relevant than SES3 (z=-.105, p=.007).



Graph 8.20: SES effect on relevance of combined discourse samples

b) Discourse-grammar

The *discourse-grammar* appropriateness ratings were not significantly affected by SES (H=5.480, p=.14) although there was a trend towards increasing inappropriateness from SES1 to SES4.

c) Clarity disruptors

The SES of the subjects did not significantly affect the percentage of *clarity disruptors* evident in the combined discourse samples (H=2.673, p=.445) but SES4 produced a higher percentage of clarity disruptors than the other groups.

---

[56] SES1=Professional SES3=Skilled Manual
SES2=Managerial SES4=Unskilled

The types of clarity disruptors (*non-specific components, word-substitutions* and *content and fluency disruptors*) were not significantly affected by SES (H=5.443, p= .142, H=2.013, p=.570, H=1.330, p=.722 respectively). Word-substitutions occurred in extremely small amounts. There was an increase from SES1 to SES4 in *non-specific elements* and *content and fluency disruptors* with fewer non-specific elements than content and fluency disruptors in all groups.

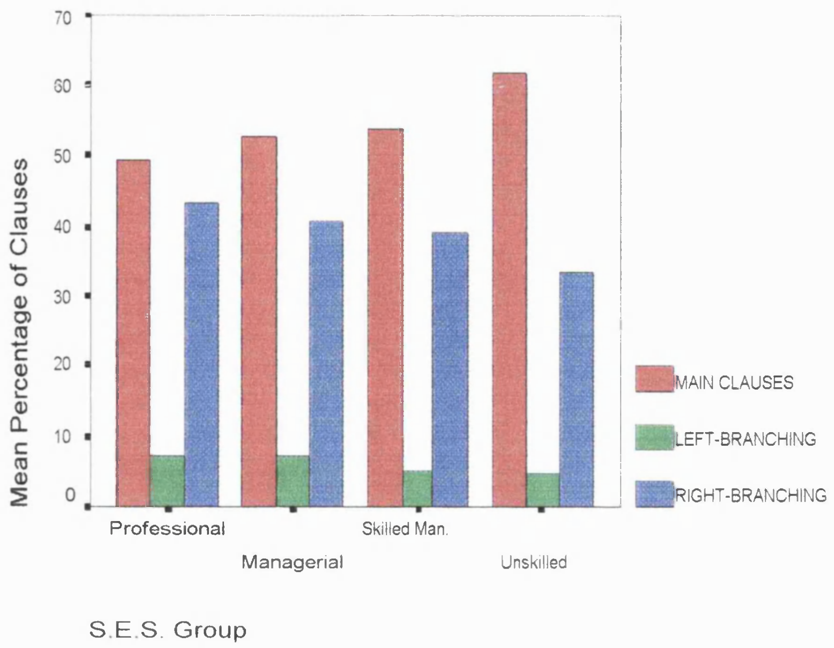
d) Productivity and syntactic analysis

No significant differences in the *length* of combined samples were observed between the four groups (H=5.781, p=.123) although SES1 tended to produce the longest samples.

SES did not have any significant effect on *words per T-unit, words per clause* and *clauses per T-unit* (H=6.543,p=.088, H=3.497, p=.321, H=6.159, p=.104, respectively) in the combined discourse samples. A decrease in T-unit size and embedding was noted from SES1 to SES4 with the latter having the least. Phrasal complexity (as measured in words per clause) was the greatest in SES3.

e) Clausal structure

SES had a significant effect on the percentages of *main clauses* (H=10.338, p=.016) and *right-branching clauses* (H=8.938, p=.030) in the combined discourse samples (Graph 8.21). SES1 produced significantly fewer main clauses than SES4 (z=-2.626, p=.007). Whilst the percentage of main clauses increased from SES1 to SES4, the reverse was observed with right-branching clauses. Thus SES4 had a greater discrepancy between main and right-branching clauses than SES1. *Left-branching clauses* remained similar across groups (H= 3.622, p=.305).

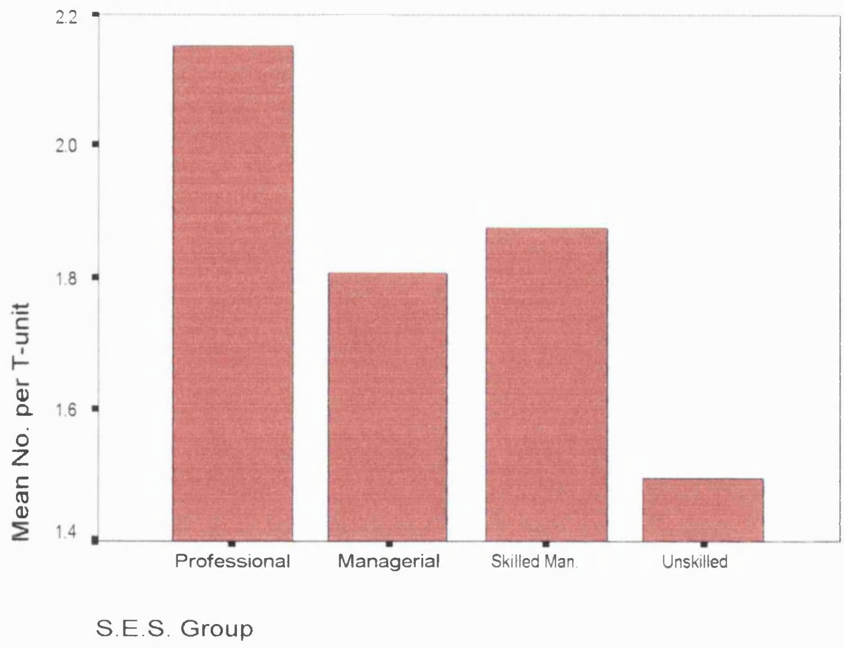


Graph 8.21: SES effect on main and branching clauses in combined samples

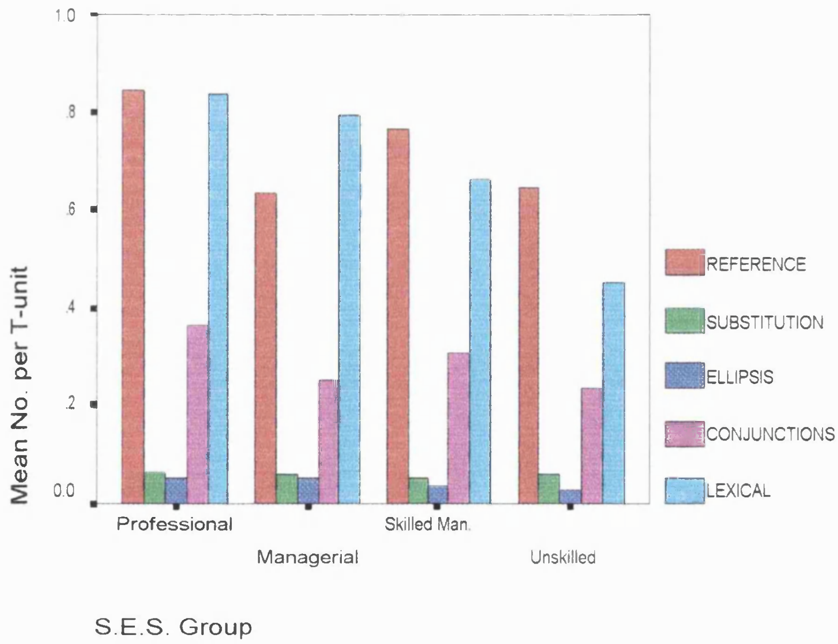
f) Cohesion analysis

Total cohesive ties per T-unit in the combined discourse samples was significantly affected by SES (H=7.916, p=.048) (Graph 8.22). SES1 produced significantly more ties than SES4 (z=-2.626, p=.007).

On the five types of cohesive ties, SES had a significant effect only on *conjunctions* (H=8.765, p=.033) and *lexicalisation* (H=10.957, p=.012) (Graph 8.23). SES1 and SES2 employed a significantly higher number of lexical ties than SES4 (z=-2.626, p=.007; z=-2.731, p=.006). *Substitution* and *ellipsis* occurred infrequently in all groups and produced no significant results (H=1.104, p=.776, H=1.988, p=.575, respectively). Reference and lexicalisation were the most common cohesive types in all groups and, together with conjunctions, decreased from SES1 to SES4.

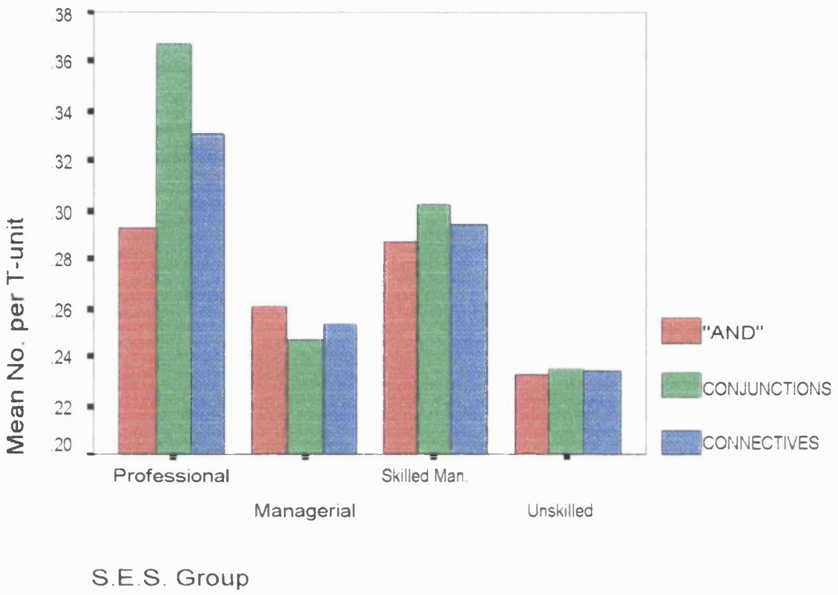


Graph 8.22: SES effect on total cohesion in combined discourse samples



Graph 8.23: SES effect on types of cohesion in combined discourse samples

Unlike conjunctions (see above) SES had no significant effect on the incidence of *"and"* (H=2.628, p=.453). Its incidence was similar in SES1 and SES3 with reduced amounts in the other groups. In SES1, conjunctions were elicited more frequently than "and"s whereas similar amounts of conjunctions and "and"s occurred in the other groups. The occurrence of *connectives* was significantly affected by SES (p= .026) (Graph 8.24). SES1 produced more connectives than the other groups, particularly SES4.



<u>Graph 8.24: SES effect on conjunctions and connectives in combined discourse samples</u>

SES had no significant effect on the incidence of *cohesive attempts* (H=5.410, p=.144) in the combined discourse samples but a linear increase in errors was observed from SES1 to SES4.

g) Dysfluency

There was no significant effect of SES on *dysfluency* (H=2.855, p=.415) in the combined discourse samples but a linearly decreasing trend to SES4 was observed.

8.2.2 The effect of SES on discourse genre

(Table 8.7)

DISCOURSE MEASURES	NARRATIVE	PROCEDURE
RELEVANCE		
All		
DISCOURSE-GRAMMAR		
All		
PROD/SYNTAX		
No. of Words		
Words/T-unit		*4<1
Words/Clause		*4<1
Clauses/T-unit		*
CLAUSE STRUCTURE		
Main Clauses		*4>1 *4>2
Left-branching Clauses		
Right-branching Clauses		*4<1 *4<2
CLARITY DISRUPTORS		
Non-Specific elements		
Substitution		
Content and Fluency		
Total Clarity Disruptors		
COHESION		
Reference		
Substitution		
Ellipsis		
Conjunctions		*4<1
Lexicalisation	*4<1	
Attempts		
Ands		
Connectives		*
Total Cohesive Ties		*4<1 *4<3
DYSFLUENCY		
All		

*=significant[57]
1=Professional 3=Skilled
2=Managerial 4=Unskilled

Table 8.7: Effect of SES on two discourse genres

a) Relevance Ratings

SES did not have any significant effect on the ratings of the narratives or procedures (H=6.434, p=.092; H=4.432, p=.218), although SES4 had poorer ratings in both genres than the more skilled groups.

---

[57] The effect of SES was determined using the Kruskal-Wallis test (significance of 0.05). The significance of the comparisons between age groups was determined by the Mann-Whitney Test with the significance set at 0.0083 (as previously).

b) Discourse-grammar

The appropriateness of *discourse-grammar* did not vary significantly for the groups in narratives or procedures (H= 3.615, p=.306; H=4.104, p=.250). In both genres discourse-grammar tended to become less appropriate in SES4 compared to SES1. In all SES groups, procedural discourse-grammar tended to be rated as more appropriate than narratives.

c) Clarity disruptors

SES had no effect on the incidence of the *total clarity disruptors* in either narratives or procedures (H= 3.015, p=.389, H=1.074, p=.783). The number of clarity disruptors tended to increase in both genres from SES1 to SES4 and they occurred more often in procedures than in narratives in all groups.

No significant effect of SES was found on the types of clarity disruptors in narratives or procedures (non-specific: H=4.276, p=.233; H=5.578, p=.134; word-substitutions: H=1.077, p=.783; H=3.734, p=.292; content and fluency: H=1.163, p=.762; H=1.885, p=.597). *Non-specific elements* and *content and fluency disruptors* tended to increase in both genres from SES1 to SES4. However more non-specific elements occurred in all groups in narratives than in procedures with the reverse for content and fluency disruptors. *Word-substitutions* in the procedures decreased to SES3.

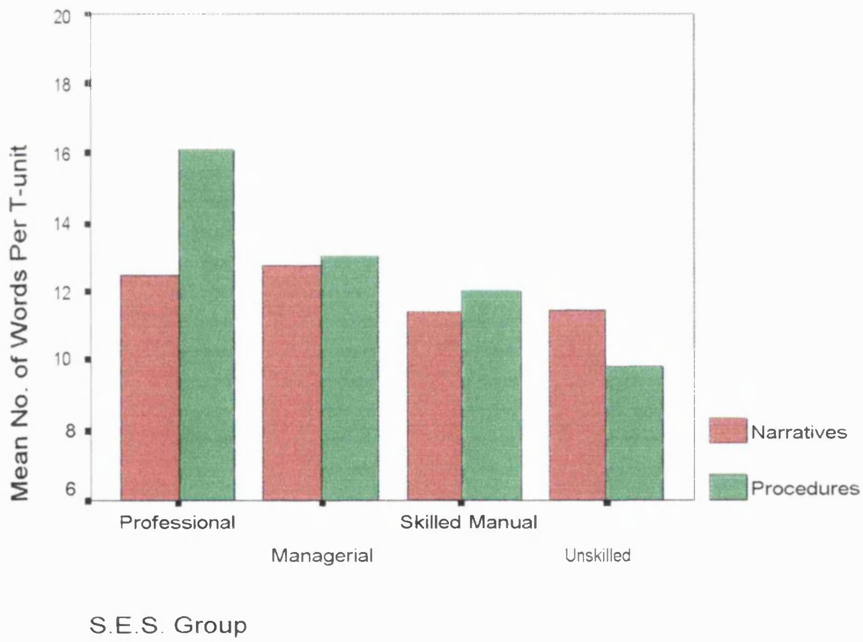
d) Productivity and syntactic analysis

There was no significant effect of SES group on the *length* of the samples produced in narratives or procedures (H=6.344, p=.096; H=4.290, p=.232). SES1 produced longer samples in both genres than the other groups.

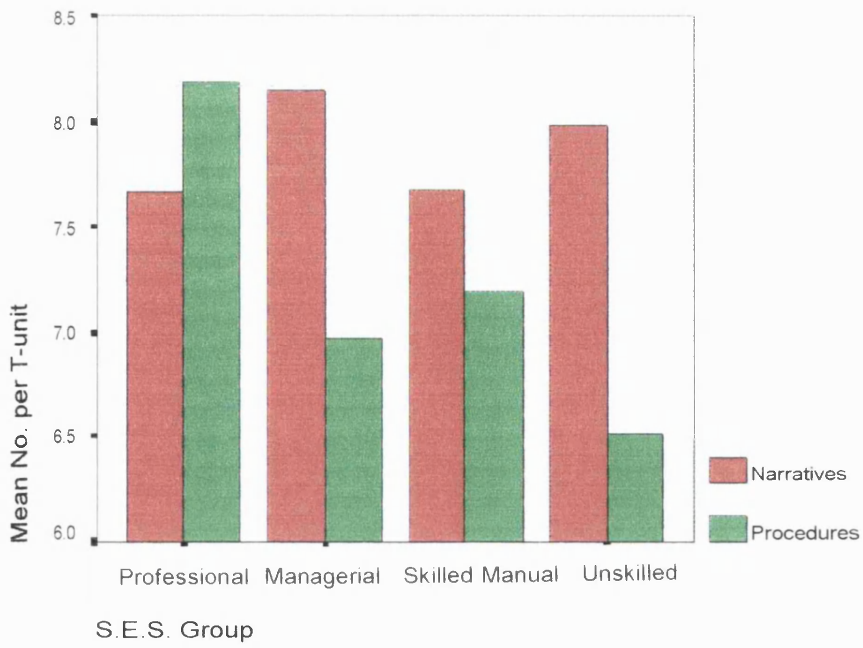
On the measures of *clause* and *T-unit-length* and *clausal-embedding*, no significant effect of SES was found in the narratives (H=2.957, p=.396; H=4.458, p=.216; H=4.348, p=.226). *T-unit-length* in narratives tended to remain constant across all groups and genres. Narratives tended to elicit longer clauses than procedures in all groups except SES1. *Clausal-*

embedding demonstrated a decrease to SES4 and narratives had consistently less embedding than the procedures in all groups.

SES had a significant effect on *T-unit-length* in procedures (H=11.298, p=.010) (Graph 8.25) and it decreased linearly from SES1 to SES4 with SES1 producing significantly greater T-unit-lengths than SES4 (z=-2.890, p=.004). The *clause-length* in procedures was also significantly affected by SES (H=9.233, p=.026) (Graph 8.26). SES1 produced procedures with significantly greater *T-unit-length* than SES4 (z=-3.151, p=.002). The amount of *clausal-embedding* in the procedures was also significantly affected by SES (H =8.086, p=.044) and demonstrated a decline from SES1 to SES4.



Graph 8.25: Effect of SES on words per T-unit of genres

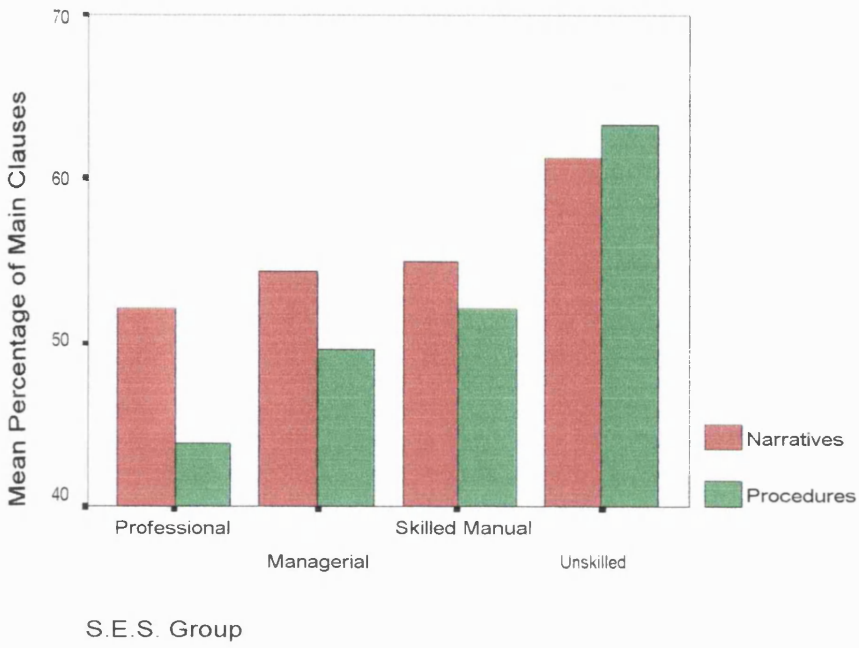


Graph 8.26: Effect on SES on clause-length of genres

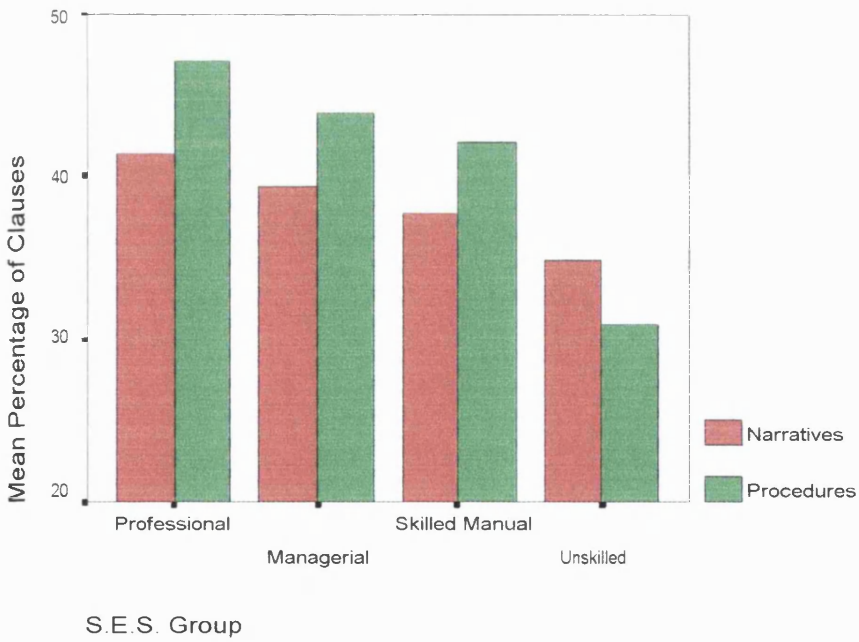
e) Clausal structure

No significant effect of SES was found in the narratives on *main, left-* and *right-branching clauses* (H =5.574, p=.134; H=3.079, p=.380; H=3.815, p=.262). Main clauses tended to increase linearly from SES1 to SES4 whilst the number of left and right-branching clauses decreased.

In procedures there was a significant effect of SES on *main clauses* used (H=14.116, p=.003) (Graph 8.27) and increased linearly from SES1 to SES4s. SES1 and SES2 both produced significantly fewer main clauses than SES4 (z=-3.151, p=.002; z=-2.731, p=.006). A significant effect of SES was also found on *right-branching clauses* in procedures (H=14.534, p=.002) (Graph 8.28). SES1 and SES2 produced a significantly higher percentage of right-branching clauses than SES4 (z=-3.361, p=.001; z=- 2.941, p=.003). No significant effect of SES was observed in *left-branching clauses* (H=3.514, p=.319), although they decreased from SES1 to SES4.



Graph 8.27: Effect of SES on percentage of main clauses of genres

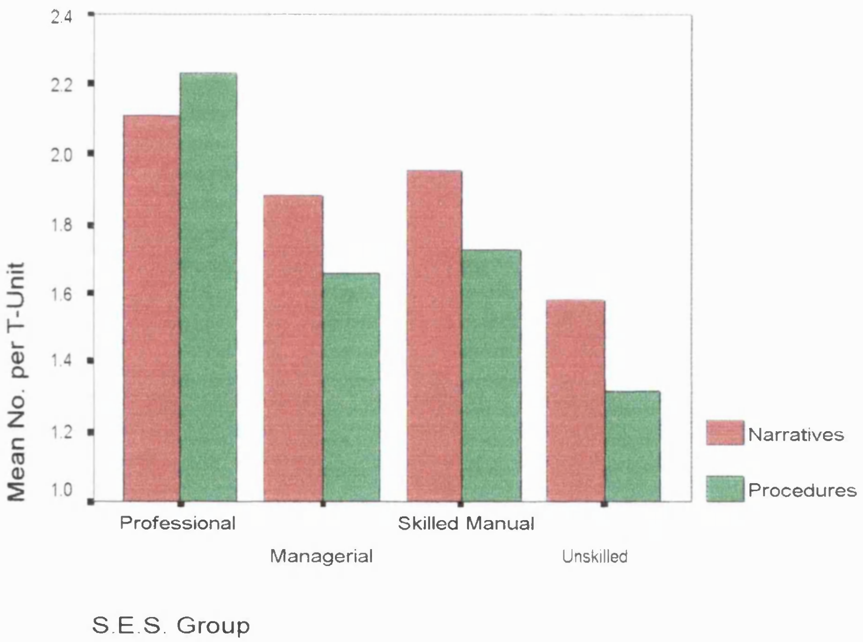


Graph 8.28: Effect of SES on right-branching clauses in genres

Except for SES4, more main clauses but fewer right-branching-clauses were elicited in narratives than in procedures. More left-branching clauses were produced in narratives than procedures by SES2 but the opposite trend was seen in the other groups.

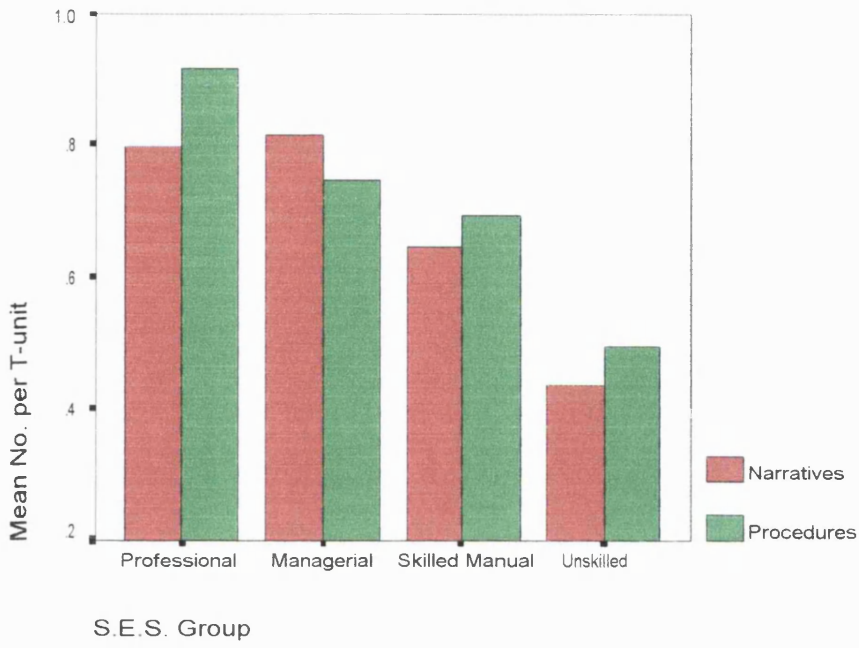
f) Cohesion analysis

On the measure of *total cohesive ties*, SES had no significant effect in the narratives (H=5.432, p=.143) but it did in the procedures (H=11.946, p=.008) (Graph 8.29). Cohesive ties tended to decrease in both genres from SES1 to SES4, with SES1 and SES3 producing significantly more cohesive ties in procedures than SES4 (z=-2.626, p=.007; z=-2.838, p=.005). Narratives elicited a greater measure of cohesion than procedures in most groups.

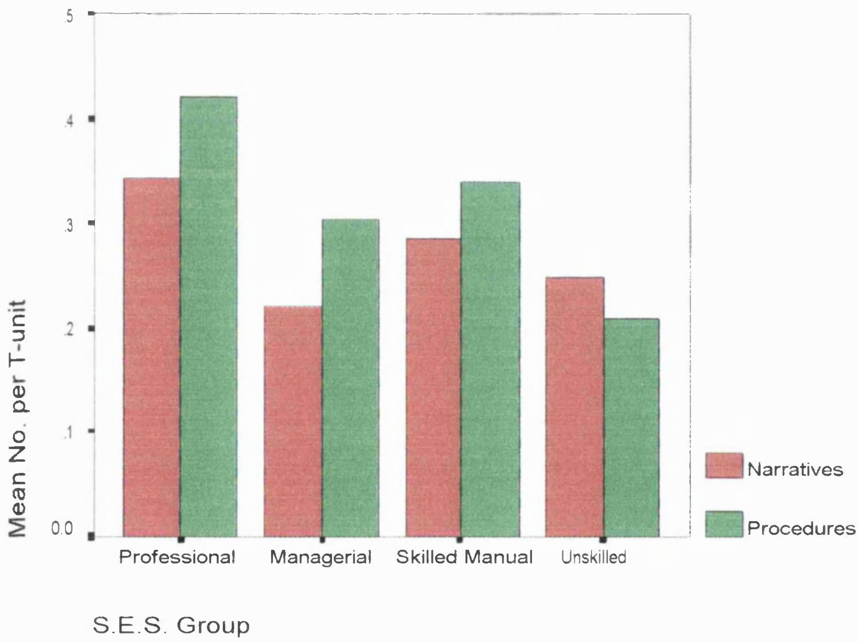


Graph 8.29: Effect of SES on total cohesive ties of genres

Of the types of cohesion, the only significant effect of SES in narratives was in lexicalisation (H=10.343, p=.016) (reference: H=2.745, p=.433; substitution: H=1.330, p=.722; ellipsis: H=.733, p=.866; conjunctions: H=5.606, p=.132) (Graph 8.30). In procedures, the only significant effect of SES occurred on conjunctions (H=11.190, p=.011) (reference: H=5.450, p=.142; substitution: H=4.078, p=.253; ellipsis: H=7.409, p=.060; lexical: H=6.225, p=.101) (Graph 8.31).

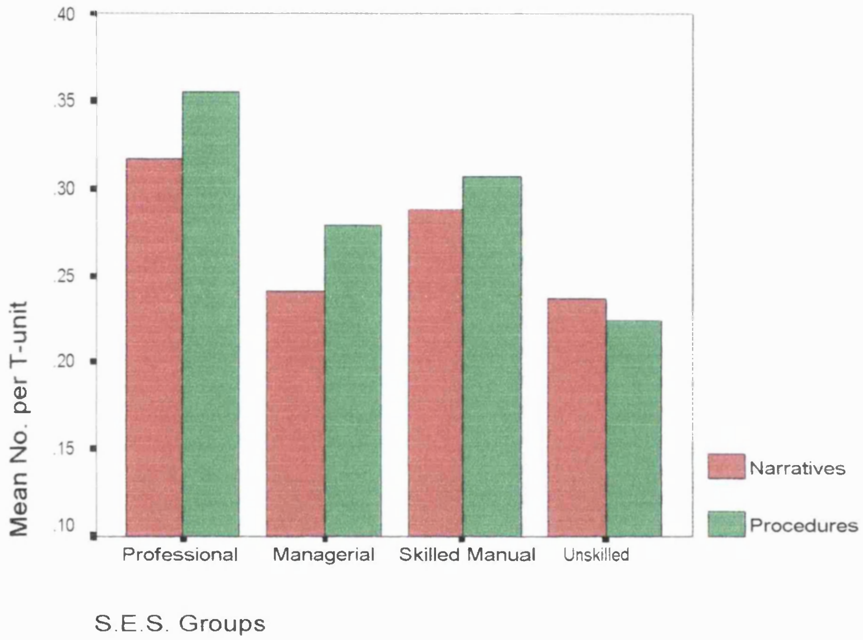


Graph 8.30: The effect of SES on lexicalisation in genres



Graph 8.31: The effect of SES on conjunctions in genres

More *referential ties* were consistently produced by all groups in narratives than procedures, with SES2 producing considerably less in procedures than other groups. A significantly greater number of *conjunctions* were produced in the procedures of SES1 than SES4 (z=-3.103, p=.002). A steady decline occurred from SES1 to the less skilled in both genres. In the first three SES groups, procedures tended to elicit more conjunctions than narratives. The production of *"and"* tended to be similar across all SES groups and both genres (H=1.404, p=.705; H=1.163, p=.762). The *connectives* demonstrated a significant effect of SES in procedures (H=7.814, p=.05) (Graph 8.32). In the first three groups, narratives tended to elicit fewer connectives than procedures.



Graph 8.32: The effect of SES on total connectives in genres

Lexicalisation tended to decrease linearly in each genre from SES1 to SES4. A significantly greater amount in narratives was measured in SES1 than SES4 (z=-2.626, p=.007).

There was no significant difference in *attempted cohesive ties* in either genre or across groups (H=6.718, p=.081; H=1.462, p=.691). Generally the number of attempted cohesive ties was small with an increase in narratives from SES1 to SES4.

g) Dysfluency

SES did not have a significant effect on *dysfluency* in the narratives or procedures (H=2.509, p=.474; H=3.003, p=.391) with both genres demonstrated a decreasing trend from SES1 to SES4. The most numerous occurred in the procedures of SES1 and the least in the narratives of SES4.

8.2.3 The effect of SES on three tasks[58]

(Table 8.8)

a) Relevance ratings

SES did not have any significant effect on the *relevance* ratings of each discourse task (personal: H 4.485, p=.214; picture: H 4.479, p=.214). The first three groups produced similar ratings across tasks with an increase in SES4.

b) Discourse-grammar

The discourse-grammar ratings of the groups were not significantly different on the three tasks (H=7.101, p=.069; H=1.412, p=.703). There was a general trend to increasing inappropriateness in all tasks from SES1 to SES4. The personal-narratives elicited both the most appropriate and most inappropriate discourse-grammar ratings (SES1 and SES4 respectively).

c) Clarity disruptors

No significant effect of SES was found on *total clarity disruptors* in the three tasks (H=5.939, p=.115; H=2.157, p=.540) nor on the types of clarity disruptors (non-specific: H=3.662, p=.300, H=1.362, p=.715; word-substitutions: none in personal; H=1.077, p=.783; content and fluency: H=2.566, p=.463; H=2.280, p=.516). *Total clarity disruptors* tended to increase from SES1 to SES4s for all tasks. The most numerous occurred in SES4 on the procedures and the least

[58] Exact statistical results for procedures were not repeated in this section and can be found in the Section 8.2.2.

in SES2 on the personal experience. Procedures elicited the most disruptors of all tasks in all groups.

DISCOURSE MEASURE	PERSONAL	PICTURE	PROCEDURE
RELEVANCE			
All			
DISCOURSE-GRAMMAR			
All			
PRODUCTIVITY/SYNTAX			
No. of Words			
Words/T-unit			*4<1
Words/Clause			*4<1
Clauses/T-unit			*
CL.STRUCTURE			
Main Clauses	* 1<3 *1<4		*1<4 *2<4
Left-branching clauses			
Right-branching clauses			*4<1 *4<2
CLARITY DISRUPTOR			
Non-Specific elements			
Substitution			
Content and Fluency			
Total Clarity Disruptors			
COHESION			
Reference			
Substitution	*		
Ellipsis			
Conjunctions			*4<1
Lexicalisation		*4<1	
Attempts		App. Sig.	
Ands			
Connectives	*4<1		*
Total Cohesive Ties	*		*4<1 *4<3
DYSFLUENCY			
All			

*=significant[59] App. Sig.=Approaching significance
1=Professional 3=Skilled
2=Managerial 4=Unskilled

Table 8.8: Effect of SES on three discourse tasks

Personal-narratives elicited the most *non-specific elements* in all groups with an increase in SES3 and SES4. The picture-sequences and procedures produced similar non-specific elements in each group and across SES groups. No *word-substitutions* occurred in the personal-narratives with decreasing amounts in the procedures to SES3. *Content and fluency disruptors* occurred

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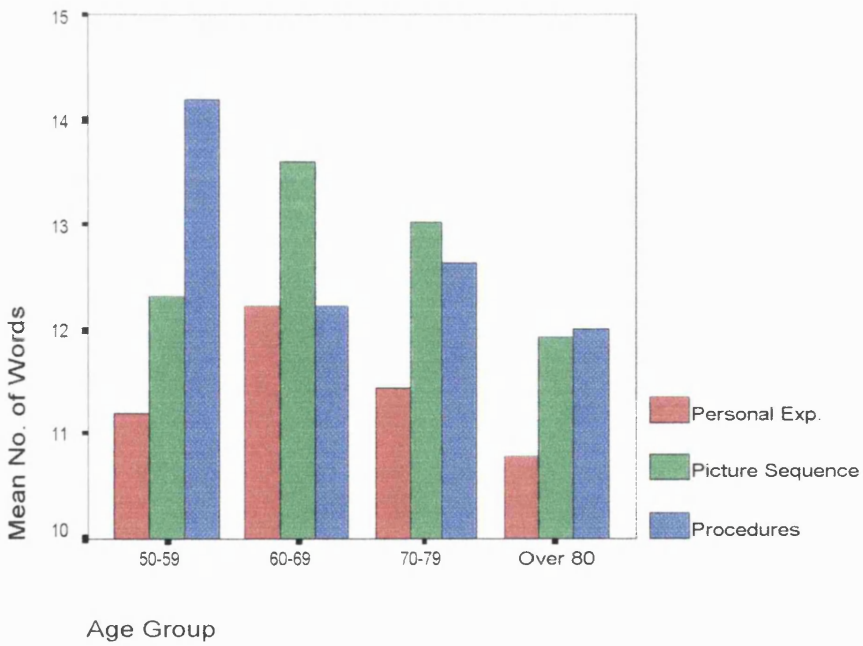
[59] The effect of SES was determined using the Kruskal-Wallis test with the significance of 0.05. The significance of the comparisons between age groups was determined by the Mann-Whitney Test with the significance set at 0.0083.

less frequently in the personal-narratives than the other two tasks in each group and they demonstrated a general increase from SES1 to SES4 in personal-narratives and procedures.

d) Productivity and syntactic analysis

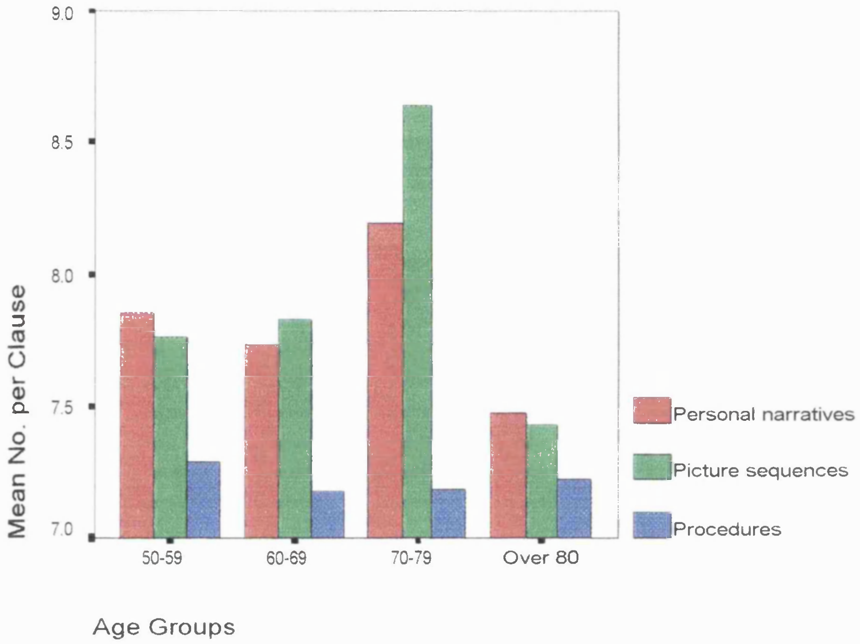
SES did not have a significant effect on sample *length* in each task (H=4.764, p=.190, H=2.711, p=.438). The personal-narratives and, to a lesser extent, the procedures, decreased in length from SES1 to SES4. Personal-narratives elicited the longest samples in all groups and picture-sequences the least.

T-unit-length of the procedures was significantly affected by SES but not the personal and picture narratives (H=6.589, p=.086, H=2.283, p=.516) (Graph 8.33). All tasks elicited samples with T-unit-length that decreased from SES1 to SES4 and this decrease was most marked in the procedures, with SES1 producing significantly longer T-units than SES4. Personal-narratives produced the shortest T-units in all groups.



Graph 8.33: Effect of age on T-unit-length of tasks

Clause-length was significantly affected by SES in the procedures but not in the personal or picture-sequence narratives (H=4.351, p=.236, H=6.638, p=.084) (Graph 8.34). The procedures elicited decreasing clause-lengths from SES1 to SES4, with SES1 producing significantly greater clause-lengths than SES4. The longest was elicited by the picture-sequences of SES2.

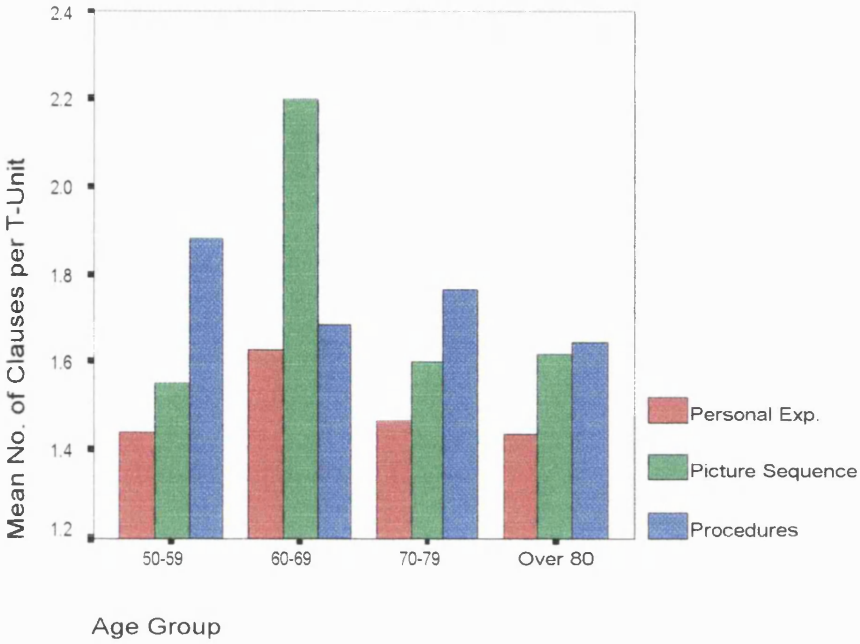


Graph 8.34: Effect of age on clause-length of tasks

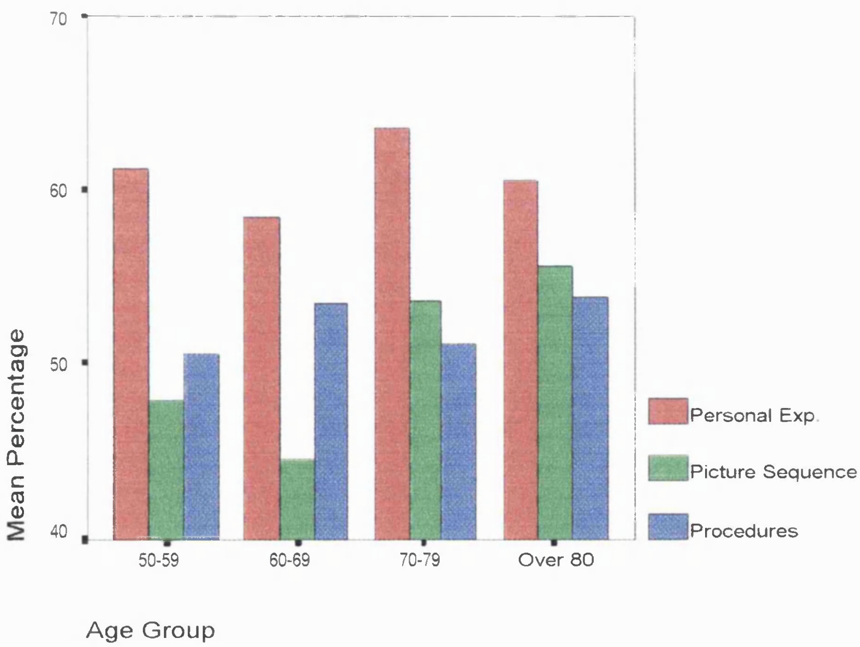
Clausal-embedding was also significantly affected by the procedural task but not the personal or picture narratives (H 3.854, p=.278, H=3.165, p=.367) (Graph 8.35). Clausal-embedding in the personal-narratives was the lowest of all tasks in all groups, whilst the procedures elicited a decrease from SES1 to SES4. The picture-sequences elicited the greatest amount in SES2. SES4 demonstrated the least variation by task.

e) Clausal structure

Main clauses were significantly affected by SES in the personal-narratives and procedures (H=19.634, p=.014) but not in the picture-sequences (H=3.020, p=.389) (Graph 8.36). All tasks demonstrated an increase from SES1 to SES4 and, to a lesser extent, in picture-sequences. On the personal-narratives, the differences between SES1 and both SES3 (z=-2.626,
p=.007) and SES4 were significant (z=-2.731, p=.006). In all groups, the greatest percentage of main clauses occurred in the personal-narratives.

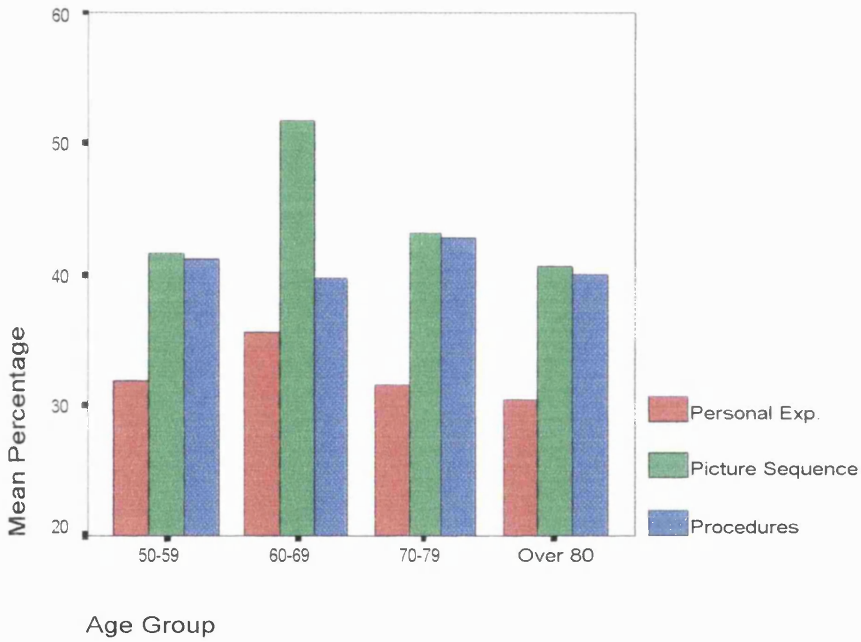


Graph 8.35: Effect of age on clausal-embedding of tasks



Graph 8.36: Effect of age on main clauses of tasks

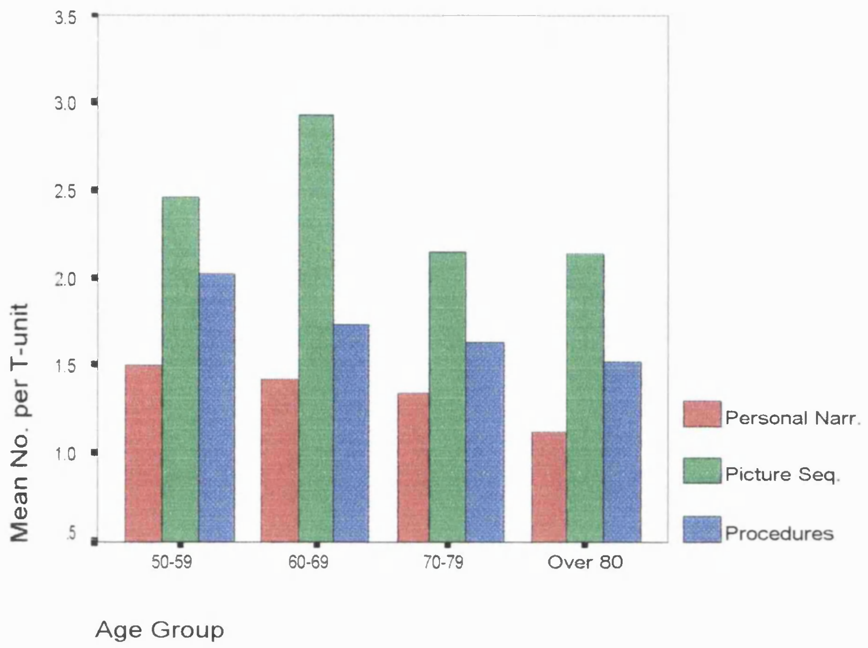
No significant effect of SES on *left-branching clauses* was found (H=6.327, p=.097; H=2.159, p=.540). A decrease in all tasks was observed from SES1 to SES4s. Picture-sequences elicited fewer such clauses than the personal-narratives and procedures in each group. A significant effect of SES on *right-branching clauses* was observed in the procedures but not in the personal or picture narratives (H=6.451, p=.092; H=1.074, p=.783) (Graph 8.37). Personal-narratives elicited the smallest number in all groups and demonstrated a decrease from SES1 to SES4s. The incidence of these clauses decreased in the procedures from SES1 to SES4 with significant differences occurring between SES1 and SES2 and the samples of SES4 (z=-3.361, p=.001, z=-2.941, p=.003).



Graph 8.37: Effect of age on right-branching clauses of tasks

f) Cohesion analysis

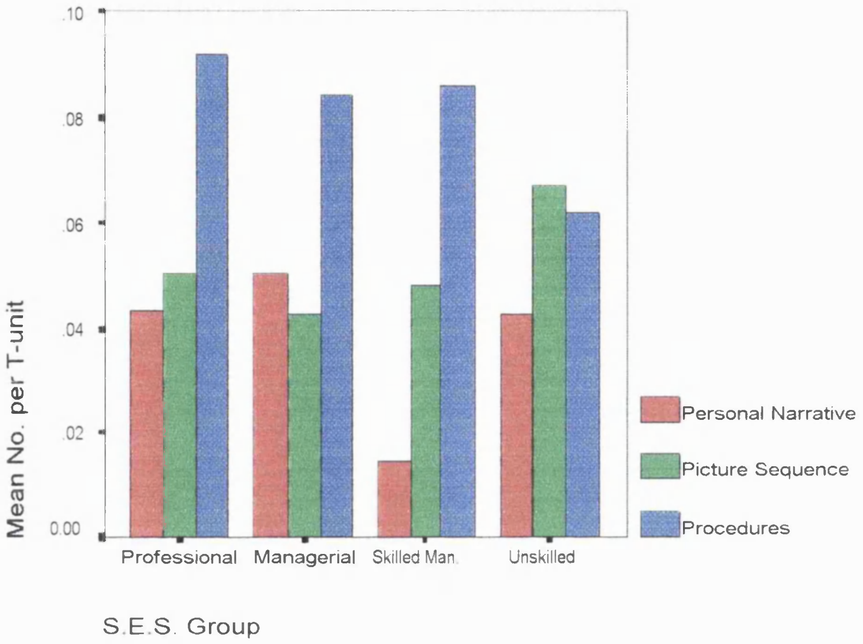
SES had a significant effect on *total cohesive ties* in the personal-narratives (H=8.095, p=.044) and the procedures (Graph 8.38). SES4 produced significantly fewer in the procedures than both SES1 and SES3 (z=-2.626, p=.007, z=-2.838, p=.005). In each SES group the picture-sequence task elicited the most and the personal-narratives the least.



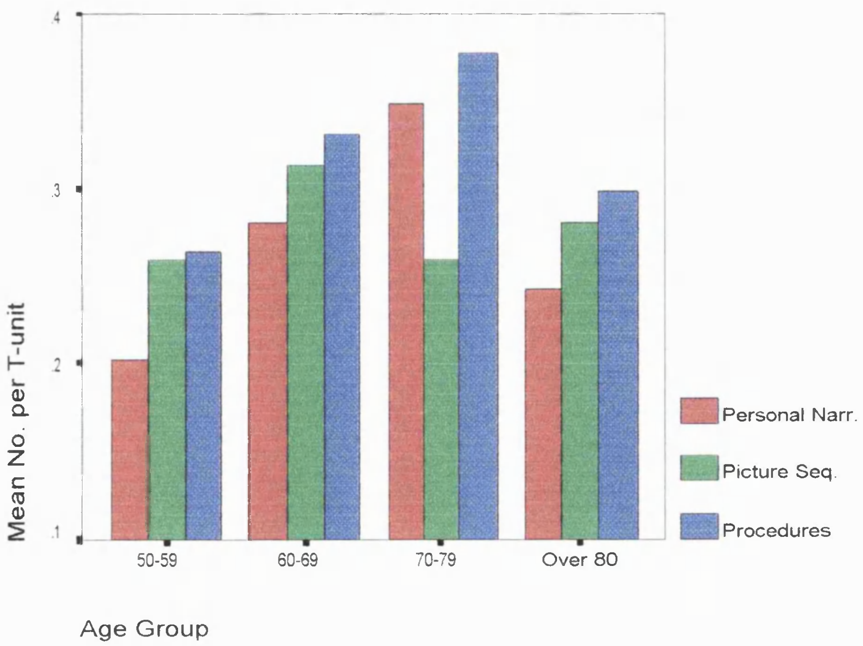
Graph 8.38: The effect of age on total cohesion of discourse tasks

Referential cohesion in the three tasks did not vary significantly with SES (H=3.972, p=.264; H=1.986, p=.575). In all groups, the picture-sequence elicited the greatest amount with personal-narratives and procedures providing similar amounts in each group. *Substitution* was significantly affected by SES in the personal-narratives (H=8.275, p=.041) but not in the pictures (H=.956, p=.812) (Graph 8.39). SES3 produced less in the personal-narratives. *Ellipsis* was not significantly affected by SES (H= 1.944, p=.584; H=.120, p=.989) and it decreased in the personal-narratives to SES3. The incidence of *conjunctions* was significantly affected by SES in the procedures but not in the two narratives (H=4.489, p=.213, H=4.037, p=.258) (Graph 8.40). In procedures it tended to decline from SES1 to SES4 with a significant difference occurring between SES1 and SES4.

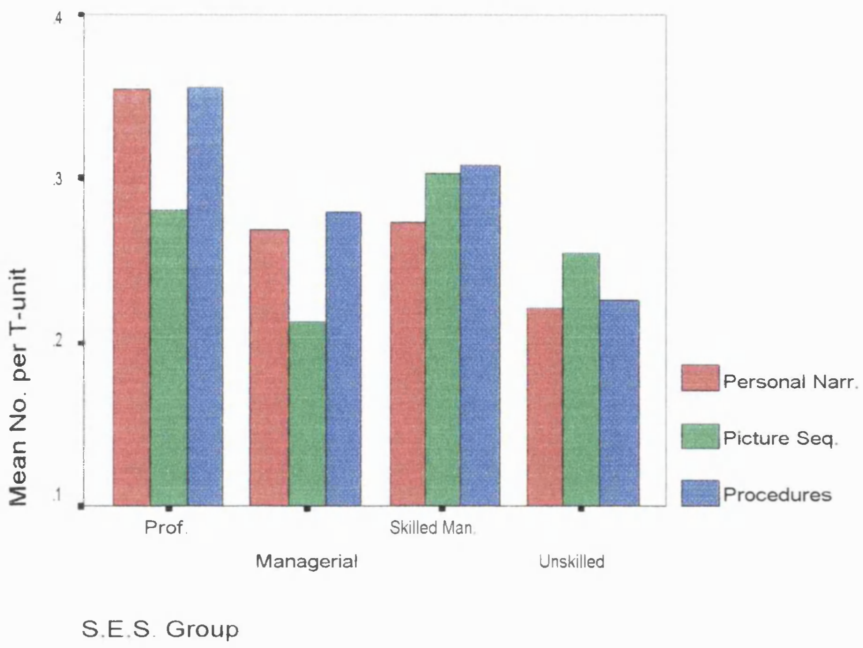
The use of *"and"* was not significantly affected by SES (H=6.185, p=.103; H=1.136, p=.768) but greater variation was found in SES1 and SES2. "And" in the personal-narratives decreased linearly to SES4 and the latter showed the least effect of task. *Connectives* were significantly affected by SES in the personal-narratives and procedures (H=9.476, p=.024) (Graph 8.41) but not in the pictures (H=2.670, p=.445). The incidence of connectives tended to decrease from SES1 to SES4 in the former two tasks. Connectives in the personal-narratives of SES1 were significantly greater than that of SES4 (z=-2.787, p=.005).



Graph 8.39: SES effect on substitution cohesion of three tasks

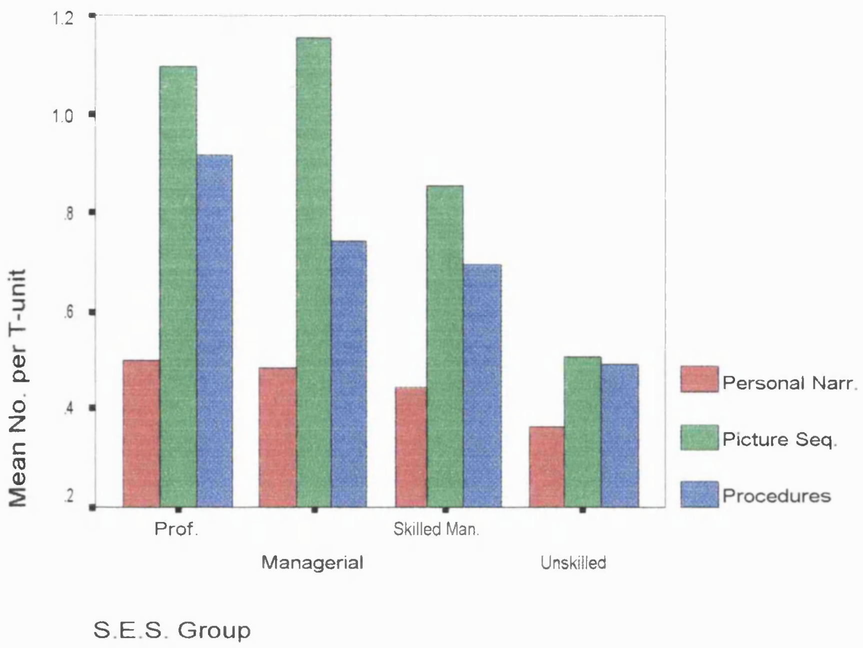


Graph 8.40: The effect of age on conjunctions of discourse tasks



Graph 8.41: The effect of SES on connectives on discourse tasks

Lexicalisation was significantly affected by SES in the picture-sequences (H=9.905, p=.019) but not in the other tasks (H=2.373, p=.499) (Graph 8.42). Picture-sequences and procedures demonstrated a declining trend from SES1 to SES4, with SES1 producing significantly more in the picture-sequences than SES4 (z=-2.680, p=.007). Of all groups, SES4 demonstrated the least task effect on lexicalisation. It tended to occur least frequently in personal-narratives but most frequently in the picture-sequences of all groups.



Graph 8.42: The effect of SES on lexicalization of discourse tasks

The effect of SES on *attempted cohesion* in the three tasks was not significant but the effect on picture-sequences approached significance (H=7.695, p=.053). Cohesive errors tended to increase from SES1 to SES4 in the latter task. The least number of errors in each group consistently occurred in the personal-narratives (H=1.538, p=.673).

g) Dysfluency

SES had no significant effect on the *dysfluency* of the narrative discourse elicited by the two methods of elicitation (H=2.307, p=.511; H=1.205, p=.752) or in the procedures. All tasks demonstrated a decrease from SES1 to SES4s. The personal-narratives contained the most dysfluencies in each group and the picture-sequences the least.

8.2.4 The effect of SES on the discourse topics

(Table 8.9)

	Personal			Picture-sequences				Procedures					
	Fr	Ha	Fu	St	Bu	Wa	Ho	Ty	Wi	Ja	Bo	Su	Bi
REL													
All		?*							*				
D/GRAM													
All								*					
PROD/ SYNTAX													
No W								*					
W/T	*4<1 *4<2		*3<1		*								
W/Cl					*3<2			*	*				
Cl/T										*4<2			
CLAUSE													
% Main	*1<4 *2<4							*1<4		*2<4			
% Left									*				
% Right	*4<1 *4<2							*4<1		*4<1 *4<2			
CLARITY													
All N Sp													
All Subs													
All Con													
% Clar													
COH													
All Ref													
All Sbn		?*			*				*4<1				
All Ell													
All Conj		*2<1										*4<1	
All Lex						*4<1	*4<1						
Attempts				*2<4			*						
Ands													
Connect		*3<1						*					
Coh/T	*4<1							*4<1					
DYSFL.													
All													

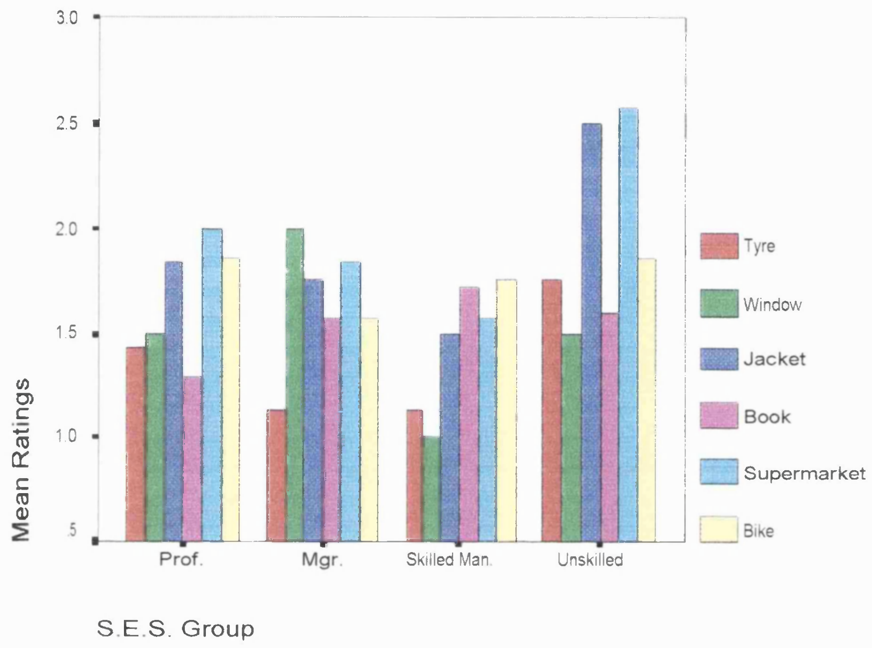
=significant[60] ?=approaching significance
1=Professional 2=Managerial 3=Skilled 4=Unskilled
Fr=Frightening Ha=Happy Fu=Funny
St=Stones Bu=Burglary Wa=Wasp Ho=Homework
Ty=Tyre Wi=Window Ja=Jacket Bo=Book
Su=Supermarket Bi=Bike

Table 8.9: Effect of SES on topic samples

[60] As discussed previously, the significance rate was set at .0083. The significance of the Kruskal-Wallis test remained at 0.05. Only three personal-narrative topics were included (as noted in Section 8.1.4 above).

a) Relevance ratings

SES had a significant effect on the *relevance* ratings of the window procedure (H=8.516, p=.036) and approached significance on the happy experience (H=7.737, p=.052) (Graph 8.43). No other significant effects of SES on the relevance ratings of the topics were observed[61].



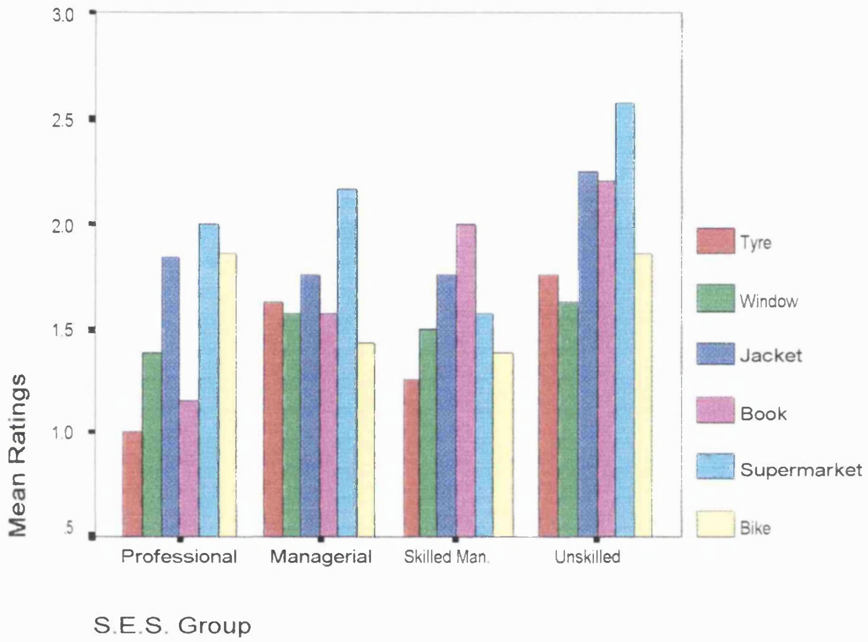
Graph 8.43: SES effect on relevance ratings of procedural tasks

There was a decrease in relevance on all personal topics in SES4 with the happy topic being rated the least relevant in all groups. The most relevant ratings were observed in SES1's frightening experience and the least in SES4's happy topic.

On the picture-sequences little variation by topic was observed on the relevance ratings in all groups apart from SES4 which produced less relevant samples on all tasks. On the procedures little variation in most tasks was observed in all groups apart from an increasingly irrelevant rating in the jacket and supermarket samples of SES4. The window procedure was rated the most relevant in SES3 and the supermarket the least in SES4.

b) Discourse-grammar

No significant effect of SES on the *discourse-grammar* ratings was found on any of the personal-narratives or picture-sequences and only one significant effect occurred in the procedures (tyre) (H=8.752, p=.033) (Graph 8.44). On personal topics there was a trend towards increasingly inappropriate grammar in SES4. The happy topic consistently elicited the least in all groups.



Graph 8.44: SES effect on discourse-grammar ratings of procedural topics

The most appropriate discourse-grammar on all picture-sequence topics was found in SES1 and the least in SES4. In the procedures there was a trend towards increasing inappropriateness in SES4 particularly in the supermarket topic.

c) Clarity disruptors

No significant effect of SES was observed on the *total clarity disruptors* in any topics. In the personal-narratives, there was an increase in SES3 and SES4 compared to the other two groups, particularly on the happy topic which elicited the greatest amount. On the stones and burglary topics, there was a decrease

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[61] Only significant topic effects are given in the text. For a complete list, see Appendix A15.

from SES1 to SES3 with an increase in SES4. The burglar sequence elicited the most disruptors of any group and the wasp often the smallest. SES4 produced the most in the majority of picture-sequence topics than the other groups. In the procedural topics, the tyre topic elicited samples with decreasing amounts of clarity disruptors from SES1 to SES4 but the jacket, book and supermarket topics presented the opposite trend. The bike procedure produced the most (SES4) and the least (SES2).

None of the three types of clarity disruptors occurring in the topic samples demonstrated any significant effect of SES. The happy experience produced the greatest amount of *non-specific elements* in SES4. All picture-sequence topics demonstrated a trend to an increasing number from SES1 to SES4, particularly in the burglary and stones sequences. On the procedures the groups demonstrated little effect of topic except for an increased number of disruptors in the tyre samples in SES1 and SES2 and in the supermarket samples in SES3 and SES4. SES2 produced the least non-specific elements of all topics in five of the six procedures (not the tyre procedure).

No significant effects of SES were found on *word-substitutions* and were non-existent in the personal-narratives. In the picture-sequences, they occurred only in SES1 and SES4's wasp sequence and SES2's homework topic. In the procedures, they only occurred in three topics (tyre, window and book), predominantly in SES1.

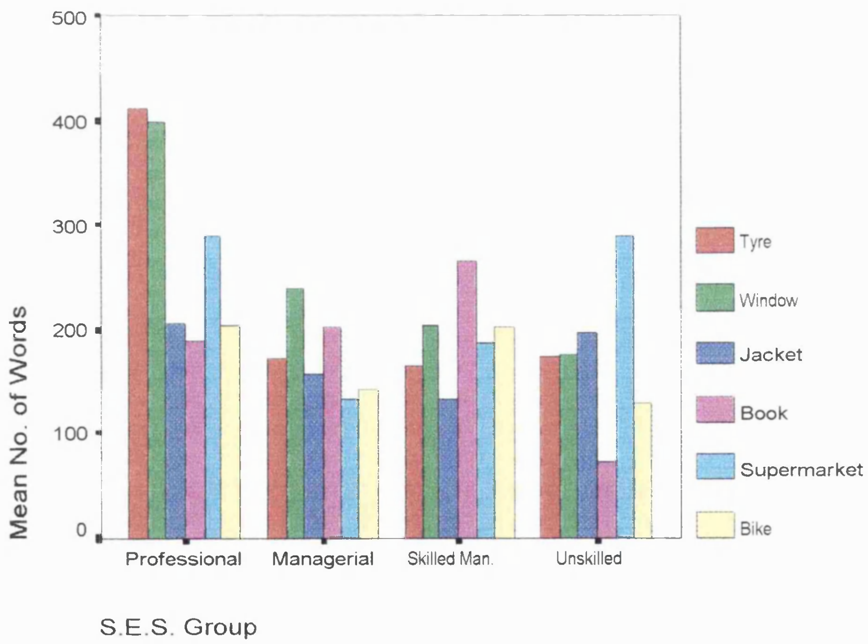
On the measure of *content and fluency disruptors*, relatively few occurred overall, particularly in SES3 and SES4. The happy topic produced an increased amount in SES3. Little effect of topic was observed in the picture-sequences across SES groups, although the burglar sequence tended to elicit more in all groups and the wasp sequence often the least.

Some procedural topics (jacket, supermarket) elicited an increasing amount of content and fluency disruptors from SES1 or SES2 to SES4 whilst others (tyre, window) demonstrated the opposite trend. The supermarket topic often elicited the most in all groups.

d) Productivity and syntactic analysis

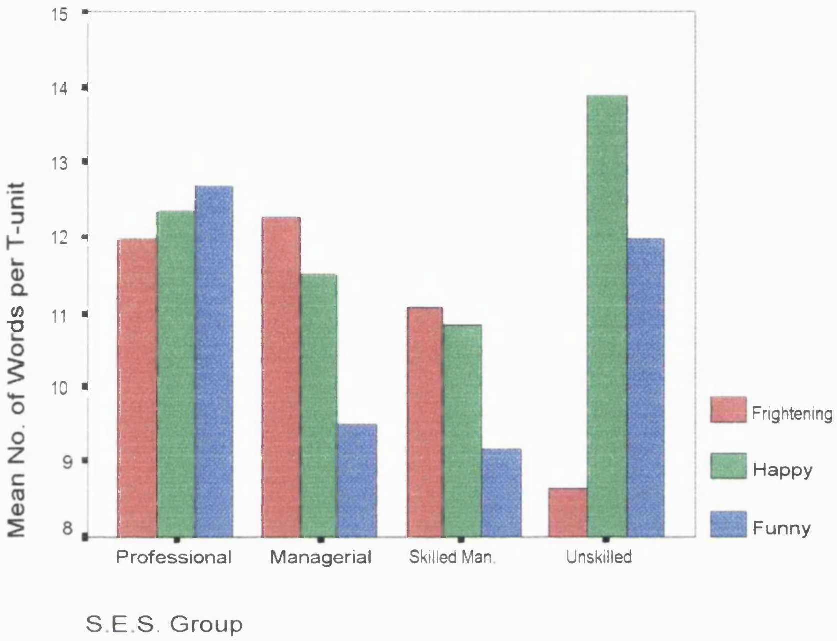
The *length* of the samples in the personal and picture topics was not significantly affected by SES. SES1 produced considerably longer samples on the frightening experience whereas the happy experience elicited shorter samples in all SES groups. On the picture topics, a general trend of decreasing sample length was observed from SES1 to SES4 in the stones and homework sequences. However longer samples were found in the wasp picture-sequence in SES3 and the burglar topic in SES4.

A significant effect of SES on the length of the tyre topic was found (H= 9.210, p=.027) (Graph 8.45). Some topics (e.g. tyre, window, book and supermarket) demonstrated a decrease in length from SES1 to SES4. Within each SES group, procedural topic had little effect. SES1 tended to elicit longer procedures regardless of topic than the other groups.



Graph 8.45: SES effect on sample length of procedural in topics

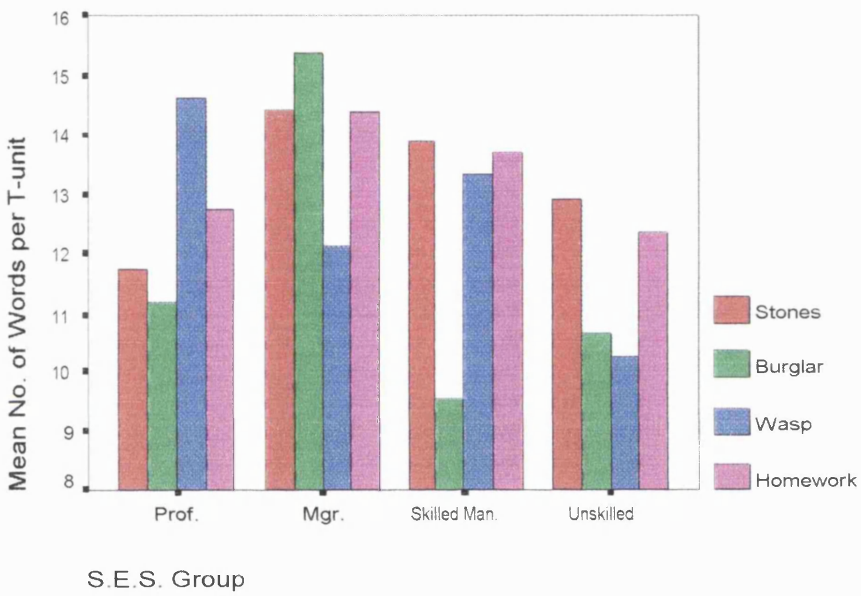
T-unit-length was significantly affected by SES on the frightening and funny experiences (H=10.081, p=.018; H=11.824, p=.008) (Graph 8.46). On all personal topics, the T-unit-length demonstrated a decrease from SES1 to SES4. On the frightening narrative both the SES1 and SES2 produced significantly greater T-units than SES4 (z=-2.777, p=.005; z=-2.503, p=.008) whilst on the funny narrative, SES1 produced significantly longer T-units than SES4 (z=-2.635, p=.006). The frightening experience elicited considerably shorter T-units in SES4 than the other personal topics.



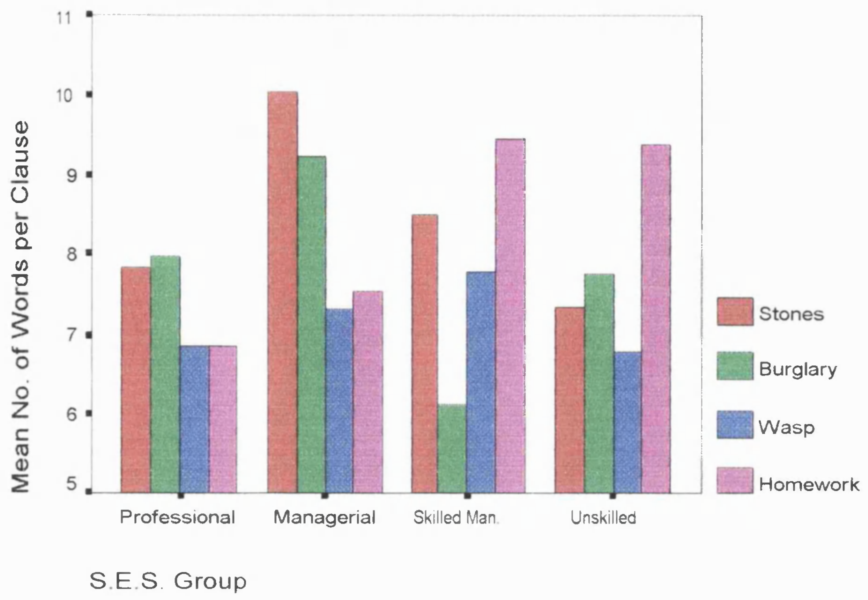
Graph 8.46: SES effect on T-unit-length of personal-narrative topics

On the picture-sequences a significant effect of SES on T-unit-length was observed on the burglar topic (H=8.462, p=.037) (Graph 8.47). This topic elicited samples with the longest (SES2) and shortest (SES3) T-units of all topics. SES4 tended to produce picture-sequences with shorter T-units. No significant effect of SES on T-unit-length in procedural topics was observed. SES1 tended to produce the longest T-units on most topics and demonstrated the least effect of topic. There was a trend to shorter T-units from SES1 to SES4.

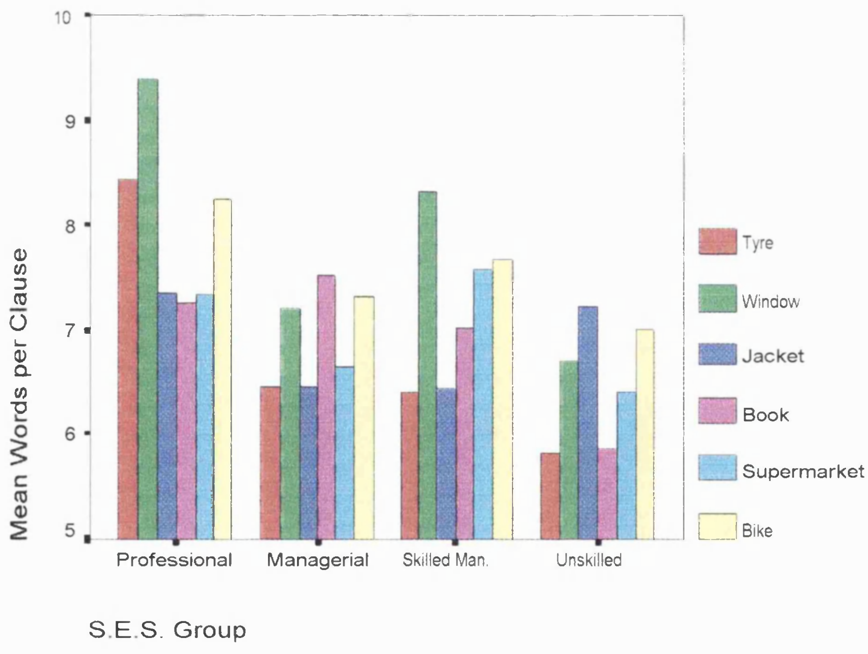
Clause-length of the personal topics was not significantly affected by SES and little variation was seen in the different topics in each age group, apart from SES3 which produced considerably longer clauses on the funny experience. In picture-sequences, SES had a significant effect in the burglar sequence (H=11.288, p=.010) (Graph 8.48), with SES2 producing significantly longer clauses than SES3 (z=-3.151, p=.002). Compared to the other SES groups, SES1 demonstrated a similar performance on all picture topics. The longest clauses were found in SES2 on the stones topic and the least on the burglar sequence in SES3. Whilst the homework topic demonstrated a trend to longer clauses from SES1 to SES4s, the stones topic showed the opposite trend. SES had a significant effect on the tyre and window topics (H=10.560, p=.014; H= 7.825, p=.050) (Graph 8.49). There was a general decrease in clause-length from SES1 to SES4 in most procedural topics.



Graph 8.47: SES effect on T-unit-length of picture-sequence topics

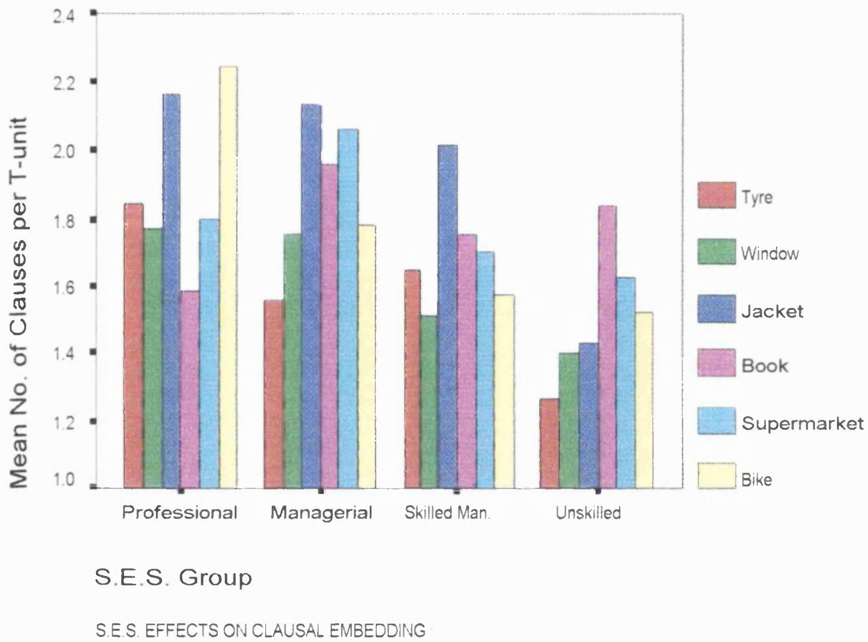


Graph 8.48: SES effect on clause-length of picture-sequence topics



Graph 8.49: SES effect on clause-length of procedural topics

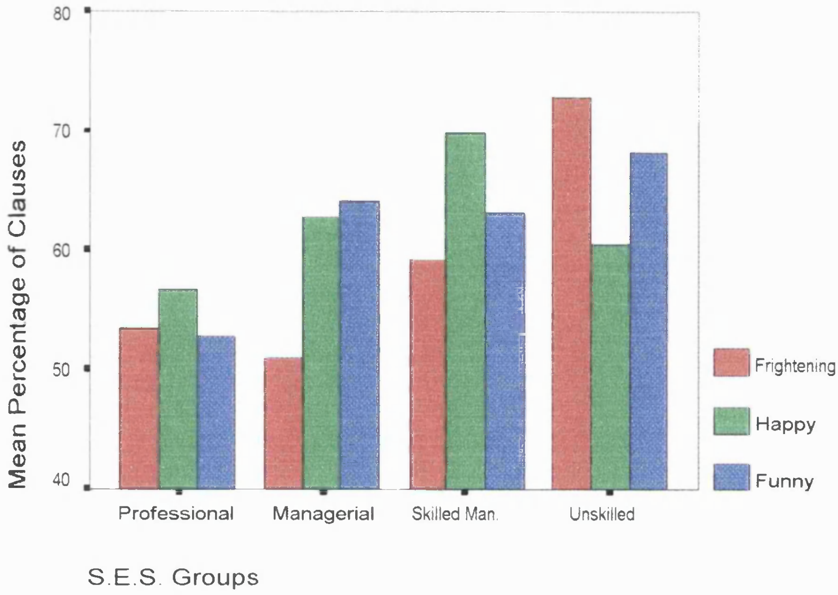
Clausal-embedding was not affected significantly by the SES of the subjects in any topics apart from the jacket procedure ($H=10.315$, $p=.016$) (Graph 8.50). Clausal-embedding in the personal topics was variably affected by SES with an overall trend to less in SES4. The most embedding occurred in SES1's funny topic and the least in SES4's frightening topic. Little variation in clausal-embedding on the picture-sequences was observed, apart from more in the stones topic in SES2. On the jacket procedure, SES2 produced significantly greater embedding than SES4 (z=-2.745, p=.006). A decrease from SES1 to SES4 was observed in all procedural topics with the jacket topic eliciting the greatest amount in each SES group and the tyre and window often the least.



Graph 8.50: SES effect on clausal-embedding of procedural topics

e) Clausal structure

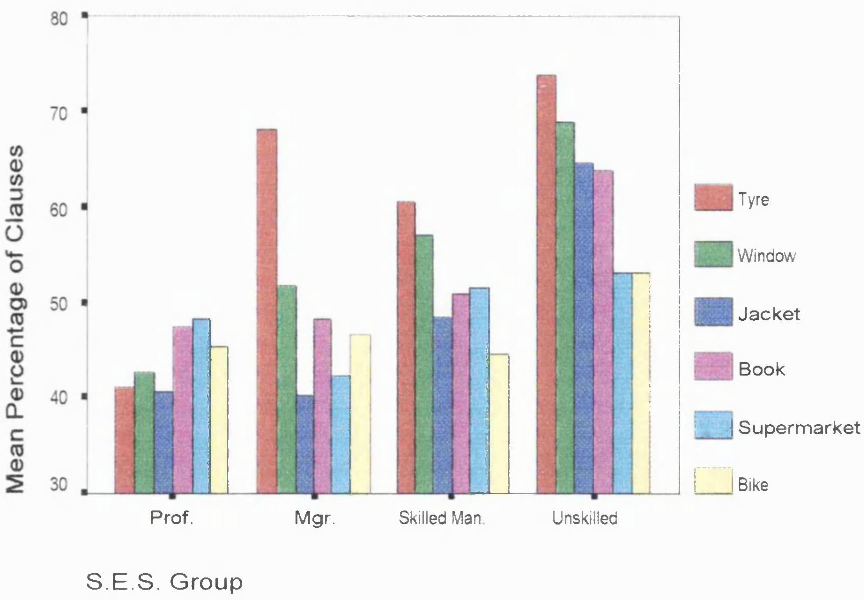
Main clauses demonstrated an increase from SES1 to SES4 in the three personal topics. SES had a significant effect on main clauses in the frightening narrative (H=10.500, p=.015), with SES1 and SES2 producing significantly fewer than SES4 (z=-2.777, p=.005; z=-2.718, p=.007) (Graph 8.51). No significant effect of SES was observed in the picture topics but the effects were variable. SES4 demonstrated least effect of topic and usually produced the most main clauses in each topic.



Graph 8.51: SES effect on main clauses of personal-narrative topics

There was a significant effect of SES on main clauses in the tyre and jacket procedures (H=11.846, p=.008; H=10.116, p=.018) (Graph 8.52). SES1 produced significantly fewer on the tyre topic than SES4 (z=-3.012, p=.003) and the difference between the SES1 and SES2 approached significance (z=-2.546, p=.009). SES2 also produced significantly fewer than SES4 on the jacket topic (z=-2.733, p=.005). Most topics (except for the tyre) demonstrated a steady increase in main clauses from SES1 to SES4. Little effect of topic was seen in SES1 compared to the other groups.

No significant effect of SES was seen on the percentage of *left-branching clauses* in the personal and picture topics. The performance of each SES group in the narrative topics tended to be similar, apart from SES2 where a larger percentage occurred in the frightening experience and in the stones sequence. Of the procedural topics, only the window topic produced a significant effect of SES on left-branching clauses (H=8.177, p=.042). Within each group there were wide ranges in the percentages of these clauses on each topic. Some topics elicited small numbers (e.g. tyre in SES2) but the window elicited the greatest number overall in SES1.

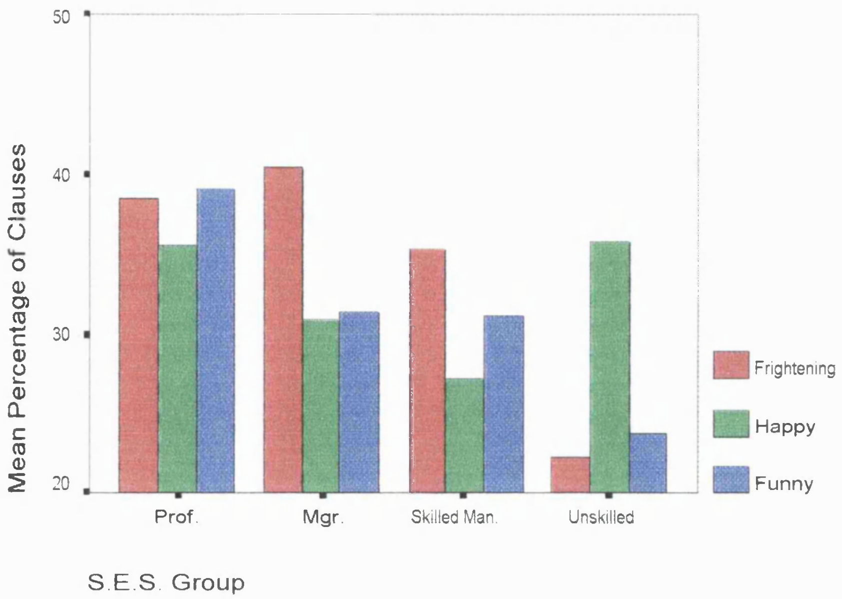


<u>Graph 8.52: SES effect on main clauses of procedural topics</u>

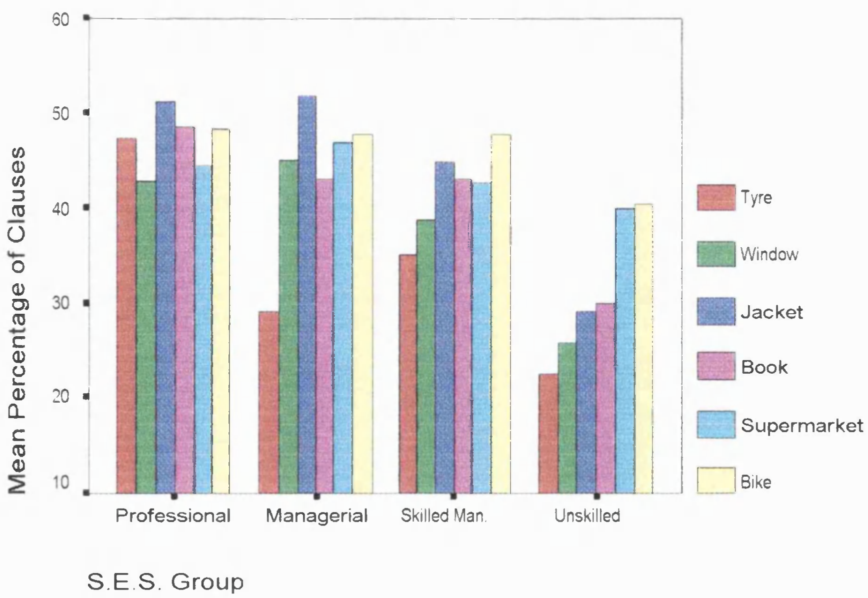
The incidence of *right-branching clauses* was significantly affected by SES on the frightening experience (H=10.474, p=.015) (Graph 8.53). SES1 and SES2 produced significantly more than SES4 (z=-2.901, p=.004; z=-2.797, p=.005). All personal-narrative topics demonstrated a decrease from SES1 to SES3 or SES4. The happy experience elicited the most of all the personal topics in SES4 but the least in the other three groups.

SES had no significant effect on the incidence of right-branching clauses in the picture-sequence topics. The most and least were found in the same topic (burglary) but in different groups (SES2 and SES3 respectively). SES4 showed the least effect of topic on this measure.

The right-branching clauses were significantly affected by SES in two of the procedural topics (viz. tyre and jacket) (H=8.146, p=.043; H=11.550, p=.009) (Graph 8.54). The tyre procedure elicited significantly more in SES1 than in SES4 (z=-3.012, p=.003). Furthermore SES1 and SES2 produced significantly more in the jacket procedure than SES4 (z=-2.973, p=.003; z=-2.995, p=.003). Apart from these two topics, little variation on the topics was observed within each group with a decreasing trend from SES1 to SES4.



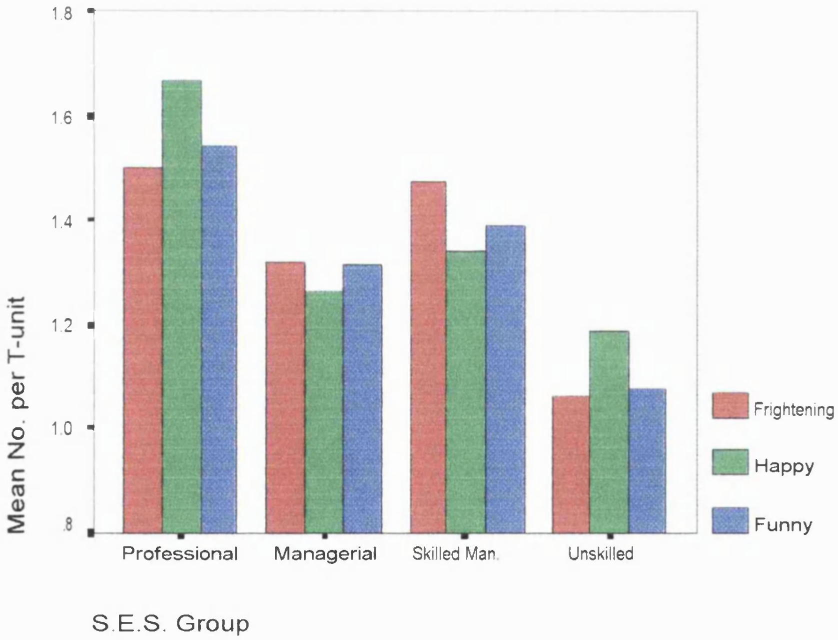
Graph 8.53: SES effect on right-branching clauses of personal-narrative topics



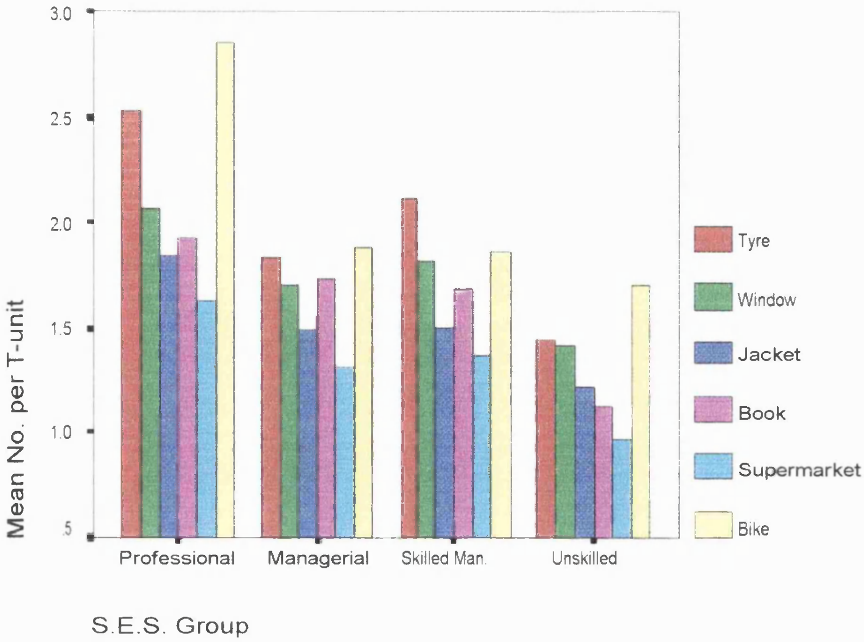
Graph 8.54: SES effect on right-branching clauses of procedural topics

f) Cohesion analysis

On the *total cohesive ties*, the personal topics demonstrated a decline from SES1 to SES4. SES had a significant effect on the these ties in the frightening experience (H=11.538, p=.009) (Graph 8.55) on which SES1 produced significantly more than SES4 (z=-3.270, p=.001). No significant effect of SES was found on the production of cohesion on the picture-sequence topics. All such topics demonstrated lower amounts in SES4. The most cohesive picture-sequence was elicited by the wasp topic in SES1 and the least in the burglar sequences of SES3 and SES4. All procedural topics demonstrated a general decline from SES1 to SES4s. SES had a significant effect on cohesion in the tyre procedure (H=10.197, p=.017) (Graph 8.56) with significantly more in SES1 than SES4 (z=-2.780, p =.004). The tyre and bike topics exhibited the most cohesive ties in each group.



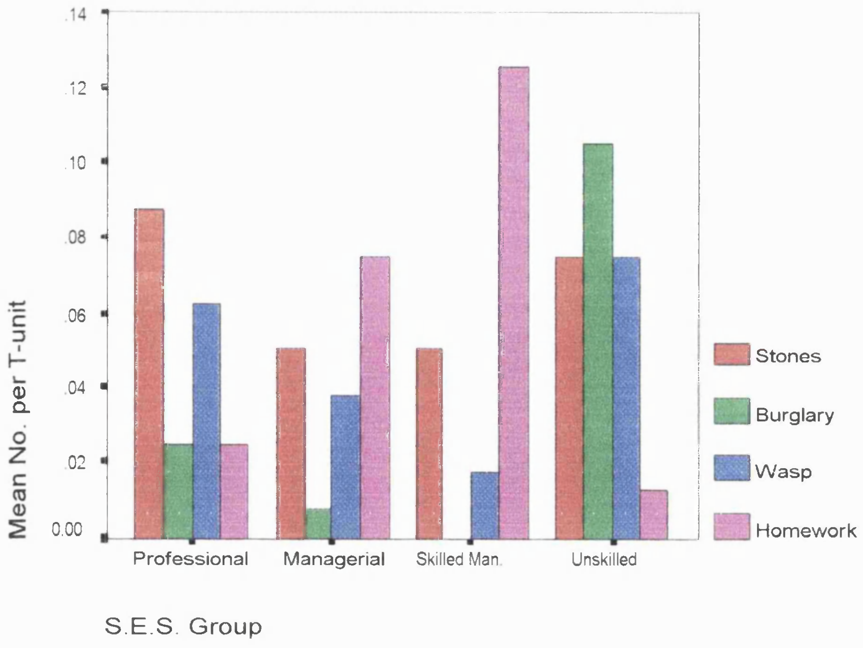
Graph 8.55: SES effect on total cohesion in personal-narrative topics



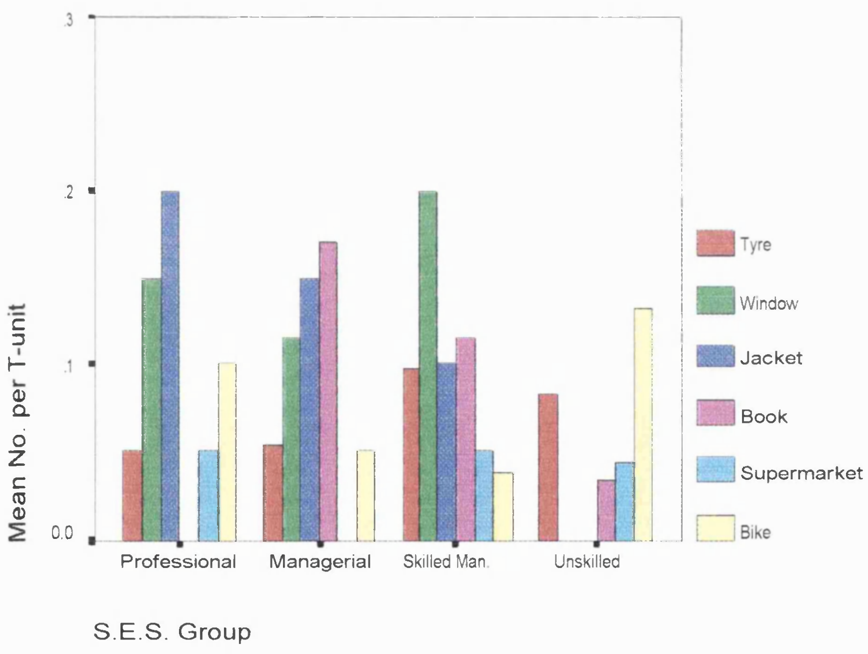
Graph 8.56: SES effect on total cohesion in procedural topics

A consideration of the five types of cohesion revealed a varying pattern. No significant effect on *referential ties* by SES was observed in any of the topics. The funny experience elicited more reference than the other personal topics in SES1 and SES3 but the least in SES4 where the happy topic elicited more. On the picture-sequences, the wasp sequence produced the most reference within the majority of SES groups and similar amounts across groups with a reduction in the other three topics in SES4. Within each SES group, reference varied little in the procedural topics (except for the bike procedure which procedure produced considerably more in all groups).

SES had a significant effect on *substitution* in two topics: the burglary sequence (H=9.886, p=.020) and the window procedure (H=11.441, p=.010) (Graphs 8.57 and 8.58). On the latter task, SES1 had significantly more than SES4 (z=-3.508, p=.000). The effect of SES on substitution in the happy personal-narrative approached significance (H=7.606, p=.055).



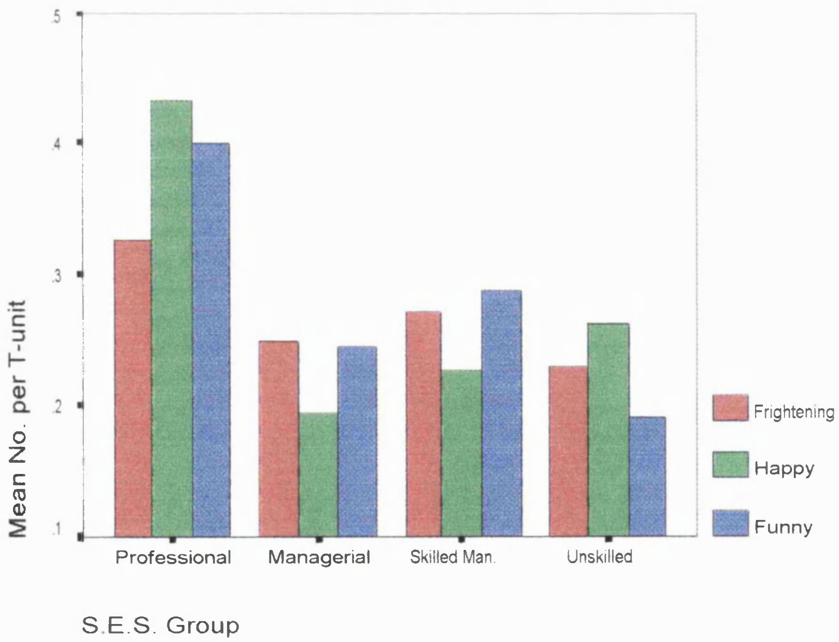
Graph 8.57: SES effects on substitution cohesion on picture topics



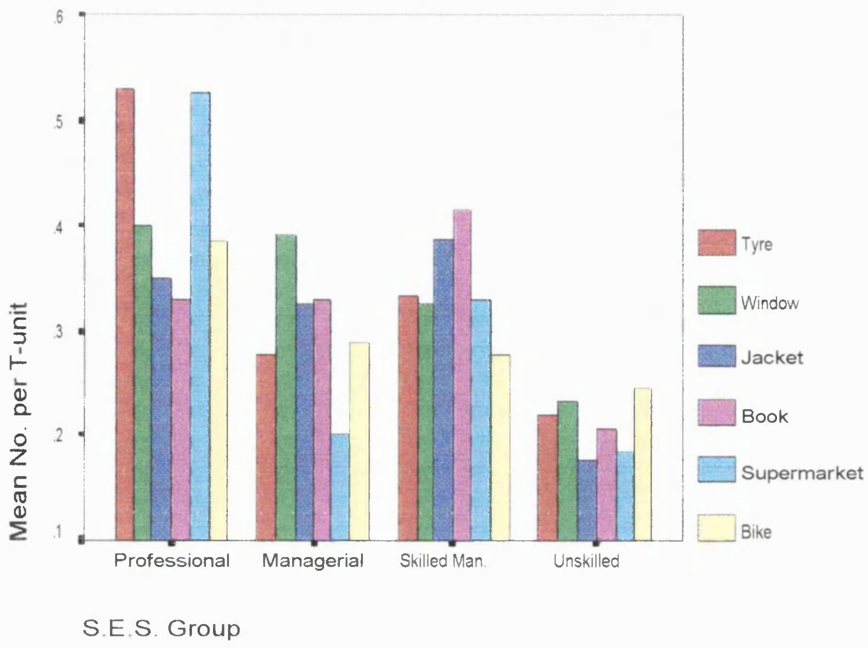
Graph 8.58: SES effect on substitution cohesion in procedural topics

SES had no significant effect on *ellipsis* although the personal-narratives demonstrated a decline to SES4.

SES had a significant effect on *conjunctions* in the happy topic (H=8.167, p=.043) (Graph 59) with SES1 producing significantly more than SES2 (z=-2.789, p=.005). On all topics SES1 produced more conjunctions than the other three groups which all had similar amounts. No significant effect of SES was observed on the picture-sequence topics. The stones sequence usually produced most conjunctions in each group and the burglary sequence the least (except for SES4). In procedures, a significant effect of SES on conjunctions was observed in the supermarket topic (H=11.946, p=.008) with SES1 producing significantly more than SES4 (z=-2.702, p=.006) (Graph 8.60). A general non-linear decrease was found from SES1 to SES4 in most of the procedural topics.



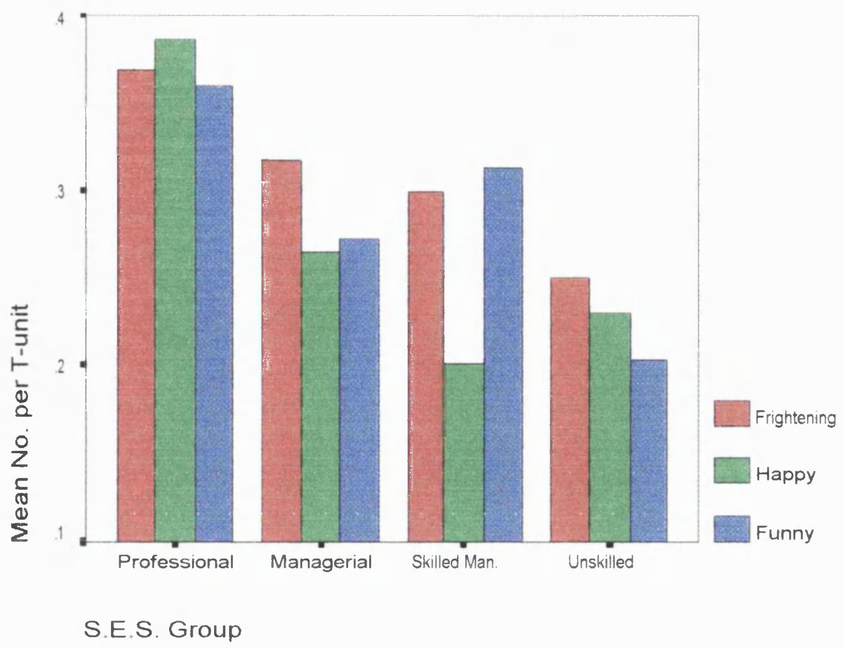
Graph 8.59: SES effect on conjunctions of personal-narrative topics



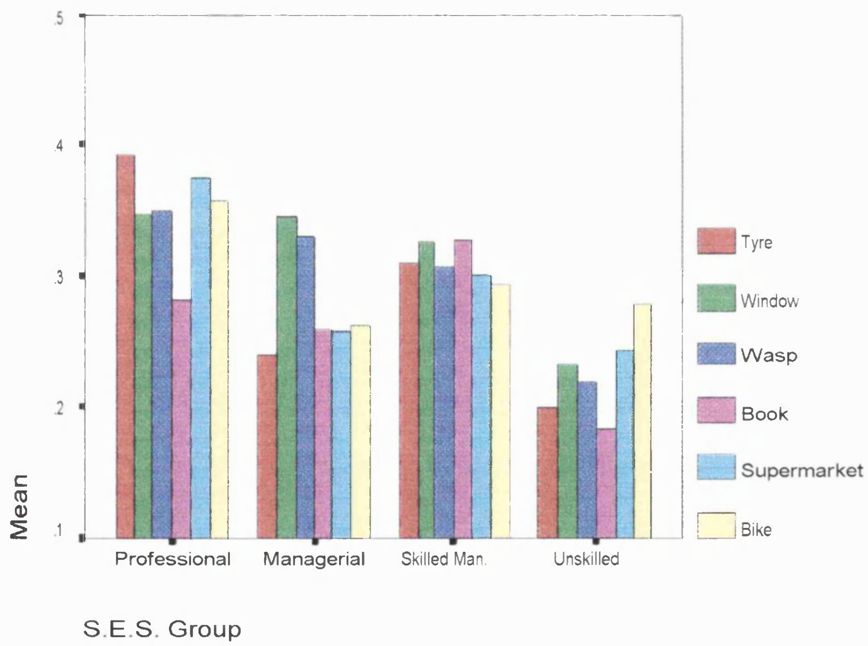
Graph 8.60: SES effect on conjunctions in procedural topics

The production of *"and"* was not significantly affected by SES in any of the topics used. In all personal topics a general declining trend from SES1 to SES4 was observed. The frightening topic had the most in each group. SES had little effect on this measure in the picture-sequences with SES3 demonstrating the highest use. On certain procedures (window, book, tyre, jacket), the incidence of "and" decreased in SES4.

A significant effect of SES was found on *connectives* in the happy topic of the personal experiences (H=9.488, p=.023) (Graph 8.61). SES1 produced a significantly greater number than SES3 (z=-2.794, p=.003). A decline in all topics was observed from SES1 to SES4. No significant effect of SES on connectives was found in the picture-sequence topics. SES2 produced the fewest in all topics than other groups. The incidence of connectives was significantly affected by SES on the tyre procedure (H=8.812, p=.032) (Graph 8.62) with fewer connectives in all procedural topics in SES4.

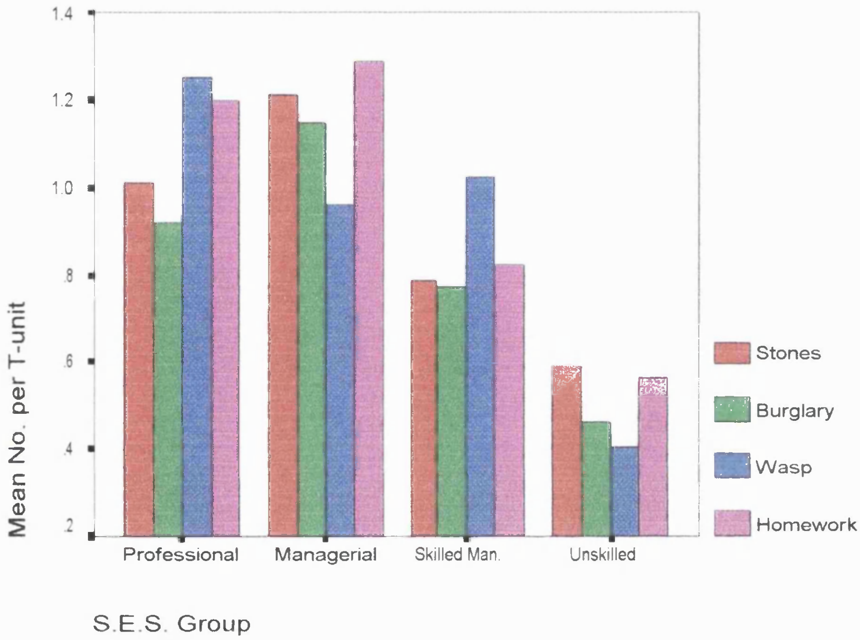


Graph 8.61: SES effect on connectives in personal-narrative topics



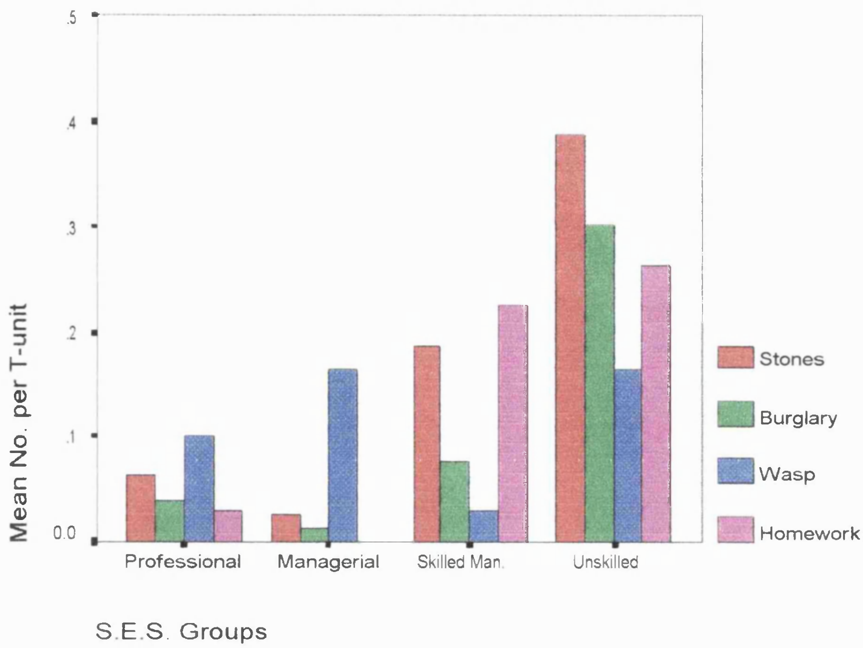
Graph 8.62: SES effect on connectives in procedural topics

SES had no significant effect on *lexicalisation* in personal and procedural topics but a significant effect occurred in the wasp and homework picture-sequences (H=9.057, p=.029, H=8.025, p=.045) (Graph 8.63). Lexicalisation on all personal-narratives was smaller in SES4 than the others and the frightening samples consistently elicited more than other topics. Lexicalisation on the picture-sequence topics demonstrated little effect within each group. In both the wasp and homework picture-sequence, SES1 produced significantly more lexical ties than SES4 (z=-2.810, p=.003, z=-2.645, p =.007). Both picture and procedural topics demonstrated a decrease from SES1 to SES4. The tyre topic produced consistently greater lexicalisation in all groups than other topics.



Graph 8.63: SES effect on lexicalisation in picture-sequence topics

No significant effect of SES on *attempted cohesion* was observed in the personal-narratives or procedures and the incidence was extremely low on all topics and groups. Two personal-narratives (happy and funny) demonstrated a decrease from SES1 to SES4. The happy experience produced samples with the most attempts in SES1, SES3 and SES4. Two of the picture-sequence topics were significantly affected by SES viz. stones and homework (H=13.134, p=.004; H=8.419, p=.038) (Graph 8.64). SES2's attempted cohesion on the stones topic was significantly less than that of SES4 (z=-2.922, p=.003). All picture-sequence topics demonstrated an increase in SES4. Certain procedural topics elicited no attempts or very few in any SES group whilst the bike elicited the most in SES3.



Graph 8.64: SES effect on attempted cohesion in picture-sequence topics

g) Dysfluency

SES had no significant effect on *dysfluencies* in any of the discourse topics. In the personal-narratives, the frightening and funny topics demonstrated a decrease from SES1 to SES4. The wasp picture demonstrated a decrease from SES1 to SES4 but no clear trends on the other sequences were observed. The greatest quantity occurred in the wasp picture-sequence of SES1 and the least in the homework sequence of SES3. SES had a varying effect on dysfluencies in the procedural topics. Whilst some topics (e.g. window, bike) elicited decreasing amounts from SES1 to SES3 or SES4, other topics elicited similar amounts in all SES groups.

8.2.5 Summary of SES Effects

Table 8.10 presents a summary of the significant results and trends on each discourse task and topics as affected by SES. This had a greater effect on the discourse measures than ageing but not all measures were affected (e.g. reference, ellipsis, substitution). The less skilled groups presented with

VARIABLE	TOTAL	NARR	PER	PIC	PRO	TOPICS
Relevance	*					App* 1 PER *1 PRO
Discourse Gr.						*1 PRO
Clarity						
Non-specific						
Substitution						
Content and fluency						
Prod/Syntax						
Length						* 1 PRO
T-unit length					*	*2 PER *1 PIC
Clause length					*	*1 PIC *2 PRO
Embedding					*	*1 PRO
Clausal struc						
Main Clause	*		*		*	*2 PRO
Right-branch clauses	*				*	*1 PER *2 PRO
Left-branching clauses.						*1 PRO
Cohesion	*		*		*	*1 PER *1 PRO
Reference						
Lexical	*	*		*		*2 PIC
Substitution			*			App* 1 PER *1 PIC *1 PRO
Ellipsis						
Conjunction	*				*	*1 PER *1 PRO
"And"						
Connectives	*		*		*	*1 PER *1 PRO
Attempts				App Sig		*2 PIC
Dysfluency						

* = significant App* = approaching significance NARR = Narratives
PER = Personal narratives PIC = Picture sequences PRO = Procedures

Table 8.10a: Summary of significant effects of SES on discourse performance decreased relevance and discourse-grammar ratings, syntactic complexity and total cohesive ties as well as an increase in clarity disruptors and main clauses. The results of other measures varied according to task and topic.

VARIABLE	PERSONAL	PICTURE	PROCEDURE	TOPICS
Relevance	Decreased	Decreased	Decreased	App* 1 PER *1 PRO 4 PRO stable
Discourse Grammar	Decreased	Decreased	Decreased	*1 PRO
Clarity Disruptors	Increased	Increased	Increased	1 PRO decreased 2 PRO stable
Non-specific	Increased	Stable	Stable	2 PER stable 3 PIC increased 1 PRO decreased 1 PRO increased
Word Substitution	None	Stable	Decreased to skilled	None in 2 PICs None in 3 PROs None in SES4
Content/ fluency	Increased	Stable	Increased	1 PER stable 2 PRO decreased 2 PRO stable
Prod/Syntax				
Length	Decreased	Stable	Decreased	2 PER stable 2 PIC decreased * 1 PRO 2 PRO stable
T-unit-length	Decreased	Decreased	* Decreased	*2 PER decreased to SES3, increased in SES4 *1 PIC
Clause-length	Increased in skilled	Stable	* Decreased	*1 PIC decreased 1 PIC increased *2 PRO
Embedding	Decreased	Decreased	* Decreased	1 PER increased 1 PRO stable *1 PRO
Clausal struc				
Main Clause	* Increased	Stable	* Increased	1 PER 3 PIC increased in SES4 *2 PRO
Right-branch. Clauses	Decreased	Stable	* Decreased	*1 PER *2 PRO
Left-branching Clauses	Decreased	Decreased	Decreased	2 PER decreased to SES3 but increased in SES4 1 PIC stable *1 PRO 2 PRO stable
Cohesion - Total	* Decreased	Decreased	* Decreased	*1 PER *1 PRO
Reference	Stable	Stable	Stable	2 PER increased 1 PER decreased 3 PIC decreased 1 PRO decreased
Lexical	Stable	* Decreased	Decreased	2 PER decreased *2 PIC

Substitution	*Stable (Decreased in SES3)	Stable	Stable	App*1 PER increased in SES4 2 PIC decreased in SES3 *1 PIC 3 PRO decreased in SES4 *1 PRO
Ellipsis	Decreased	Stable	Stable	1 PER stable 1 PIC Increased None in 3 PROs in SES3/SES4
Conjunction	Increased in SES1	Stable	* Decreased	*1 PER *1 PRO
"And"	Decreased	Stable	Stable	3 PIC increased in SES3 4 PRO decreased
Connectives	* Decreased	Stable	* Decreased	*1 PER 1 PIC increased to SES3 1 PIC decreased *1 PRO
Attempts	Stable	Increased (app *)	Stable	2 PER decreased *2 PIC 1 PRO decreased 1 PRO increased to SES3 2 PRO variable
Dysfluency	Decreased	Decreased	Decreased	1 PER stable 3 PIC variable 3 PRO stable

=significant App.=approaching significance
PER=Personal-narratives PIC=Picture-sequences PRO=Procedures

Table 8.10: Summary of SES effects by task and topic

8.3 Effects of genre, method of narrative elicitation and topic on discourse

8.3.1 The effect of genre on combined discourse samples

(Table 8.11)

a) Relevance ratings

The procedural genre was rated as less relevant than the narrative genre but this was not significant (z=-1.412, p=.158).

b) Discourse-grammar

Narrative discourse was rated as significantly less appropriate than procedures (z=-2.293, p=.022).

DISCOURSE MEASURES	RESULTS
RELEVANCE	
All	
DISCOURSE-GRAMMAR	
All	*PROC<NARR
PRODUCTIVITY/SYNTAX	
No. of Words	
Words/T-unit	
Words/clause	*PROC<NARR.
Clauses/T-unit	*NARR<PROC
CLAUSE STRUCTURE	
Main Clauses	*PROC<NARR
Left-branching clauses	
Right-branching clauses	
CLARITY DISRUPTORS	
Non-Specific elements	*PROC<NARR
Substitution	*NARR<PROC
Content and Fluency	*NARR<PROC
Total Clarity Disruptors	*NARR<PROC
COHESION	
Reference	*PROC<NARR
Substitution	*NARR<PROC
Ellipsis	
Conjunction	*NARR<PROC
Lexicalisation	
Attempts	
Ands	
Connectives	
Total Cohesive Ties	
DYSFLUENCY	
All	

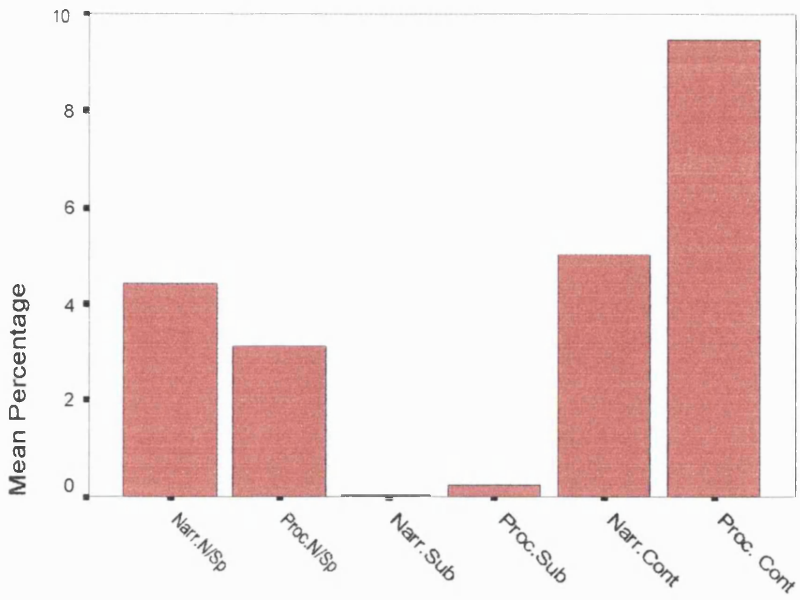
*=significant[62]
NARR= Narrative genre PROC=Procedural genre

Table 8.11: Narrative vs. procedural genres

c) Clarity disruptors

Procedural discourse contained a significantly more *total clarity disruptors* than narratives (z=-2.393, p=.017) (Graph 8.65). An examination of the types of clarity disruptors reveals that *non-specific components* occurred significantly more in the narratives than in procedures (z=-3.048, p=.002). In contrast, *word-substitutions* and *content and fluency disruptors* occur significantly more frequently in procedures than in narratives (z=2.197, p=.026; z=-3.331, p=.001).

[62] The Wilcoxon Signed Ranks Test was used to compare these two genres (p=0.05).



Graph 8.65: The effect of genre on types of clarity disruptors

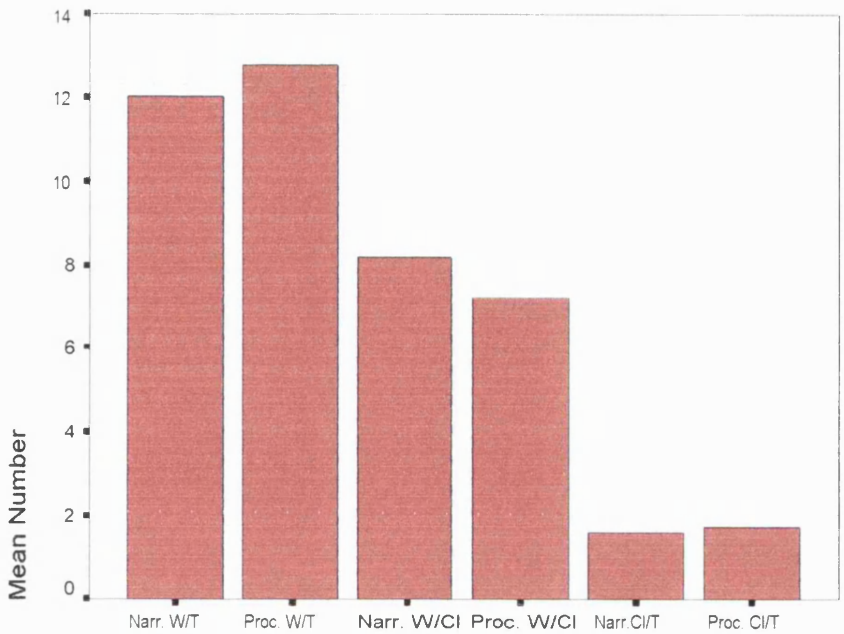
d) Productivity and syntactic analysis

The narrative genre elicited longer samples than the procedural genre but not significantly so (z= -.449, p=.654)

Words per T-unit were not significantly affected by discourse genre (z=-1.141, p=.254) (Graph 8.66). The number of *words per clause* in narratives was significantly greater than in procedures.(z=-2.506, p =.012). Procedural discourse produced a significantly more *clausal-embedding* than in narrative discourse (z=-2.478, p=.013).

e) Clausal structure

The percentage of *main clauses* in narrative discourse was significantly greater than in procedures (z=-2.150, p=.032) (Graph 8.67). Discourse genre had no significant effect on *left or right-branching clauses* (z=-1.776, p=.076: z=-1.720, p= .085) with the procedures eliciting more of each type of clause than the narratives.

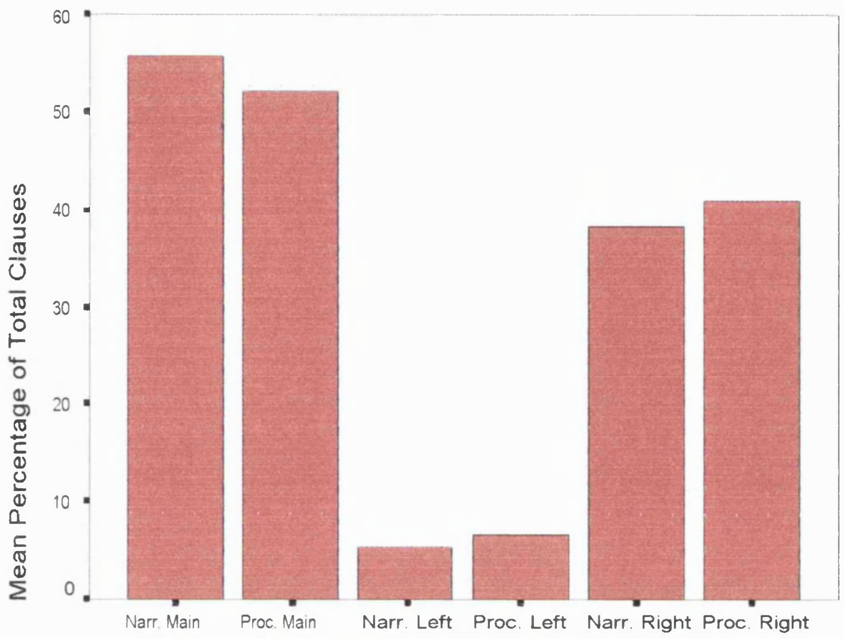


Graph 8.66: The effect of genre on syntactic complexity

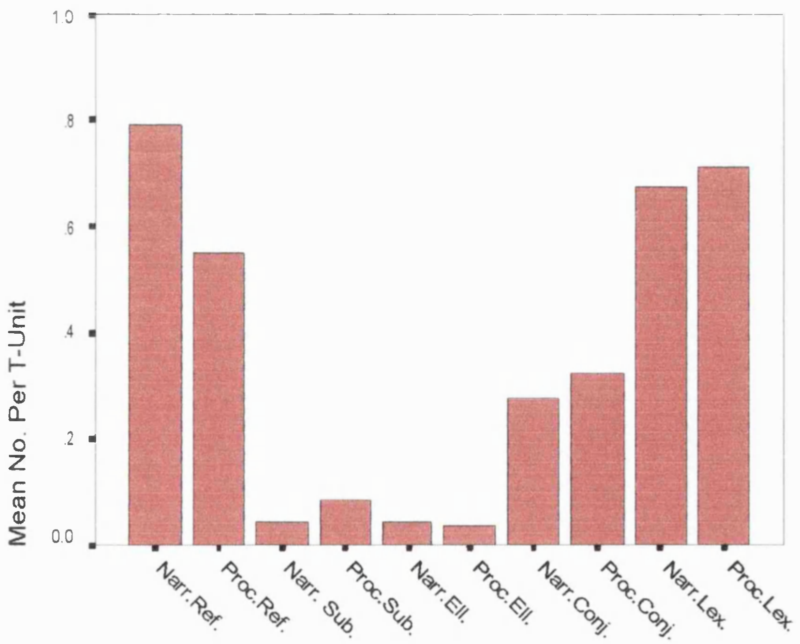
f) Cohesion analysis

The genre of discourse had no significant effect on *total cohesive ties* (z=-1.767, p=.077) although narratives were more cohesive than procedures.

Narratives elicited a significantly greater use of *reference* than procedures (z=-3.300, p=.001) (Graph 8.68). *Substitutions* and *conjunctions* occurred significantly more frequently in procedures than in narratives (z=-3.348, p=.001; z=-2.113, p=.035). Genre had no significant effect on *ellipsis* or *lexicalisation* (z=-1.176, p=.240; z=-.496, p=.620), with more ellipsis in the narrative than procedural genre and vice versa on lexicalisation.



Graph 8.67: The effect of genre on main and branching clauses



Graph 8.68: The effect of genre on types of cohesion

Although genre had a significant effect on conjunctions, it had no such effect on *"and"* (z=-.037, p=.970) or on the *connectives* (z=-1.075, p=.282).

The incidence of *attempted cohesion* was significantly affected by discourse genre (z=.2.476, p=.013). The narratives elicited more cohesive errors than procedures.

g) Dysfluency

The genre had no significant effect on *dysfluencies* (z=-.243, p=.808). The procedures elicited more dysfluencies than the narratives.

<u>8.3.2 The effect of three tasks on discourse measures</u>

(Table 8.12).

a) Relevance ratings

The discourse task did not have any significant effect on the *relevance* ratings (H=3.846, p=.146). Personal experiences were rated as less relevant than the picture-sequence but the procedures were rated the least relevant.

b) Discourse-grammar

The *discourse-grammar* ratings were not significantly affected by task (H=5.309, p=.070). Personal-narratives were rated least appropriate and procedures the most.

c) Clarity disruptors

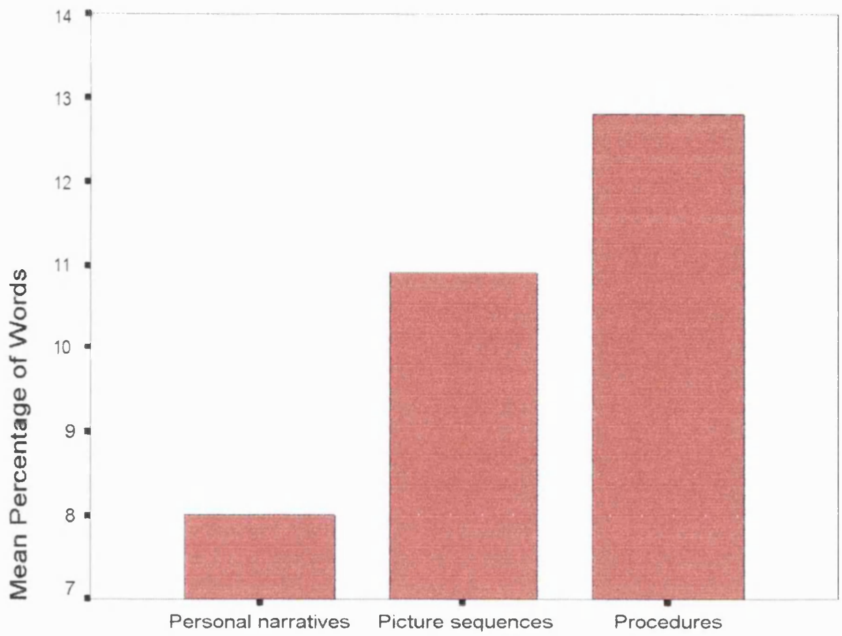
The effect of task on *total clarity disruptors* was significant (H=9.000, p=.011) (Graph 8.69). Personal-narratives elicited the least clarity disruptors, with an increase in the picture-sequences and the most in the procedures. Clarity disruptors in the personal-narratives was significantly less than in procedures (z=-3.272, p=.001).

MEASURES	RESULTS
RELEVANCE	
All	
DISCOURSE-GRAMMAR	
All	
PRODUCT/SYNTAX	
No of Words	*PIC<PER *PRO<PER *PIC<PRO
Words/T-unit	*PER<PRO
Words/Clause	
Clauses/T-unit	*PER<PRO
CLAUSE STRUCTURE	
Main Clauses	*PRO<PER *PIC<PER
Left-branching clauses	*PIC<PER *PIC<PRO
Right-branching clauses	*PER<PIC *PER<PRO
CLARITY DISRUPTORS	
Non-Specific elements	*PIC<PER *PRO<PER
Substitution	*
Content and Fluency	*PER<PIC *PER<PRO
Total Clarity Disruptors	*PER<PRO
COHESION	
Reference	*PER<PIC *PRO<PIC
Substitution	*PER<PRO
Ellipsis	
Conjunctions	
Lexicalisation	*PER<PIC *PER<PRO
Attempts	*PER<PIC *PER<PRO
Ands	
Connectives	
Total Cohesive Ties	*PER<PIC *PRO<PIC *PER<PRO
DYSFLUENCY	
All	*PIC<PER *PIC<PRO

*=significant[63]
PER=Personal-narratives PIC=Picture-sequences PRO=Procedures

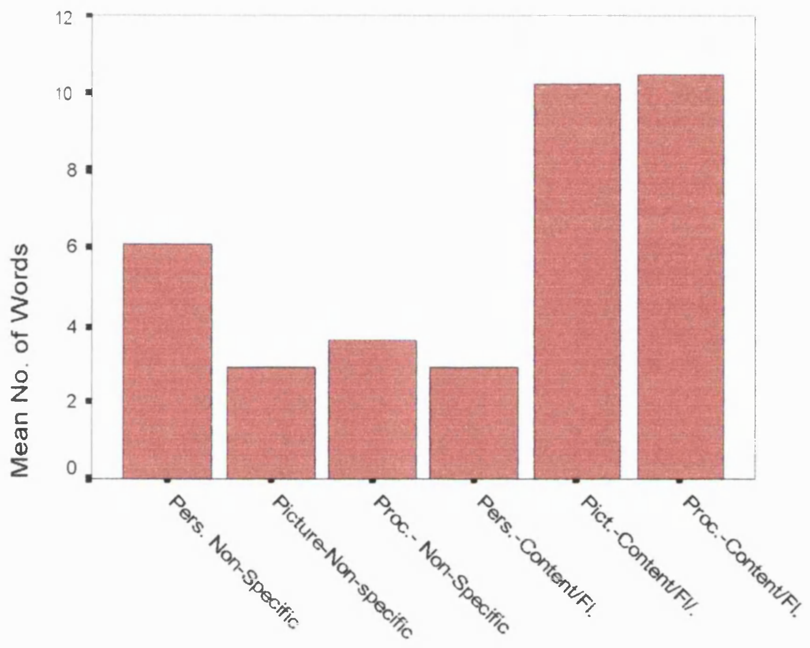
Table 8.12: Effect of three discourse tasks on discourse measures

[63] The Friedman Test was used to determine the effect of the three tasks on the discourse measures (p=0.05). The Wilcoxon Matched Pairs Signed-Ranks Test was used to make comparisons between the tasks with the significance level determined by the Bonferroni correction as p=0.016 (three tasks: p=0.05 divided by three comparisons=0.016).



<u>Graph 8.69: Task effect on total clarity disruptors</u>

All three types of clarity disruptors (viz. *non-specific elements, word-substitutions, content and fluency disruptors*) were significantly affected by task (H=23.250, p=.000; H=8.957, p=.011; H=31.256, p=.000) (Graph 8.70). Personal-narratives produced significantly more non-specific elements than both the picture-sequences and procedures (z=-3.665, p=.000, z=-4.095, p=.000). However the personal-narratives elicited a significantly fewer content and fluency disruptors than the picture-sequence or procedures (z=-3.917, p=.000, z =4.390, p=.000).



Graph 8.70: Effect of tasks on non-specific elements and content and fluency disruptors

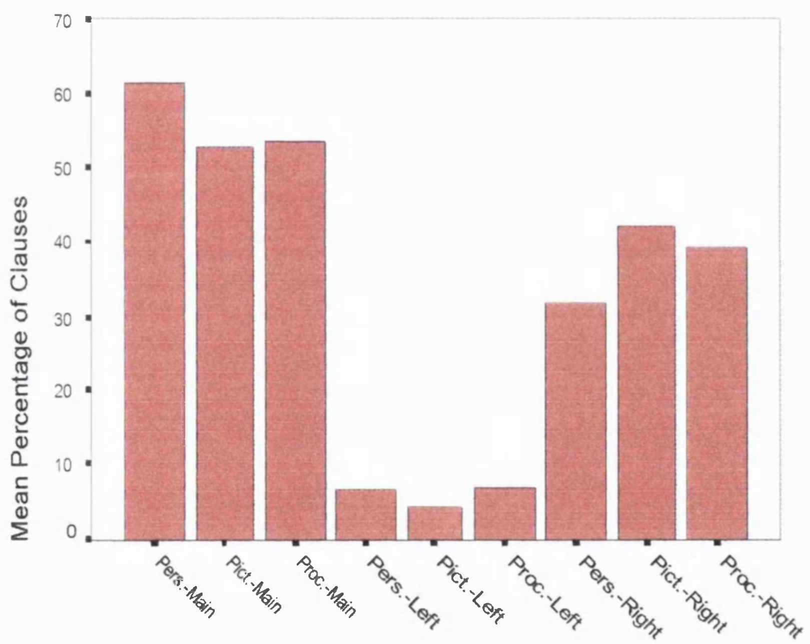
d) Productivity and syntactic analysis

Task had a significant effect on sample *length* (H=34.750, p=.000). Personal narratives produced significantly longer samples than both picture-sequences and procedures (z=-4.7495, p=.000; z=-2.6366, p=.0084). Procedures also elicited significantly longer samples than the picture-sequences (z=-4.2447, p=.000).

T-unit-length was significantly affected by task (H=6.750, p=.034). Personal-narratives elicited samples with significantly shorter T-units (z=-2.487, p=.013) whilst picture-sequences and procedures produced similar lengths. The task had no significant effect on *clause length* (H=4.938, p=.085). Personal narratives elicited samples with longer clauses than the picture-sequences or procedures. The amount of *clausal-embedding* was significantly affected by task (H=15.134, p=.001). Clausal-embedding in the picture-sequences and procedures was similar but the procedures elicited significantly more clausal-embedding than the personal-narratives (z=-3.6156, p=.003).

e) Clausal structure

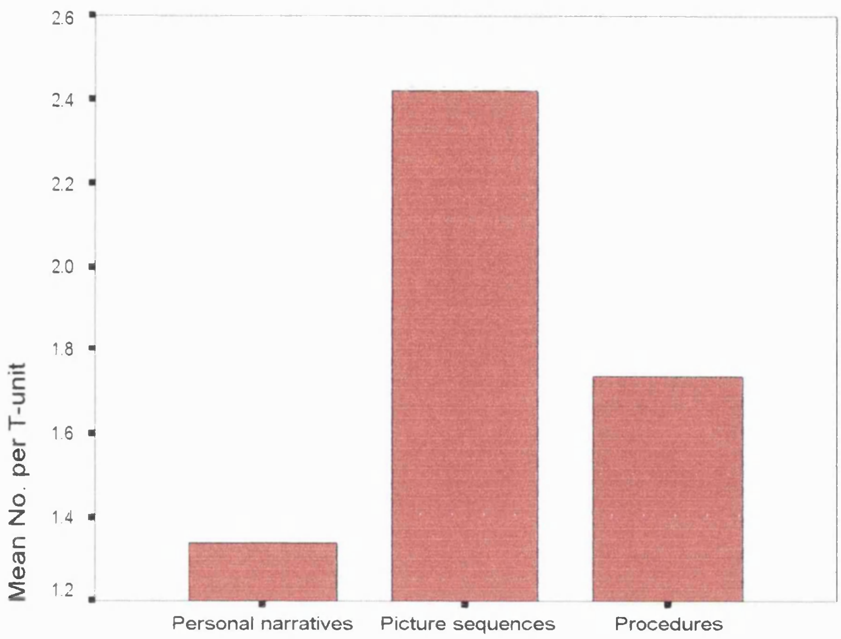
The tasks used to elicit discourse had a significant effect on *main, left* and *right-branching clauses* produced (H=24.813, p=.000; H=14.787, p=.001; H=34.563, p=.000) (Graph 8.71). Personal-narratives elicited significantly more main clauses than either the picture-sequences or procedures (z=3.9642, p=.0001; z=-4.2634, p=.0000). Picture-sequences elicited significantly fewer left-branching clauses than the personal or procedural tasks (z=-2.8023, p=.0051; z=-3.1040, p=.0019). Right-branching clauses occurred at a significantly lower rate in personal-narratives than in either picture-sequences or procedures (z=-4.4316, p=.0000; z=-4.4316, p=.0000) with the picture-sequences eliciting the most.



Graph 8.71: Effect of tasks on main, left- and right-branching clauses

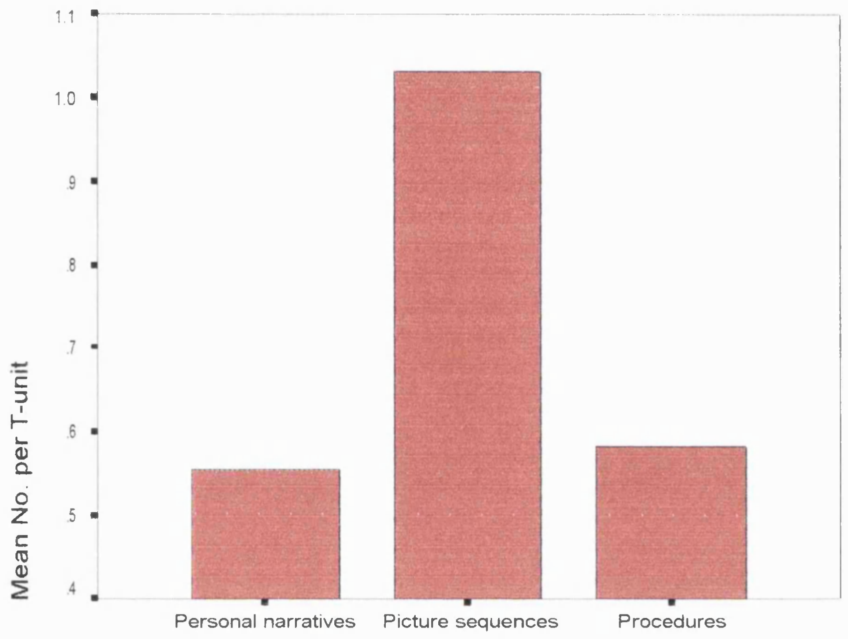
f) Cohesion analysis

Discourse task had a significant effect on *total cohesive ties* (H= 36.000, p=.000) (Graph 8.72). The picture-sequence task elicited samples containing significantly more than the personal-narratives (z=-4.862, p=.000) and procedures (z=-4.002, p=.000). The procedures also elicited significantly more cohesive ties than the personal-narratives (z=-3.918, p=.000).

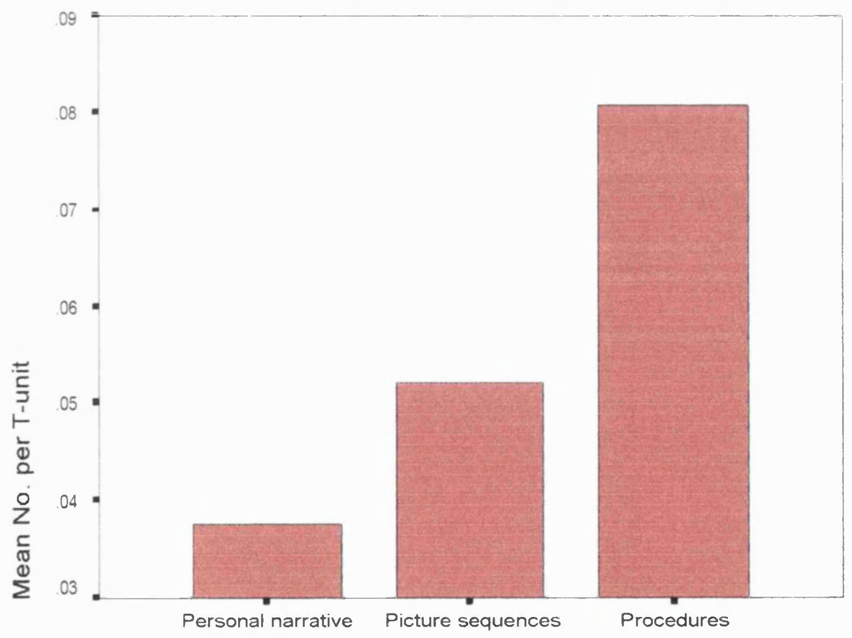


Graph 8.72: Task effect on total cohesive ties

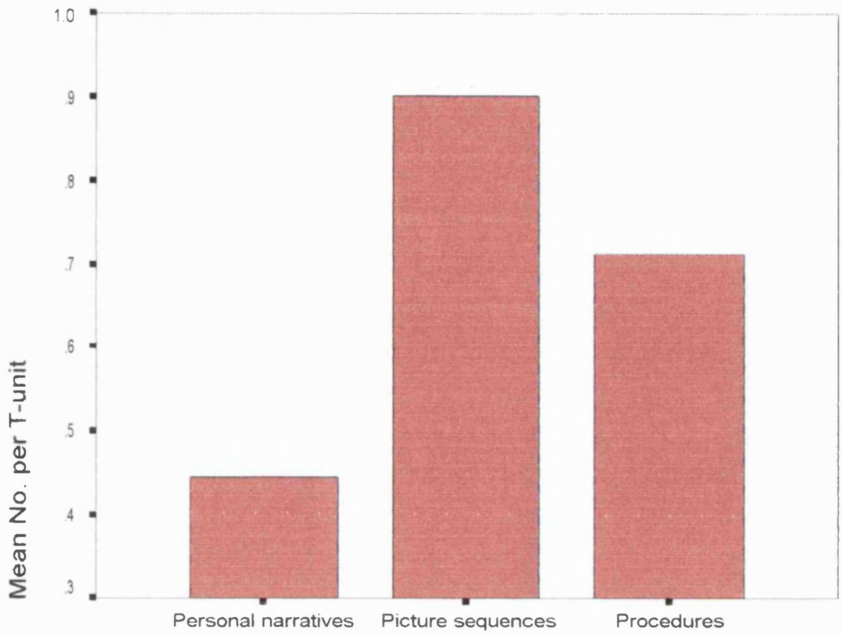
Of the five types of cohesion assessed, *reference, substitution* and *lexicalisation* were all significantly affected by the method of elicitation (H=27.354; p=.000, H=19.983, p=.000; H=25.339, p=.000) (Graphs 8.73, 8,74, 8.75). Picture-sequences produced significantly more referential cohesion than personal-narratives and procedures (z=-4.6560, p=.0000; z=-4.142, p=.0000). The incidence of substitution was significantly higher in procedures than in personal-narratives (z=-3.779, p=.000). Lexicalisation occurred significantly more frequently in picture-sequences (z=-4.3195, p=.0000) and procedures (z=-4.0271, p=.0001) than in personal-narratives.



Graph 8.73: Task effect on reference



Graph 8.74: Task effect on substitutive cohesion



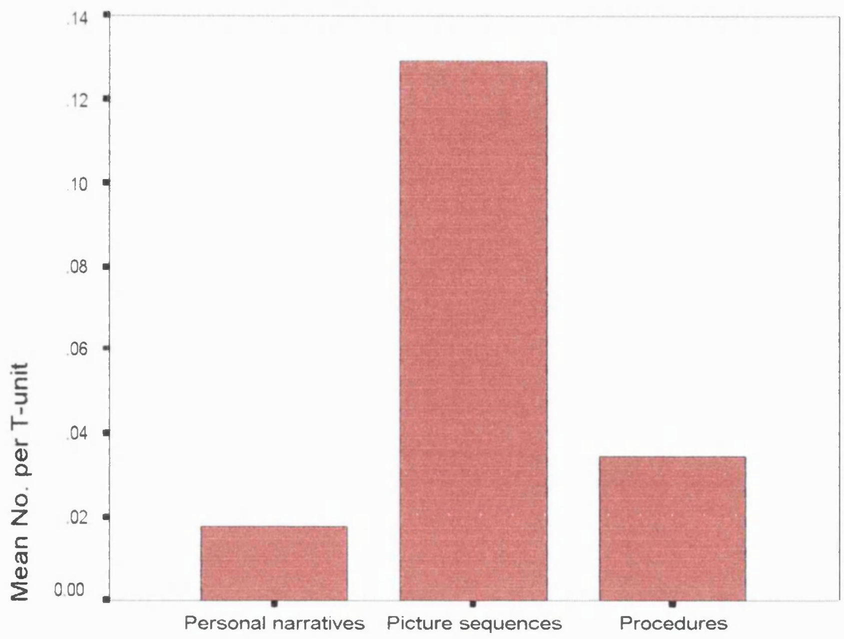
Graph 8.75: Task effect on lexicalisation

Task did not have a significant effect on *ellipsis*, *conjunctions, "and"* or *connectives* (H=4.466, p=.107, H=5.232, p=.073, H=4.912, p=.086, H=2.189, p=.335). C*onjunctions* were highest in procedures, followed by picture-sequences then personal-narratives, whilst *"and"* was highest in personal experience followed by procedures, then picture-sequences. Procedures demonstrated the most *connectives* with personal-narratives and picture-sequences demonstrating the least.

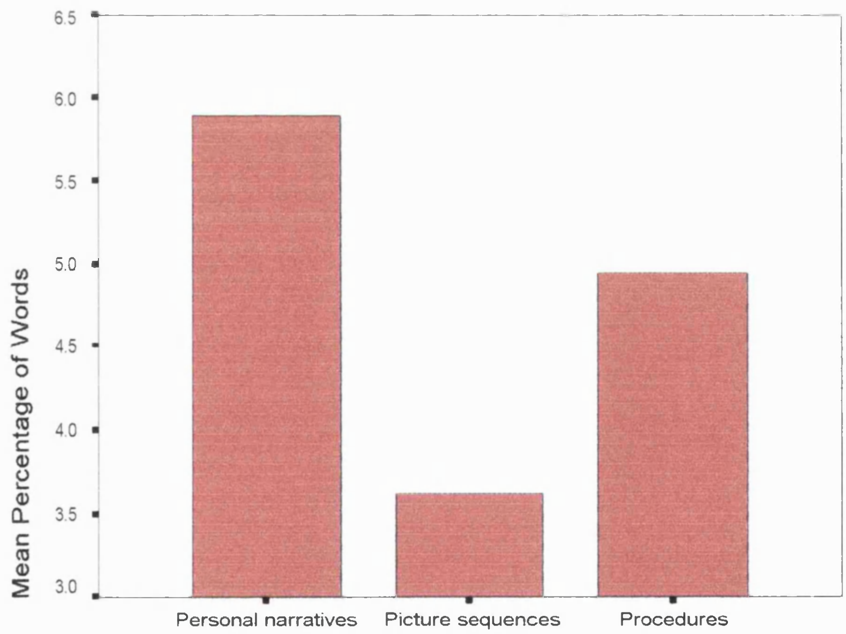
The incidence of *attempted cohesion* was significantly affected by task (H=12.765, p=.002) (Graph 8.76). Personal-narratives produced significantly fewer than picture-sequences (z=-3.3143, p=.0009) and procedures (z=-2.763, p=.006).

g) Dysfluency

Task had a significant effect on *dysfluencies* (H=15.438, p=.000) (Graph 8.77). Personal-narratives and procedures contained significantly more dysfluencies than the picture-sequences (Z=-3.188, p=.001; Z=-2.833, p=.005).



Graph 8.76: Task effect on attempted cohesion



Graph 8.77: Task effect on dysfluencies

8.3.3 The effect of topic on discourse measures

(Table 8.13)

Due to the large number of topics used and therefore the number of potential comparisons (and increased possibility of false positives), the samples elicited by each topic were only compared to those within the same task[64].

MEASURE	PERSONAL	PICTURE	PROCEDURE
RELEVANCE			
All	*FR<HA		*TY<JA *TY<SU *WI<SU
D/GRAMMAR			
All	*FR<HA		
PROD/SYNTAX			
No Words		*HO<BU	
Words/T-unit			?*
Words/Clause			
Clauses/T-unit			* (?*WI<JA)
CL. STRUCTURE			
Main Clauses			*SU<TY ?*BI<TY
Left-Branching	*HA<FU		
Right-Branching			*
CLARITY DIS.			
Non-Specific			
Substitution			
Content/Fluency			*
Total Clarity Dis			
COHESION			
Reference		?*	*TY<BI *WI<BI *BO<BI *JA<BI *SU<JA
Substitution			
Ellipsis		*HO<ST	
Conjunctions		*BU<ST	
Lexicalisation	*HA<FR *FU<FR		*WI<TY *JA<TY *BO<TY *SU<TY *BI<TY *JA<WI
Attempted Ties			*
Ands	*HA<FR		*
Connectives		*	*
Total Cohesion		*BU<WA	*SU<WI *SU<TY *SU<BI
DYSFLUENCY			
All			

=Significant[65] ?=approaching significance

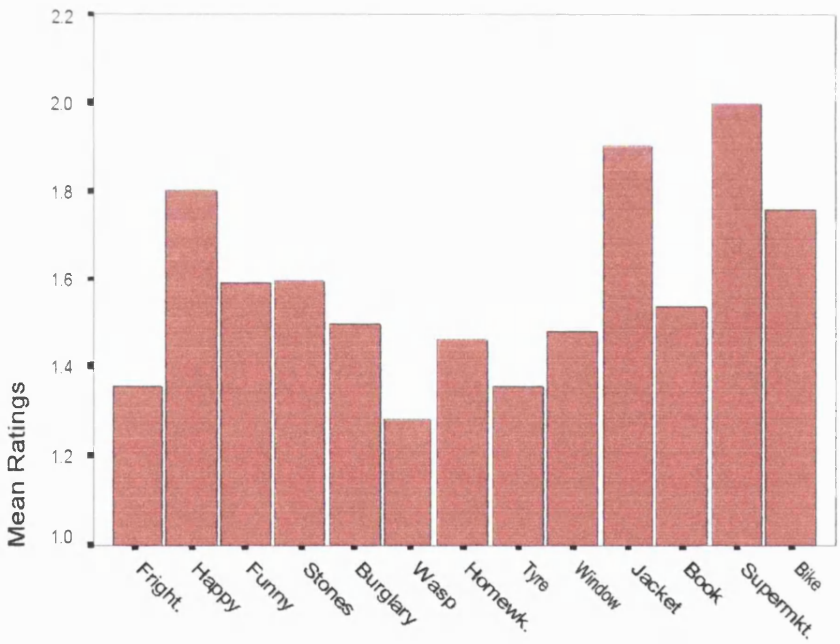
FR=Frightening HA=Happy FU=Funny
ST=Stones BU=Burglary WA=Wasp HO=Homework
TY=Tyre. WI=Window JA=Jacket BO=Book
SU=Supermarket BI=Bike

Table 8.13: Effect of topic on discourse measures

[64] Using the Bonferroni correction, the significance levels were set as follows: 3 personal-narrative topics=0.05 divided by 3 comparisons=0.016; 4 picture-sequences: 0.05 divided by 6 comparisons=0.0083; procedural topics: 6 topics: 0.05 divided by 15 comparisons=.0033.

a) Relevance ratings

On personal-narratives, topic had a significant effect on *relevance* ratings (H=6.982, p=.030)[66] (Graph 8.78). The happy experience was rated as significantly less appropriate than the frightening experience (z=-2.725, p=.006). No significant differences were observed for the picture-sequences. The wasp sequence was considered the most relevant picture-sequence and the stones the least. A significant effect of topic was demonstrated on the relevance ratings of the six procedures (H=14.793, p=.011). The tyre procedure was rated as the most relevant procedure and as significantly more appropriate than the jacket and the supermarket (z=-3.398, p=.001, z=-3.095, p=.002). The window procedure was also significantly more relevant than the supermarket sample (z=-3.153, p=.002). On all topics, the wasp picture-sequence was rated most relevant and the supermarket procedures least.



Graph 8.78: Topic effect on relevance ratings of all subjects

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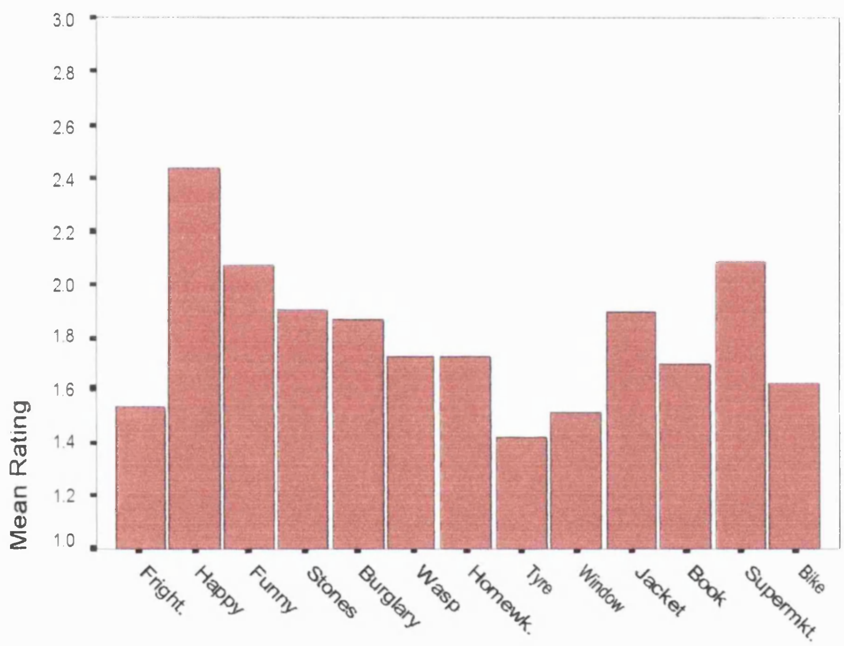
[65] The Friedman Test with p=0.05 was used to determine the topic effect on each measure. The Wilcoxon Signed Ranks Test was used to compare the topics in each task.
[66]:Only significant topic effects are given in the text. For a complete list, see Appendix A16.

b) Discourse-grammar

The personal-experience topics had a significant effect on the appropriateness of the *discourse-grammar* (H=16.848, p=.000) and the happy narrative was rated significantly less appropriately than the frightening (z=-3.035, p=.002) (Graph 8.79). The discourse-grammar rating was not significantly affected by topic in the picture-sequences or the procedures. Of all topics, the tyre procedure elicited the most appropriate and the happy experience was rated the least.

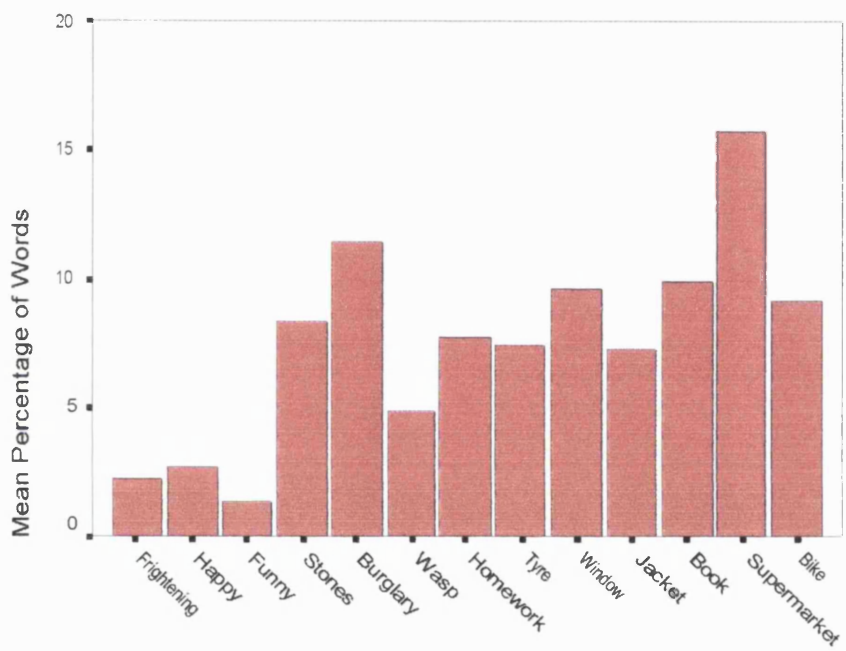


Graph 8.79: Topic effect on discourse-grammar ratings for all subjects

c) Clarity disruptors

No significant effect of topic on the percentage of *total clarity disruptors* of any of the tasks was observed and the incidence was variable. The burglar sequence elicited more than the other picture-sequences and the supermarket had considerably more than the other procedures. The greatest amount was observed in the supermarket procedure and the lowest in the funny experience.

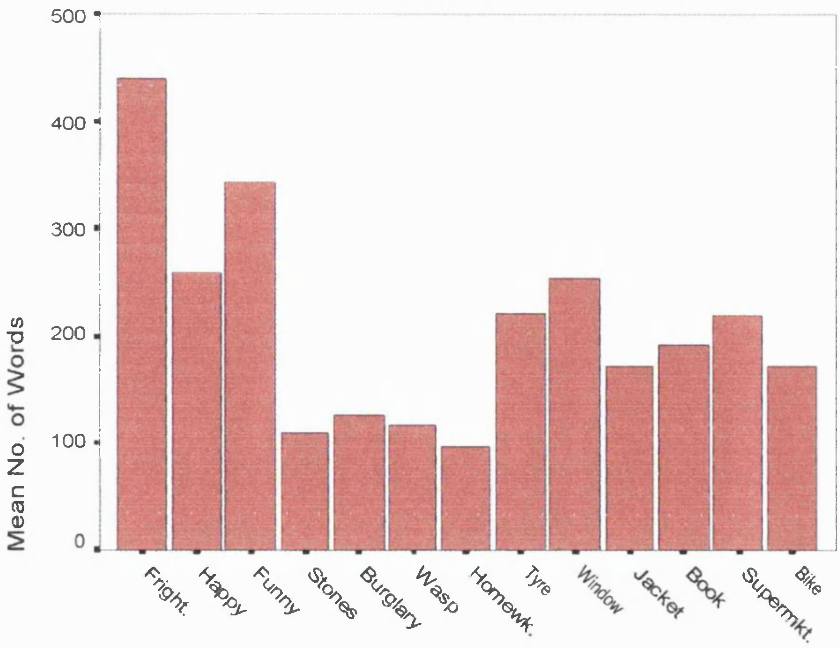
Of the three types of clarity disruptors measured, the only significant effect of topic was on *content and fluency disruptors* in the procedural samples (H=11.925, p=.036) (Graph 8.80). The supermarket procedure contained the most of all topics and the funny personal-narrative the least. All personal experience topics contained few of these disruptors. *Word-substitutions* occurred in only two picture-sequences and three procedures with the most in the window procedure. The amount of *non-specific elements* was similar for the picture-sequences and procedures with an increase in all personal experiences. The happy experience elicited more than the other personal topics.



Graph 8.80: Topic effect on content and fluency disruptors for all subjects

d) Productivity and analysis

In the personal-narratives, no significant effect of topic was observed on the *sample length* (H=2.696, p=.260). The frightening experience elicited the longest samples of any topic with the happy experience eliciting the least. No significant effect of topic was found on the sample length of the six procedures (H=4.115, p=.533). Topic did have a significant effect on the length of samples elicited by the picture-sequences (H=10.514, p=.015) (Graph 8.81). The homework sequence elicited significantly shorter samples than the burglary sequence (z=-2.824, p=.005). On all topics, the frightening narrative elicited the longest and the homework sequence the shortest.

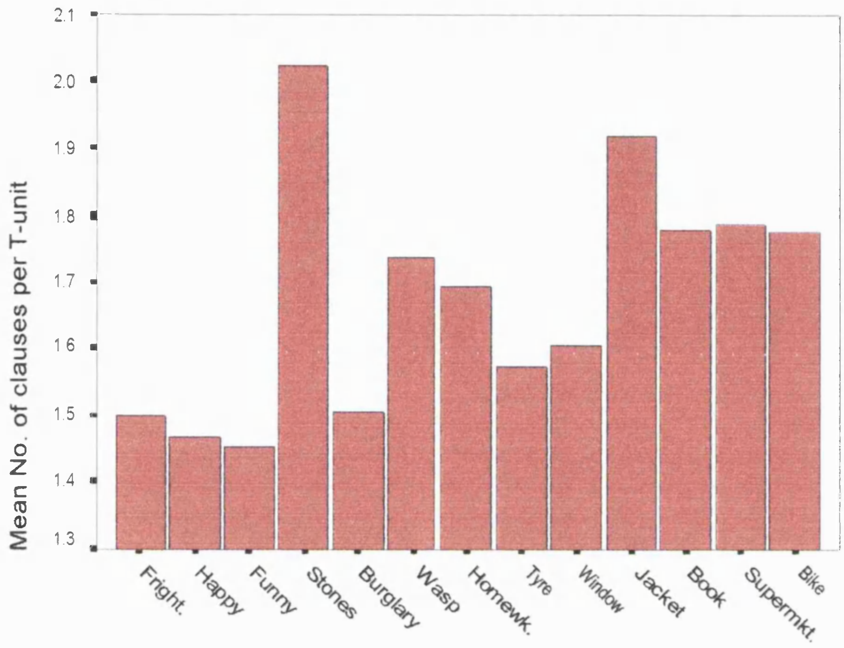


Graph 8.81: Topic effect on sample length for all subjects

T-unit-length was not significantly affected by topic in the personal-narratives (H=.348, p=.840) or picture-sequences (H=.748, p=.862). The happy experience elicited longer T-units than the other two experiences whilst the burglar picture-sequence elicited shorter ones than the other sequences. In procedures, the topic's effect approached significance (H=10.953, p=.053). The tyre topic elicited shorter T-units than the other procedural topics. Of all topics, the longest were observed in the bike procedures and the smallest in the tyre.

Clause-length was not significantly affected by topic in any of the tasks used. Substantial variation by topic within each task occurred and the happy personal topic elicited the longest and the tyre procedure the shortest.

Topic did not have a significant effect on the amount of *clausal-embedding* in personal-narratives and picture-sequences. In the latter, the stone topic elicited more than the other sequences. Clausal-embedding in the procedural discourse samples was significantly affected by topic (H=19.321, p=.002) (Graph 8.82). The difference between the jacket and window procedures approached significance (z=-2.874, p=.004). The stones sequence elicited the most embedding and the funny experience elicited the least.

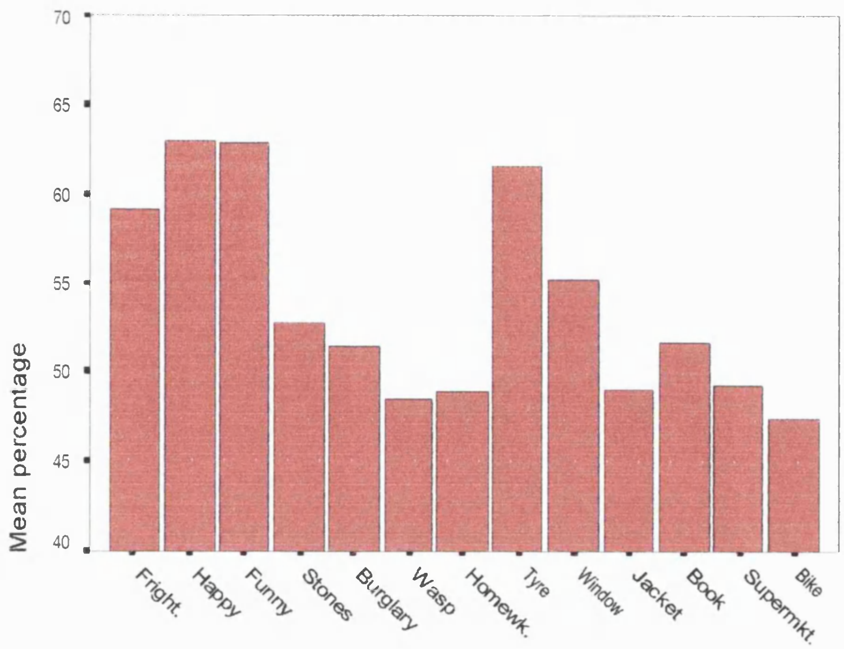


Graph 8.82: Topic effect on clausal-embedding for all subjects

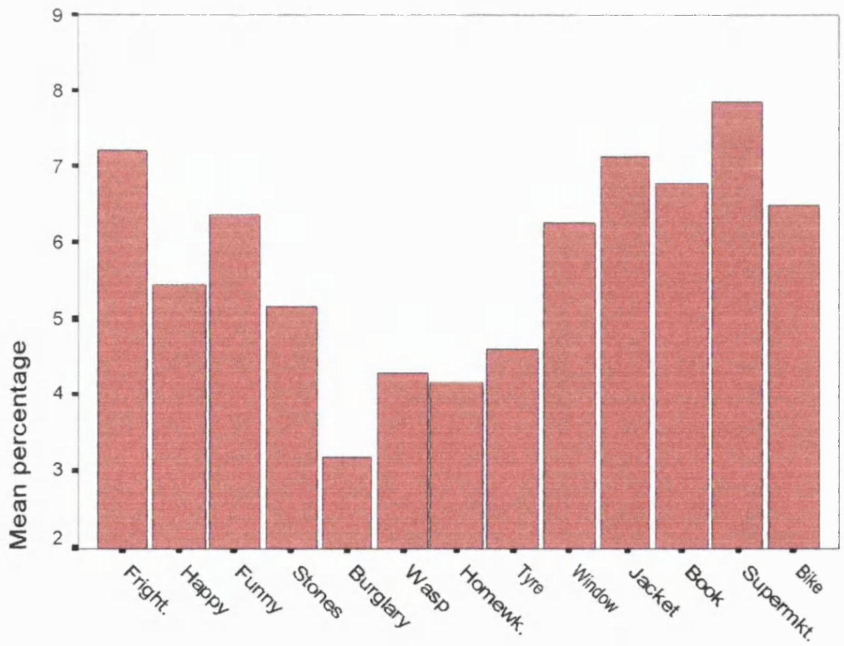
e) Clausal structure

Topic had a significant effect on the percentage of *main clauses* in procedures (H=18.085, p=.003) (Graph 8.83) but not in the personal-narratives and picture-sequences. The tyre procedure elicited relatively more than the other procedures and produced significantly more than the supermarket procedure (z=-3.029, p=.002). The difference between the tyre and bike procedures approached significance (z=-2.847, p=.004). On all topics, the happy personal experience elicited the most and the bike procedure the least.

Personal-narrative topic significantly affected the percentage of *left-branching clauses* used (H=7.655, p=.022) with the frightening experience producing nore than the happy topic (Graph 8.84). There was no significant effect on picture-sequences or procedures. The burglary topic elicited considerably fewer than other picture-sequences and the tyre procedure than other procedures. On all topics, the most left-branching clauses were found in the supermarket procedure and the least in the burglary sequence.

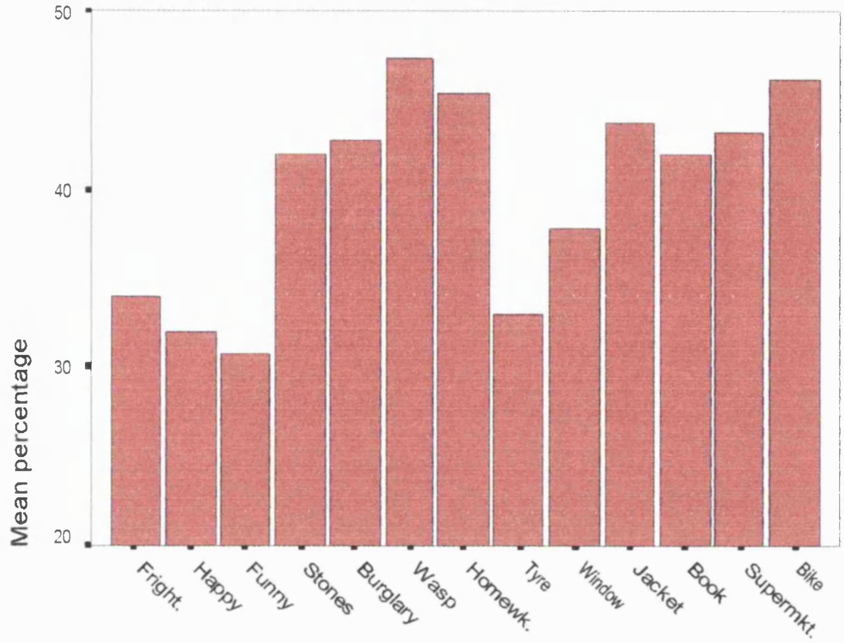


Graph 8.83: Topic effect on main clauses for all subjects



Graph 8.84: Topic effect on left-branching clauses for all subjects

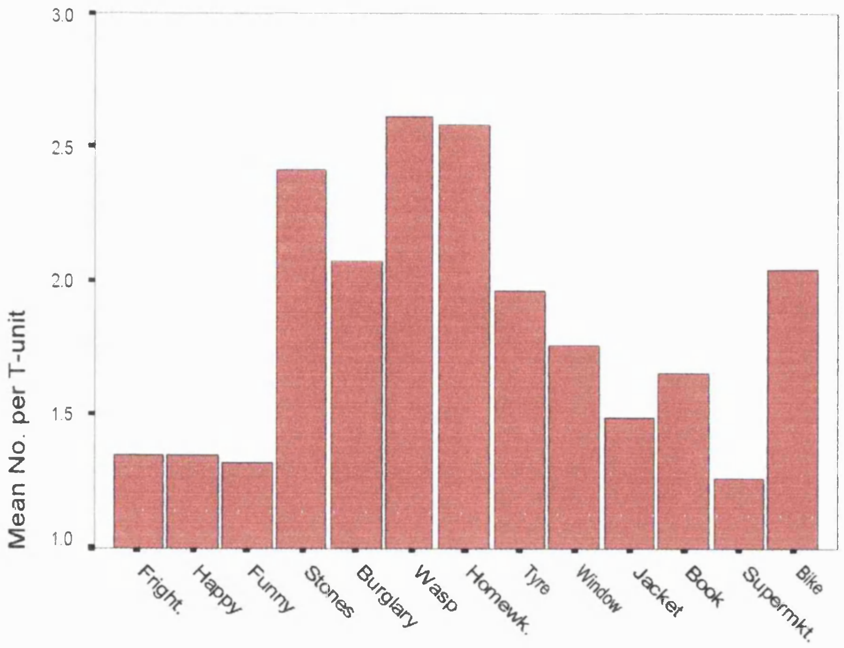
Topic had a significant effect on *right-branching clauses* in procedures (H=11.425, p=.044) (Graph 8.85) but not in personal-narratives or picture-sequences. The tyre procedure elicited considerably fewer than other procedures. The greatest number in any topic occurred in the wasp sequence and the least in the funny experience.



Graph 8.85: Topic effect on right-branching clauses for all subjects

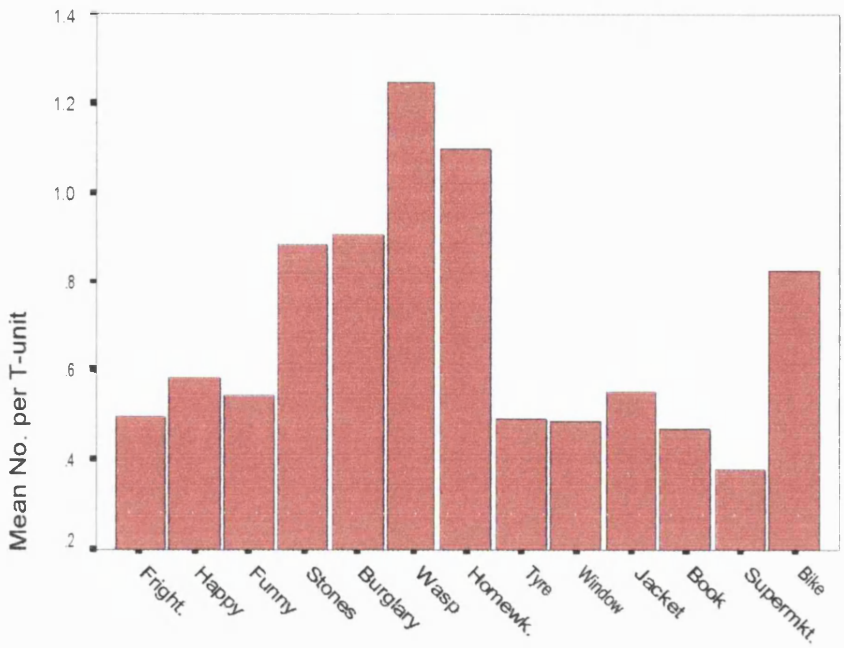
f) Cohesion analysis

Total cohesive ties were significantly affected by topic in the picture-sequences (H=10.471, p=.015) and the procedures (H=12.439, p=.029) but not in the personal-narratives (Graph 8.86). In the picture-sequences the wasp topic was significantly more cohesive than the burglar sequence (z=-3.37, p=.001). Of the procedural samples, the supermarket was the least cohesive and significantly less cohesive than the tyre, window and bike procedures (z=-3.625, p=.000, z=-2.961, p=.003, z=-3.46, p=.001). The most cohesive sample was the wasp picture-sequence with the supermarket procedure being the least.



Graph 8.86: Topic effect on total cohesive ties for all subjects

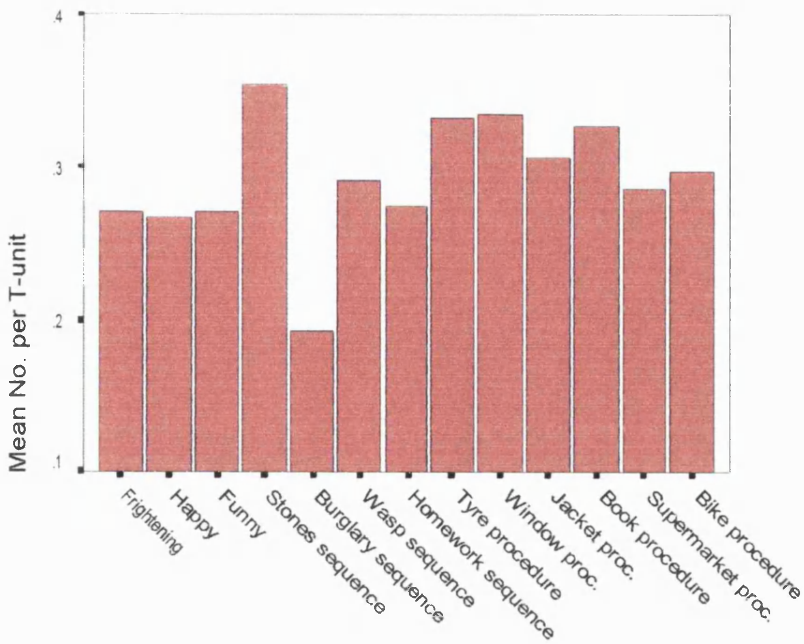
The effect of topic on *reference* was not significant in the personal-narratives but approached significance in the picture-sequence (H= 7.718, p=.052). The wasp sequence elicited more than the other sequences and the picture-sequences elicited more than most other topics. Topic had a significant effect on reference in the procedures (H=15.394, p=.009) (Graph 8.87). The bike procedure elicited significantly more than the tyre, window, supermarket and book procedures (z=-3.287, p=.001; z=-3.188, p=.001; z=-3.718, p=.000; z=-3.358, p=.001) and the jacket topic significantly more than the supermarket one (z=-2.976, p=.003). The wasp picture-sequence had the most reference of any topic whilst the supermarket procedure had the least. No significant effect on *substitution* was noted. Topic had a significant effect on *ellipsis* in the picture-sequences (H=10.882, p=.012). The homework sequence elicited significantly less than the stones (z=-2.773, p=.006). Most procedural topics elicited more substitution than the other topics and the most and least ellipsis of all topics occurred in the picture-sequences (stones and homework respectively).



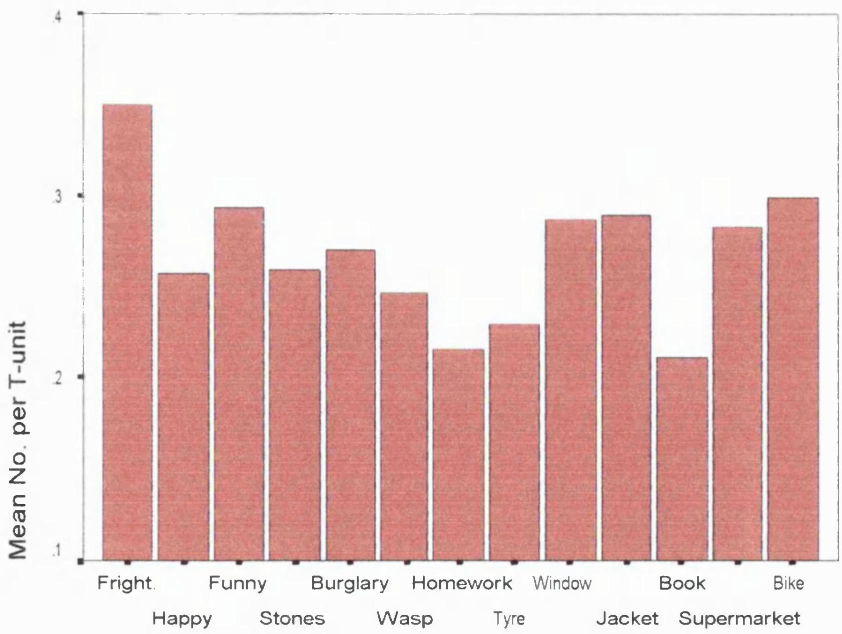
Graph 8.87: Topic effect on referential ties for all subjects

The incidence of *conjunctions* was significantly affected by picture-sequence topic (H=13.410, p=.004) but not in the personal-narratives or procedures (Graph 8.88). In the picture-sequences, the burglar topic had significantly fewer conjunctions than the stones (z=-3.317, p=.001). The most in any topic occurred in the stones sequence with the least occurring in the burglar picture-sequence.

The incidence of *"and"* was significantly affected by topic in the personal-narratives (H=6.727, p=.035) and procedures (H=11.096, p=.05) but not in the picture-sequences (Graph 8.89). The happy experience had significantly fewer "ands" than the frightening one (z= -2.468, p=.014). The book procedure elicited fewer "ands" than the other procedures. The most "ands" in any topic occurred in the frightening experience and the least in the book procedure.

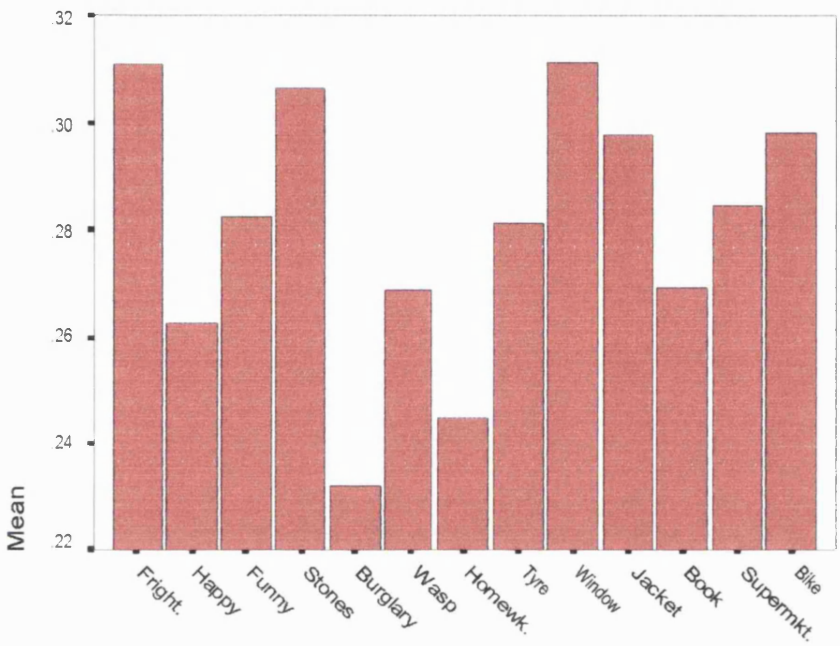


Graph 8.88: Topic effect on the conjunctions for all subjects



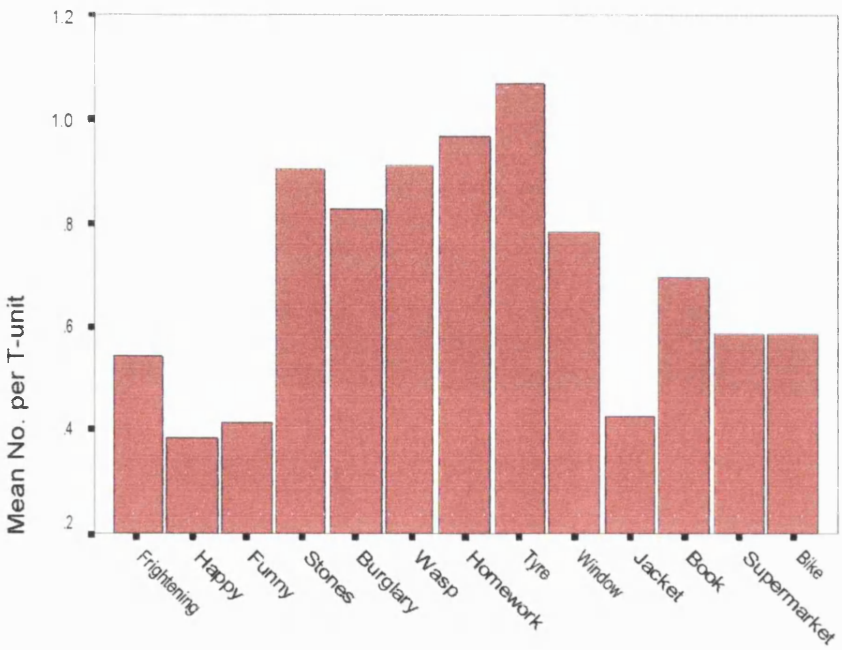
Graph 8.89: Topic effect on incidence of "and" for all subjects

The *connectives* were significantly affected by topic in the picture-sequences (H=8.527, p=.036) and procedures (H=12.439, p=.029) but not in the personal-narratives (Graph 8.90). The frightening experience had considerably more than the happy experience. In the picture-sequences, the stones topic elicited substantially more than the burglar and homework ones. The window procedure produced more connectives than all topics and the burglary sequence the least.



Graph 8.90: Topic effect on connectives for all subjects

The incidence of *lexicalisation* was significantly affected by personal-narrative topic (H=13.927, p=.001) and procedures (H= 27.574, p=000) but not the picture-sequences (Graph 8.91). In the personal-narratives, the frightening experience elicited samples with significantly greater lexicalisation than both happy and funny narratives (z=-2.460, p=.014, z=-2.510, p=.012). In the procedures, the tyre sample had significantly more than the other procedures (jacket: z=-4.35, p=.000; book: z=-2.933, p=.000, supermarket: z=-3.222, p=.001, bike: z=-3.535, p=.000; window: z=-3.337, p=.001) and the window procedure had significantly more than the jacket topic (z=-3.592, p=.000). The tyre procedure produced considerably greater lexicalisation than all the other topics with the happy experience producing the least.



Graph 8.91: Topic effects on lexicalisation for all subjects

Attempted cohesive ties were significantly affected by topic in the personal-narratives (H=6.686, p=.035) and procedures (H=21.103, p=.001) but not in the picture-sequences (Graph 8.92). The happy experience elicited more than the other personal-narratives and in the bike procedure compared to the window, it approached significance (z=-2.879, p=.004). Certain topics elicited samples with virtually no attempted ties (e.g. frightening experiences, tyre and window procedures). The picture-sequence topics elicited samples with similar amounts and an increased incidence compared to the personal topics and the procedures. The stones sequence elicited most and the frightening experience the least.

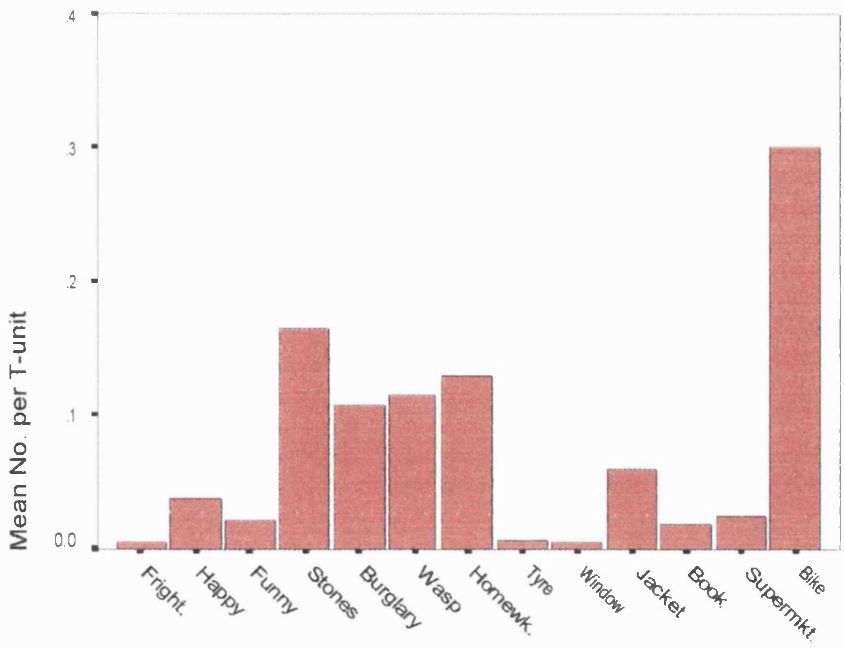
g) Dysfluency

Topic had no significant effect on *dysfluencies*. The happy topic elicited the greatest number in the personal-narratives and of all topics and the least occurred in the homework picture-sequence.

VARIABLE	GENRE (NARR vs PRO)	TASK (PER vs PIC vs PRO	TOPICS
Relevance			* 1 PER * 3 PRO
Discourse Gr.	*		* 1 PER
Clarity	*	*	
Non-specific	*	*	
Substitution	*	*	
Content and fluency	*	*	*1 PRO
Prod/Syntax			
Length		*	* 1 PIC
T-unit length		*	App Sig 1 PRO
Clause length	*		
Embedding	*	*	*1 PRO
Clausal struc			
Main Clause	*	*	* 1 PRO App Sig 1 PRO
Right-branch clauses		*	* 1 PRO
Left-branching clauses.		*	* 1 PER
Cohesion		*	* 1 PIC * 3 PRO
Reference	*	*	App Sig 1 PIC * 5 PRO
Lexical		*	* 2 PER * 6 PRO
Substitution	*	*	
Ellipsis			* 1 PIC
Conjunction	*		* 1 PIC
"And"			* 1 PER * 1 PRO
Connectives			* 1 PIC * 1 PRO
Attempts		*	* 1 PRO
Dysfluency			

* = significant App* = approaching significance NARR = Narratives
PER = Personal narratives PIC = Picture sequences PRO = Procedures

Table 8.14a: Summary of significant effects of genre, task and topic



Graph 8.92 Topic effect on attempted cohesion for all subjects

8.3.4 Summary of task and topic effects

A summary of the task effects on selected measures is provided in the form of a hierarchy, with the relative incidence of the measures indicated (Table 8.14).

Rel Most	D.G. Most	Clarity Least	N.Sp least	Con least	Length Least	Cl. emb Least	Main Least	Left Least	Right Least	Tot Coh Least	Ref Least	Conj Least	Lex Least	Att Least	Dysfl Least
PIC	PRO	PER	PIC	PER	PIC	PER	PIC	PIC	PER	PER	PER PRO	PER	PER	PER	PIC
PER	PIC	PIC	PRO	PIC	PRO	PIC PRO	PRO	PRO	PRO	PRO	PIC	PIC	PRO	PRO	PRO
PRO	PER	PRO	PER	PRO	PER		PER	PER	PIC	PIC		PRO	PIC	PIC	PER

PER=Personal narratives
Rel=Relevance
N.Sp.=Non-specific
Tot.Coh.=total cohesion
Lex=Lexicalisation
PIC=Picture sequences
DG=Discourse grammar
Con=Content and fluency
Ref.=Reference
Att=Attempted cohesion
PRO=Procedures
Clarity=Total Clarity disruptors
Cl.emb.=clausal embedding
Conj=Conjunction
Dysfl=Dysfluencies

Table 8.14: Hierarchy of incidence of discourse measures by tasks

Thus for example, picture-sequences elicited the most relevant discourse. This also contained the most right-branching clauses, cohesion, reference, lexicalisation and attempted cohesion but the least non-specific elements and main and left-branching clauses and were the shortest. A similar hierarchy of topic results can be found in Appendix 17.

8.4 Selection of discourse samples for assessment of the RBD subjects

Apart from determining the effect of age, SES and sampling techniques on the discourse of NBD subjects, the assessment of the relatively large number of samples was aimed at selecting a core battery of discourse tasks for the assessment of the RBD subjects. If discourse elicitation tasks can be chosen on the basis of being the most impervious to age and SES, it is hypothesised that the RBD subjects' performance would be more clearly delineated.

To select the tasks, the correlations between the discourse measures and the two demographic factors (age and SES) were determined using Pearson's Product Moment (bivariate) correlations. From these, each measure on each topic which did not demonstrate a correlation (i.e. no effect) with age and SES were noted (see Table 8.15).

	Personal Narr				Picture Narr.				Procedures					
	Fr	Em	Ha	Fu	St	Bu	Wa	Ho	Ty	Wi	Ja	Bo	Su	Bi
No. of Samples	28	10	30	27	32	32	32	32	31	31	30	26	24	29
Age - no effect	4	3	2	3	1	2	1	6	7	4	3	2	4	4
SES-no effect	2	5	2	2	6	3	5	4	-	-	3	3	1	3
Age and SES - no effects	6	8	4	5	7	5	6	10	7	4	6	5	5	7

PERSONAL NARR FR=Frightening
EM=Embarrassing
FU=Funny
HA=Happy

PICTURE-NARR ST=Stones
BU=Burglary
WA=Wasp
HO=Homework

PROCEDURES TY=Tyre
WI=Window
JA=Jacket
BO=Book
SU=Supermarket
BI=Bike

Table 8.15: Correlations between discourse measures and age/SES

The selection of specific topics within each discourse task was based on those with the greatest similarities (i.e. no correlation). From the personal-narratives, the "frightening" and "funny" topics were selected. Although the "embarrassing" topic was found to be the most impervious to age and SES, this topic was not considered for selection due to the small number of subjects who felt able to provide such a sample (one-third of the subjects).

On the picture-sequence narratives, the "homework" topic was least affected by age and SES. However the "stones" and "wasp" topics were selected for two reasons:- viz. firstly, they demonstrated a similar lack of effect of demographic variables, and secondly, only two characters were used in these sequences (as opposed to three in the "homework" sequence) which had important implications for cohesion skills.

For the procedures, the effect of age and SES was similar for all topics. However, the "book" and "supermarket" topics could only be elicited from twenty-four to twenty-six subjects, possibly indicating their lack of appropriateness to older males. The other four topics were elicited more frequently (from 29 - 31 subjects). These four topics were thus selected based on the increased frequency that subjects supplied them. Therefore, "tyre", "window", "jacket" and "bike" were used.

Thus from the original fourteen samples, eight samples were finally selected for assessment of the RBD subjects. In summary, this battery comprises:-

- Personal-experience narratives (2)
  - frightening
  - funny
- Picture-sequence narratives (2)
  - stones
  - wasp
- Procedures (4)
  - tyre
  - window
  - jacket
  - bike.

8.5 Results of the attention tests and correlations with the discourse measures [67]

8.5.1 Age effects on attention assessment.

The results of the attention assessments for each of the four age groups and for all subjects are presented in Table 8.16.

ATTENTION TEST	50s Group	60s Group	70s Group	Over-80s	Total subjects
Forward Digit Span	9.000 (1.069)	8.750 (1.389)	9.000 (.756)	7.625 (1.061)	8.594 (1.188)
Backward Digit Span	7.500 (.756)	7.375 (1.408)	6.750 (1.488)	5.875 (1.126)	6.875 (1.338)
Digit Span Mean	8.250 (.845)	8.063 (1.374)	8.375 (1.408)	6.750 (1.035)	7.86 (1.309)
FAS Fluency	59.750 (11.61)	58.375 (16.379)	38.375 (9.319)	39.250 (14.656)	48.938 (16.288)
Trail-Making Part A	.628 (.245)	.705 (.343)	.919 (.189)	1.308 (.249)	.89 (.366)
Trail-Making Part B	1.253 (.385)	1.898 (1.024)	2.203 (.693)	3.931 (.957)	2.32 (1.27)

(Standard deviations are provided in brackets)

Table 8.16: Attention assessment by age group

A statistical examination of the effect of age on the assessment of attention revealed that age had a significant effect on backward digit span, the digit span mean, word fluency and the Trail-making test (Table 8.17). Significant differences were found between specific age groups on backward digit span, word fluency and both parts of the Trail-Making test. On all six measures there was a decline with age.

[67] : For graphs of these results, see Appendix A18.

	Forward Digit Span	Backward Digit Span	Digit Span Mean	FAS Word Fluency	Trail Making A	Trail Making B
Age Group	H=7.582 p=.055	H=8.008 *p=.046	H= 7.925 *p=.048	H=11.161 *p=.011	H=17.629 *p=.001	H=18.908 *p=.000
50s/60s						
50s/70s				50s*>70s		50s*<70s
50s/80s		50*>80			50s*<80s	50s*<80s
60s/70s						
60s/80s					60s*<80s	60s*<80s
70s/80s					70s*<80s	70s*<80s

*=Significant[68].

Table 8.17: Effect of age on attention measures

8.5.2 SES effects on attention assessment

The means for the attention measures for each SES group and the total subject group are provided in Table 8.18.

TEST	Professional	Managerial	Skilled	Unskilled	All Subjects
Forward Digit Span	8.875 (.835)	9.500 (.926)	8.625 (.744)	7.375 (1.188)	8.594 (1.188)
Backward Digit Span	7.500 (.756)	7.625 (1.188)	6.750 (.8864)	5.625 (1.506)	6.875 (1.338)
Digit Span Mean	8.563 (.943)	8.688 (1.033)	7.688 (.799)	6.500 (1.225)	7.86 (1.309)
FAS Fluency	60.875 (11.777)	56.625 (14.382)	40.250 (8.481)	38.000 (17.436)	48.938 (16.288)
Trail-Making Part A	.856 (.372)	.745 (.343)	.929 (.24)	1.029 (.48)	.89 (.366)
Trail-Making Part B	2.25 (.0062)	1.883 (1.116)	2.328 (1.37)	2.83 (1.57)	2.32 (1.27)

Standard deviations are given in brackets.

Table 8.18: Attention assessment by SES group

From Table 8.19 it can be observed that SES had a significant effect on forward and backward digit span, mean digit span and Word Fluency. Significant differences between some groups were recorded in the forward and mean digit spans and the word fluency test. The trend on all six measures was to decreasing performance with lower SES group

[68] The effect of age was determined using the Kruskal-Wallis test with the significance of 0.05. The significance of the comparisons between age groups was determined by the Mann-Whitney Test with the significance set at 0.0083 using the Bonferroni correction (four age groups: 0.05 divided by six comparisons=0.0083).

	Forward Digit Span	Backwd Digit Span	Digit Span Mean	FAS Word Fluency	Trail Making A	Trail Making B
	H=12.469, *p=.006	H=10.219, *p=.017	H=13.367, *p=.004	H=12.46 *p=.006	H=1.610 p=.657	H=2.292 p=.514
A/B						
A/C				A*>C		
A/D			A*>D			
B/C						
B/D	B*>D		B*>D			
C/D						

*=significant[69]

A=Professional B=Managerial
C=Skilled D=Unskilled

Table 8.19: Effect of SES on attention measures

8.5.3 Correlations of attentional measures and age or SES

	ACT. AGE	SES	DIGIT - FWD	DIGIT-BACK	DIGIT-MEAN	FAS TEST	Trail-A	Trail-B
AGE	----------							
SES	----------	----------						
DIGIT-F	-*	-**	----------					
DIGIT-BWD	-**	-**	**	----------				
DIGIT-M	-*	-**	----------	----------	----------			
FAS	-**	-**	*	**	**	----------		
TRAIL-A	**		-**	-**	-**	-**	----------	
TRAIL -B	**		-**	-**	-**	-**	**	----------

Using Spearman's rho (nonparametric correlation)

Table 8.20: Correlations of actual age and SES with attentional measures

Actual age was negatively correlated with the three Digit Span measures and with the Word Fluency test, indicating that these scores decreased as age increased (Table 8.20). Furthermore, actual age was positively correlated with both parts of the Trail-Making test, suggesting that as age increased, time taken to complete it increased, indicating a poorer performance.

SES was negatively correlated with the three Digit Span measures and with the Word Fluency test, suggesting that adults from lower SES groups performed more poorly on these tests. There was no correlation between SES and the Trail-Making test.

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[69] Significance set using Bonferroni correction at $p < 0.0083$ (4 groups/6 comparisons).

8.5.4 Correlations between discourse and attention measures

Due to the problematic nature of correlational research[70] and the large number of comparisons in this study, only those aspects that indicate a clustering of correlations between a number of measures are discussed here[71].

Relevance ratings were negatively correlated with the Digit Span test (Table 8.21). Thus subjects who performed better on this test produced discourse which was rated as more relevant. Discourse-grammar appropriacy ratings were negatively correlated with the FAS test, indicating that subjects with greater verbal fluency produced better-structured discourse.

The incidence of non-specific elements correlated negatively with the FAS test and positively on the Trail-Making test, indicating that adults with better scores on these tests produce discourse containing fewer non-specific elements.

Sample length, clausal-embedding and T-unit-length were positively correlated with the FAS test, suggesting that adults with greater verbal fluency produced longer samples with more embedding and longer T-units. The incidence of right-branching clauses was positively correlated with Digit Span scores and the FAS test. Therefore subjects with a better performance on these tests produced more right-branching clauses. The incidence of main clauses correlated negatively with the FAS test, indicating that subjects with greater verbal fluency produced discourse containing fewer main clauses.

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[70] Failure to find significant correlations between standardized and experimental measures suggests that different abilities are being measured, that the range of performances tapped by the experimental tasks is too restricted or that the sample size is too small (Chapman and Ulatowska 1989).
[71] For complete correlational matrices, see Appendix A19.

	Rel	Disc. Gram	Clar Dis	Non-Sp	Con/ Flu	Lth	Cl. Emb	Cl. Lth	T-U Lth	Right Cl.	Left Cl	Main Cl.	Total Coh	Ref	Lex	Att	Conj	And	Conn	Dys-Flu
ALL	**	++ (=)		++ ==			(*) ++		(*) ++	** ++ (=)	(+)	** ++	** ++		** ++ ==	** ++ ==				
PER	**	(+)		++			++	(*)	(+)	** ++		(*) ++	** ++		** ==			(*)	**	
PIC		++		++ ==	** (=)	++	(*) ++		(+)	++		++	(+)		** ++	** ++ ==	(*)		**	
PRO		++ ==		++ ==		(*) ++	** (+)	(+)	** ++	** (+)	++	** ++	** ++ ==		++ ==	++	**			

PER=Personal narratives PIC=Picture sequences PRO=Procedures
Rel=Relevance DiscGram=Discourse grammar ClarDis=Total Clarity disruptors NonSp.=Non-specific Con/Flu=Content and fluency Cl.emb.=clausal embedding Cl.Llth=Clause length T-U.Lth=T-unit-length Tot.Coh.=total cohesion Ref.=Reference Conj=Conjunction Lex=Lexicalisation Att=Attempted cohesion Dysflu=Dysfluencies
** Sig.[72] correlation with Digit Span (*) Trend towards correlation with Digit Span
++ Sig. correlation with Word Fluency (+) Trend towards correlation with Word Fluency.
== Sig. correlation to Trail-Making test (=) Trend towards correlation with Trail-Making.

Table 8.21: Correlations between discourse and attentional measures

[72] The non-parametric correlational test, Spearman's rho, was used to examine the relationships between discourse measures and attention.

The incidence of total cohesive ties was positively correlated with the Digit Span and FAS tests. This indicates that adults with greater digit spans and verbal fluency produce more cohesive samples. Lexicalisation and attempted cohesive ties correlated with all attention measures, supporting the view that adults with better attention skills produce discourse with increased lexical cohesion and decreased cohesive errors.

In addition to these general correlations, specific tasks demonstrated additional correlations, particularly the procedures. The Digit Span test was significantly correlated in the procedures with the amount of clausal-embedding, T-unit-length and incidence of main clauses and conjunctions indicating that adults with greater digit spans produced procedures with more embedding, conjunctions and main clauses and longer T-units. Left-branching clauses in the procedures correlated positively with the FAS test. Thus adults with higher verbal fluency scores produced procedures with more left-branching clauses. Discourse-grammar ratings and cohesive ties in procedures were significantly correlated with the Trail-Making test indicating that subjects who performed better on this test provided more appropriately structured and cohesive procedures.

In personal-narratives, the incidence of connectives was positively correlated with digit span, indicating that more connectives were used in this type of narrative by adults with greater digit spans.

On the combined samples and each task, more discourse measures correlated with the FAS test and fewer with the Trail Making Test. This will be discussed in the Chapter 9.

8.6 Correlations between discourse measures

As discussed in the previous section, only those correlations occurring between clusters of measures will be discussed, although all significant correlations for the combined samples are presented in Table 8.22.

	REL	D.G	NW	WT	WCL	CLT	MA	LEF	RGH	NSP	SUB	CON	CLA	REF	SBN	ELL	COJ	AND	CNN	LEX	ATT	COH
REL	----																					
DG	**	------																				
NW		-*	----																			
WT		-*		------																		
WCL		-*		------	-----																	
CLT				------		------																
MA	*	**	-*	------	-*	------	------															
LEF			*	------		------	------	-----														
RGH	-**	-**	*	------	**	------	------	------	----													
NSP		*					*		-*	----												
SUB		-*	*						*		----											
CON												----										
CLA										----	----	----	----									
REF	-**	-**					-*							-----								
SBN															----							
ELL							-*			-**						----						
COJ			**	------		-----	------	------	------								----					
AND	-*					------	------	------	------									------				
CNN	-*					------	------	------	------								------	------	----			
LEX	-**	-**	*	**	**	**	-**		**	-**				*				*		----		
ATT				-*		-*	**		-*											-**	----	
COH	-**	-**	**	**	**	**	-**	*	**	-*				----	----	---	----	------	------	----		----
DYSF								**														

REL=Relevance DG=Discourse grammar CLA=Total Clarity disruptors NSP=Non-specific CON=Content and fluency CLT=clausal embedding WCL=Clause length WT=T-unit-length COH=Total cohesion REF=Reference COJ=Conjunction LEX=Lexicalisation ATT=Attempted cohesion DYSF=Dysfluencies

*p<.05(2-tailed)[73] **p<.01 (2-tailed)

----=Those measures related to each other.

Table 8.22: Correlations between discourse measures on all samples

[73] The non-parametric correlational test, Spearman's rho, was used to examine the relationships between discourse measures and attention.

Discourse-grammar and relevance ratings were correlated, with decreasingly relevant samples being linked with less appropriate discourse-grammar. A correlation also occurred between less relevant samples and more main but fewer right-branching clauses. In picture-sequences, this relationship was reinforced by a correlation between relevance and the measures of syntactic complexity. Lower relevance ratings were also associated with decreased total cohesion (particularly reference, lexical ties and "ands").

Discourse-grammar correlated with the syntactic measures, suggesting that lower discourse-grammar ratings were linked to shorter samples and T-units, with more main but fewer right-branching clauses (particularly in the picture-sequences and procedures). Correlations between discourse-grammar and total cohesion suggested that lower discourse-grammar ratings were also linked to lower total cohesion, particularly to fewer lexical and referential ties (and fewer "ands" and connectives in the two narrative tasks).

Correlations regarding sample length indicated that longer samples were related to relatively fewer main but more left-branching clauses (as well as increased syntactic complexity in the picture-sequences and procedures). Longer sample length was also associated with an increased ratio of total cohesive ties, particularly conjunctions and lexical ties (and reference in the two narrative tasks). In the picture-sequences and procedures, longer samples were linked to a higher percentage of substitutive elements and in picture-sequences to more content and fluency disruptors. Longer samples were also linked with more attempted ties per T-unit in the personal-narratives but with fewer in the procedures.

Correlations also occurred between clause-length (reflecting nominal and verbal complexity) and syntactic complexity (fewer main clauses, more right-branching clauses) and also with total cohesive ties. Thus it is suggested that longer clause-length is associated with less syntactic complexity and a greater incidence of cohesive ties (particularly lexicalisation). Longer clauses in procedures were linked with greater clausal-embedding, increased conjunctions and connectives. Clausal-embedding was also correlated with cohesive ties, indicating that increased embedding related to increased cohesiveness, particularly lexicalisation, and decreased attempted ties (as well as increased reference in picture-sequences).

The increased incidence of main clauses and the decrease in right-branching clauses was associated with more non-specific elements and less cohesion, particularly lexicalisation. Left-branching clauses correlated with total cohesion and dysfluencies, with increased clauses being associated with more cohesive ties and increased dysfluency. Increased left-branching clauses in picture-sequences and procedures were linked to more referential ties and to decreased cohesive errors in procedures.

Non-specific elements were correlated with cohesive ties indicating that increased non-specific elements were associated with decreased total cohesion, ellipsis and lexicalisation. In picture-sequences, fewer non-specific elements were associated with fewer attempted cohesive ties. In personal-narratives, fewer non-specific elements and total clarity disruptors were linked to more "ands", whilst in the picture-sequences fewer content and fluency elements and total clarity disruptors were associated with more "ands". Fewer non-specific elements were linked to more syntactic complexity in the picture-sequences and procedures and fewer total clarity disruptors were associated with left-branching clauses in the personal-narratives.

Lexicalisation was also correlated with reference, "and" and attempted cohesion, indicating that increased lexicalisation was related to increased referencing, more "ands" and decreased cohesive errors (as well as connectives in the two narrative tasks). In the picture-sequences, more referential ties were linked with the increased use of "and", connectives, lexical ties and a decrease in errors.

As stated above, correlations between large numbers of measures must be interpreted cautiously and they will be discussed in Chapter 9. The three tasks demonstrated similarities and differences in their patterns of correlations[74] compared to the correlations of the combined discourse samples. They also varied in the number of correlations which occurred with the picture-sequences and procedures producing the most (69 and 63), fewer in the total samples (54) and considerably less in the personal-narratives (32).

8.7 Summary

This chapter has provided the results of the effects of age, SES and discourse sampling techniques on the discourse performance of a group of NBD male adults. Based on these results, the method of selection of those tasks for assessment of the RBD subjects has been presented. The results of the attentional status assessment, a correlation of these results with the discourse measures and the inter-correlation between discourse measures have been detailed. The results presented in this chapter will be discussed in the Chapter 9.

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[74] Correlational matrices for each task can be found in Appendix A20.).

CHAPTER 9
NORMAL DISCOURSE PERFORMANCE
DISCUSSION OF RESULTS

This chapter provides a discussion of the effects that age, SES and discourse sampling techniques had on the discourse performance of NBD subjects. The correlations between the attention and discourse measures as well as the inter-correlations between the discourse measures are also discussed.

9.1 Effect of ageing on discourse

Only the main findings (significant results and trends) of the effects of age on the three discourse tasks used will be discussed here. It is vital to remember that these results reflect the performance on the three tasks but this does not necessarily mean that the performance on each topic demonstrates the same trend[75]. It is also important to note that results and trends do not necessarily follow a linear path and old-elderly subjects (over 80) may perform differently to the ageing trend. This reinforces the need for differentiating older adults into separate groups so that the effects of ageing can be more clearly delineated.

Certain aspects of discourse demonstrated a similar trend on all three discourse tasks. Older subjects produced discourse which was rated as less relevant and contained less appropriate discourse-grammar than younger subjects. This is consistent with previous findings for relevance (e.g. Glosser and Deser 1992, Ulatowska et al 1985, Ulatowska and Chapman 1991) and for procedural discourse structure (Ulatowska et al 1985, Purdy and Loos-Cosgrove 1990). However narrative structure has been found to be relatively unimpaired, depending on the type of discourse and the assessment measure used (e.g. North et al 1986, Kemper et al 1990).

The total percentage of clarity disruptors and its three types demonstrated a differential impairment with age. These measures demonstrated an increase with age to the seventies or eighties on the picture-sequence and procedural tasks but no such effect was observed on the personal-narratives. Similar results in procedures have been reported (Ulatowska et al 1985) and with other types of discourse (Cooper 1990, Walker et al 1988, Obler and Albert 1981) but results are often difficult to compare to previous studies due to the variation in the type and definition of clarity disruptors.

With respect to the category of productivity and syntax, an ageing effect was observed on the discourse length of the less constrained self-generated personal experiences (with older subjects producing longer samples) but not in the more structured picture-sequences and procedures. Increases in sample length with age have been observed in some discourse tasks (Gould and Dixon 1993, Cardebat, Demonet and Doyon 1993) but this has not been invariable on other tasks (Lock and Armstrong 1997, Gubarchuk and Kemper 1997). T-unit-length (incorporating phrase and clause complexity, as well as embedding) declined with age, possibly reflecting the competing demands on working memory in the older groups. A correlation between reduced working memory and lower levels of syntactic complexity has been noted (Kynette and Kemper 1986, Kemper et al 1992). On the other hand, clause-length was not affected by age. This suggests that clausal-embedding would be the measure which would decline with age. However, clausal-embedding remained largely unaffected by age, apart from a trend to a decreasing amount in the picture-sequence task. Previous research on the effects of age on various measures of syntactic complexity in different discourse types has yielded conflicting results (see Chapter 4). This may be due to the precise nature of the discourse topic, the method of elicitation and the exact discourse measures employed.

On the clausal structure measures, the incidence of main and right-branching clauses tended to remain static with age, apart from an increase in main clauses on the picture-sequence task. The latter increase has been noted previously in other discourse tasks (Kemper et al 1990, Gubarchuk and Kemper 1997). Whilst age had no effect on the incidence of left-branching clauses in the picture-sequences, a decline in procedures was observed. In

[75] See Table 8.14.

the personal-narratives, these clauses demonstrated a lower incidence to the seventies group but an increase in the eighties group. This lack of clear-cut results of left-branching clauses conflicts with the conclusions of Kemper and her colleagues (e.g. Cheung and Kemper 1992, Kemper et al 1990, Kynette and Kemper 1986, Gubarchuk and Kemper 1997) who found a reduction in both left and right-branching clauses in narratives with age. They correlated the decrease in complex sentences with poor digit span results (a working memory/attention measure). These contrasting findings may be due to the low incidence of left-branching clauses which were recorded (as also reported by Gubarchuk and Kemper 1997, Maxim and Bryan 1994) and the fact that differing effects were found on individual topics used in the present study.

On all cohesive ties, a decrease with age was observed. However the effects varied, depending on the type of cohesion assessed. Referential ties demonstrated a decrease in both narrative tasks but remained relatively unaffected in procedures. A number of studies have reported similar findings (Kemper et al 1990, North et al 1986, Stover and Haynes 1989) but no age effect has also been observed (Glosser and Deser 1992, Chapman et al 1995). Lexical ties demonstrated a decrease with age across all three tasks in contrast to previous research using tasks which differed from those used here (Glosser and Deser 1992, Kemper et al 1990). Substitutive ties were not affected by age whilst ellipsis showed a small decline with age. Conjunctions and connectives in the personal-narratives tended to increase with age to the seventies group before decreasing. However the incidence of "and" in this task did decrease with age. Although conjunctions remained unaffected in the picture-sequences, the incidence of "and" and the connectives varied considerably with the topic used. In procedures, the incidence of "and" and connectives increased with age whilst conjunctions demonstrated no effect. Thus for these three measures, task and topic had an important effect and obscured any clear or linear finding of the effects of age. Previous research into these measures has been limited and varying results from different discourse tasks have been reported (Cardebat et al 1993, Pratt et al 1989).

The predominant finding of previous research, viz. an increase in attempted cohesive ties or cohesive errors (see Chapter 4), was replicated in this research in the picture-sequence task but not on the personal-narratives and procedures. Oral discourse is considered to place a maximum load on working memory as "the speaker must simultaneously remember what has just been said and plan what is to be said next" (Au and Bowles 1991, p 301). Oral discourse elicited by means of picture-sequence (as opposed to self-generated narratives) should therefore place a decreased load on working memory as the structure of the narrative is provided to the speaker. Working memory has been found to decrease with age (Cohen 1979, Au and Bowles 1991, Light , Capps, Singh and Owens 1994). Measures of working memory have been found to correlate with ambiguous use of pronouns and the use of some cohesive devices (Ulatowska et al 1986, Kemper et al 1990, Pratt et al 1989). If an increase in ambiguous pronouns is related to poorer working memory, it would be expected that more errors would appear in personal-narratives rather than the picture-sequences but this is not the case. However an increase in non-specific elements (which incorporates indefinite terms) was noted in personal-narratives. The reason for the increase in cohesive errors with age on the picture-sequences may be due to the need for increased referential and lexical use to differentiate between the two characters (both male) who are depicted in the picture-sequence tasks.

An increase with age in dysfluency rates was observed in the personal-narratives and procedures but not on the picture-sequences. Thus the structure of the picture-sequence task may have assisted older subjects in remaining more fluent.

9.2 Effect of socio-economic status on discourse

As in the ageing section above, the main findings (trends and significant results) of the effect of SES on the three discourse tasks will be discussed here and it will become apparent that SES had a greater effect on the discourse measures than age. SES often had a differential effect on the measure being used depending on the discourse task and the results of some individual topics conflicted with the task results[76].

The relevance ratings of the three tasks demonstrated a decrease from SES1 to SES4 groups, although only two of the six procedural topics demonstrated this pattern. The effect of SES on this measure is in contrast to previous research which found that education had no effect on the ratings of the relevance of the contribution to the topic in conversational discourse (Mackenzie 2000b) or on the efficiency of imparting relevant information in picture description tasks (Mackenzie et al 1997b, Shewan and Henderson 1988). These results are probably due to the differences in SES categorisation and also the discourse genre used. The discourse-grammar ratings of the three tasks also displayed a decline from SES1 to SES4 groups. A similar decline in procedural and descriptive discourse has been noted with education levels (Mackenzie et al 1997, Purdy and Loos-Cosgrove 1990).

The percentage of total clarity disruptors demonstrated an increase from SES1 to SES4 group in the personal-narratives but were more variable in the picture-sequences and procedures e.g. the most and least disruptors on any topic were found within the same genre. Thus on the measure of clarity disruptors in relation to SES, the selection of topic superseded genre and method of elicitation in importance.

This trend towards an increasing amount of disruptors in the SES4 was mirrored to a considerable extent by the incidence of non-specific elements and content and fluency disruptors. Mackenzie (2000b) reported that more formal tasks (e.g. picture description) required better retrieval of lexical items. Therefore, less educated subjects may produce more non-specific elements due to poorer vocabulary. She also commented that the formality of some tests may make less educated speakers uncertain, resulting in an increased amount of comments (personalised or task) on such tasks. However, in this study, SES had a greater effect on the least structured and least formal personal-narratives, with a variable performance on the other two tasks. Thus the inherent demands of the task may be of more importance than the subjects'

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[76] See Table 8.10.

attitude to it. Due to the variation in terminology and the different types of discourse studied (see Chapter 5), it is difficult to compare the varying results of previous research to the present study.

SES1 produced longer personal-narratives and procedures than the other groups. It is suggested that the education, job responsibilities and social commitments of SES1 would make them more used to holding the floor, whether in formal or informal situations. SES1's skill at "holding the floor" even in procedural tasks may reflect their work and social experiences. This group produced longer samples even on those topics (e.g. changing a car tyre, replacing a broken glass in a window) where more practical/manual skills are needed. Thus the ability to carry out the task may not be reflected in the ability to describe the procedure verbally. Furthermore the "amount of experience" individuals have had in carrying out the tasks has not been found to be related to the number of steps included in their procedures (Ross and Berg 1990). The sample length of the picture-sequences remained unaffected by SES reflecting the constraining structure of this method of elicitation. No previous research can be directly compared to these results due to differences in assessing length and the various discourse elicitation tasks/genres used. However, higher education levels have been associated with longer picture samples (LeDorze and Bedard 1997, Mackenzie et al 1997b, Mackenzie 200b), story retellings (Yorkston and Beukelman 1990) but not in conversation (Mackenzie et al 1997b, Mackenzie 2000b) or in description or narrative recall in Russian adults (Gubarchuk and Kemper 1997). This may also reflect Bernstein's (1973) "elaborated" communication code which places importance on verbal communication and is associated with the education system (see Chapter 5).

The dominant trend in the three syntactic complexity measures was towards a decrease from SES1 to SES4, although some variation by topic occurred. These results reflect previous research into the effects of education on syntactic complexity (mostly clausal-embedding) in a variety of discourse types (e.g. see Cheung and Kemper 1992, Kemper, Rash, Kynette and Norman, 1989, Kemper et al 1990, Labov and Auger 1993, Yorkston et al 1990). Ulatowska et al (1998) noted the use of complex syntax in a longitudinal study of old-elderly subjects who were highly educated for their age. However, education level/SES has also been reported to have no effect on syntactic complexity (Shewan and Henderson, Speedie et al 1990, Gubarchuk and Kemper 1997), as assessed on a variety of measures and discourse types.

The incidence of main clauses in the three tasks demonstrated an increase from SES1 to SES4 whilst the right and left-branching clauses decreased, reflecting the decrease in clausal-embedding discussed above. Similar results have been described by Kemper et al (1989) in expository discourse across three education levels, although Labov and Auger (1993) concluded that SES had no effect on the production of left-branching clauses in conversation. Furthermore no effect was found on main, left- and right-branching clauses in the discourse of Russian adults (Gubarchuk and Kemper 1997).

There was a general decline in the number of total cohesive ties from SES1 to unskilled groups in all three tasks although the incidence of reference, substitution and ellipsis tended to remain constant. Lexicalisation declined from SES1 to SES4 in the picture-sequences and procedures whilst conjunctions declined in the procedures (but remained similar on the other tasks). Kemper et al (1990) observed a similar decline in lexical ties and conjunctions in fantasy narratives depending on education level whilst reference and ellipsis remained unaffected (as in this study). The incidence of "and" and connectives in the personal-narratives and connectives in the procedures decreased fromSES1 to SES4. No significant effect of SES on the number of attempted cohesive ties was found in the personal experience or procedural topics but an increase occurred from SES1 to SES4. The amount of attempts in the personal-narratives was extremely small and even non-existent in some SES groups. Education level did not affect unclear referencing in conversation (Mackenzie et al 1997a, 1997b, Mackenzie 2000b) but those subjects with less education tended to use more pronouns than more educated subjects (LeDorze and Bedard 1998, Bucks et al 2000). Light et al (1994) state that "it is unknown whether educational level by itself is a predictor of anaphoric errors or whether it may interact with age" (p 78).

The dysfluency rate demonstrated a decrease from SES1 to SES4. Gubarchuk and Kemper (1997) described more fragments and continuations in highly educated Russian adults whereas Yorkston et al (1990) found no differences in the incidence of mazes in three SES groups. The categories and definitions of dysfluency used in previous research make direct comparisons problematic.

From the above discussion, it is apparent that some measures (e.g. discourse-grammar, total cohesive ties) were similarly affected by age and SES. However these factors had the opposite effect on other measures e.g. increased dysfluency in older adults but decreased in less skilled adults, clarity disruptors in the personal-narratives did not vary with age but they did increase in less skilled adults compared to SES1. This will be discussed further in Chapter 12.

9.3 Effect of discourse sampling

Table 9.1 presents the hierarchy of the results of each discourse measure on the three tasks for all subjects. As can be observed, no single discourse task consistently elicited samples with the most or least of the discourse measures.

Rel Most	**D.G. Most**	**Clarity Least**	**N.Sp least**	**Con least**	**Length Least**	**Cl. emb Least**	**Main Least**	**Left Least**	**Right Least**	**Tot Coh Least**	**Ref Least**	**Conj Least**	**Lex Least**	**Att Least**	**Dysfl Least**
PIC	PRO	PER	PIC	PER	PIC	PER	PIC	PIC	PER	PER	PER PRO	PER	PER	PER	PIC
PER	PIC	PIC	PRO	PIC	PRO	PIC PRO	PRO	PRO	PRO	PRO	PIC	PIC	PRO	PRO	PRO
PRO	PER	PRO	PER	PRO	PER		PER	PER	PIC	PIC		PRO	PIC	PIC	PER

PER=Personal narratives	PIC=Picture sequences	PRO=Procedures
Rel=Relevance	DG=Discourse grammar	Clarity=Total Clarity disruptors
N.Sp.=Non-specific	Con=Content and fluency	Cl.emb.=clausal embedding
Tot.Coh.=total cohesion	Ref.=Reference	Conj=Conjunction
Lex=Lexicalisation	Att=Attempted cohesion	Dysfl=Dysfluencies

<u>Table 9.1: Hierarchy of incidence of discourse measures by tasks</u>

Therefore, for example, of the three tasks, picture-sequences elicited samples which were the most relevant and had the most clausal-embedding, right-branching clauses, reference, lexicalisation, attempted cohesion and total cohesive ties. This task also elicited the shortest samples containing the least main clauses, left-branching clauses and non-specific elements and fewer dysfluencies. On a considerable number of measures, the personal-narratives produced results at the other end of the continuum to the picture-sequences, whereas the results of the procedural analysis tended to lie on the continuum between the results of the other tasks.

A closer examination of a similar hierarchy for topics (Appendix A17) demonstrates that on some measures, there is no clustering of topics on the continuum according to task. For example, although picture-sequences were rated the most relevant task, only one topic of the three eliciting the most relevant samples is a picture-sequence topic (the other two are a procedure and a personal experience). Thus, in these cases, topic has a greater effect than task. However, on other measures, topics are clustered exactly or closely to the task. For example, all personal-narrative topics elicited the longest samples and all picture-sequences the shortest. Such a topic hierarchy provides additional weight to the contention that topic effects must be taken into account when determining discourse performance. The use of these hierarchies to provide more specific assessment and treatment will be discussed in Chapter 14.

As stated above, the picture-sequences elicited the most relevantly rated discourse suggesting that the structure and content matter of this task enabled the speakers to remain relevant. However, the relevance ratings of the topics (most relevant for tyre procedure and least for supermarket) may also reflect the relative appropriateness of the topics to older male subjects, thereby emphasising the need for topics to be selected according to subject group. Whilst the procedures were rated as least relevant, they were considered to be the most appropriately structured, with the personal experience the least. The strict logical order of the procedural genre reflected in the clear relationships at the conceptual level may facilitate more adequate discourse-grammar. Both genre, narrative elicitation method and topic are reported to have affected the discourse structure produced (e.g. Coelho, Liles and Duffy 1990, Purdy and Loos-Cosgrove 1990, Ross and Berg 1990, Ska and Guenard 1993), but these findings did not assess similar tasks to the present study, making direct comparisons problematic.

On the clarity disruptors measures, non-specific elements occurred significantly more and content and fluency disruptors significantly less in the personal-narratives than in the picture-sequences or procedures. The increased incidence of the non-specific elements in the personal-narratives may relate to the associated decrease in cohesive errors. The smaller amounts of content and fluency disruptors in the self-generated narratives may reflect the difficulties in classifying certain aspects of this category (e.g. personal value judgements) in a personal experience task. Previous studies of aspects of clarity have not assessed self-generated narratives (e.g. Cherney 1990) or else have compared this task only to descriptive discourse (Glosser et al 1988, Glosser and Deser 1992).

The length of the task samples (longest in the personal-narratives and shortest in the picture-sequences) may echo the differing levels of personal relevance and task structure inherent in the tasks. Rochon, Fink, Schwartz, Myers, Sobel, Bluestone and Socolof (1994) contend that the least cognitively demanding discourse type produced the longest samples. This contention does not appear to apply to this study as, although the personal experiences are longer, the speakers seem to have more difficulty with these on other measures (e.g. reduced syntax, cohesion etc). The findings of this study are also in direct contrast to that of Shadden et al (1991) who found longer procedural samples than narratives. However, the relevance of the topic (supermarket shopping) to older women and the instructions given (describe to a foreigner) may have affected the results.

Of all the topics, the longest samples was elicited by the frightening experience which may relate to its interest value. As discussed in Chapter 2, narratives of a stressful or sensational nature produced longer and more complex narratives (Tannen 1982, Peterson and McCabe 1983). Suspense is considered to be one of the major discourse structures which account for the enjoyment of the story (Brewer and Lichtenstein 1982) and this aspect may have been emphasised. On the other hand, older male subjects may find it more socially appropriate to speak at length on frightening rather than happy topics.

In general, the narratives elicited samples with reduced syntactic complexity compared to the procedures. Simpler syntax (less embedding and more main clauses) would be expected in procedures by their very nature and this has been recorded by Ulatowska et al (1981, 1983a). However the procedures used in their research tended to be simpler, more frequently performed tasks whilst the relevance and complexity of topics used in this study may have affected their syntactic complexity. Thus the syntactic distinction between the two genres is not as transparent as it would superficially seem. Shadden et al (1991) and Li et al (1996) also found more complex syntax in procedures than other discourse tasks and Labov (1972) and Cortazzi (1993) consider narrative syntax to be simpler.

A further syntactic distinction can be observed between the two methods of narrative elicitation. Personal-narratives demonstrated the least embedding and the most main and least right-branching clauses, in direct contrast to the picture-sequences. Thus in the less structured task (personal-narratives) the limited cognitive resources available are forced to rely on the internally supplied narrative structure and so less resources are available to provide complex syntax. The externally provided structure of the sequences may reduce the processing demands, thereby enabling the subjects to use their cognitive resources to produce greater syntactic complexity. Thus the personal relevance and familiarity of the personal-narratives may not be sufficient to overcome the processing demands of the discourse task, although familiarity is considered to reduce these demands (Cohen 1988). Chapman et al (1998) observed that difficulties in accessing the language to convey one's thoughts may be more transparent when formulating longer and spontaneously generated responses. Thus the reduction in syntax in the personal-experience narratives may be a compensatory mechanism to overcome other difficulties in discourse production. Kemper et al (1990) consider it a trade-off because they found that as narratives became structurally more complex, embedding and cohesion declined. In this study, personal-narratives also contained the least cohesive ties and errors as well as the highest number of non-specific elements.

Of all cohesion measures the narratives were more cohesive than the procedures, a finding similar to that of Ulatowska et al (1986). Furthermore, picture-sequences elicited more cohesive ties than the personal-narratives and procedures. Previous studies have not compared the same discourse tasks used in this study. The incidence of cohesive types varied depending on the demands of the task. The fact that more referential and lexical cohesion occurred in the picture-sequences than the personal-narratives reflects the necessity for speakers to use both types of cohesion to accurately differentiate between the two male characters depicted in the pictures. Furthermore, more cohesive errors occurred in this task, possibly due to the additional cohesion demands placed on the speakers. Cardebat et al (1993) also suggested that difficulties in the identification of iconographic material may induce referential errors because the correct use of reference requires an accurate identification of the referent. Thus the spontaneous nature of the personal experiences results in decreased errors but increased non-specific elements with the picture-sequences containing the reverse. Thus the effect of stimuli on cohesion processing may be manifested in different ways.

The procedures elicited an increased incidence of conjunctions whilst the personal-narratives contained more "ands". These findings may reflect the strict logical and temporal demands of the procedures in which the relationships at the conceptual level are clearly defined and manifested in the adequate use of conjunctions.

The apparent structure of the task may have affected the incidence of dysfluencies because picture-sequences elicited the least of all three tasks with personal-narratives containing the most. Certain types of dysfluencies can be used as a stalling technique to provide additional time to overcome planning difficulties at a conceptual or formulation level or word retrieval problems (see Chapter 3). Thus the task placing more processing demands on the speaker (personal-narratives) may elicit more dysfluencies.

What is clearly apparent from this discussion is that performance on different discourse genres and types cannot be compared. Although the incidence of certain discourse measures can be associated with specific tasks (e.g. personal-narrative topics tended to elicit the longest samples with the least embedding and cohesive ties), cast-iron assumptions cannot be made on this basis due to the possible conflicting effects of the topic used. The relative incidence of discourse phenomena cannot easily be predicted on the basis of the genre of discourse, method of elicitation or topic. When a large number of topics is employed (as in this study), the overriding effects of task on the discourse measures may become apparent but the use of a single example of one task, or even single examples of a number of tasks, as in previous research, may lead to erroneous conclusions. In addition, although processing demands have been ascribed to the structure of the task, this is also often difficult to determine. The solving of difficult, complex, unfamiliar and nonstandard communicative tasks presents a greater inferential load than the processing of simple, familiar communicative acts (Bara et al 1997). The considerable influence that task and topic have on performance may well account for the contradictory findings which commonly occur in research into the discourse performance of neurologically-impaired or intact individuals.

9.4 Attention assessments and their correlations with discourse measures

The declining trend on the attention measures with age and SES observed in this study corresponded closely with previous research (e.g. Salthouse 1991, Speedie et al 1990), although this has been less conclusively and less widely examined with regard to SES (Chapter 3).

Appropriate discourse requires the integration and interaction of cognitive processes (such as attention), linguistic knowledge and pragmatic competence and therefore correlations between discourse and attentional status assessments could reveal additional information. There were clear correlations between all three attention tests and some discourse measures on the combined discourse samples (e.g. lexicalisation, attempted cohesive ties). A relationship between working memory/attention span and adequate cohesive ties has been reported (Clark and Sengul 1979, Hartley and Jensen 1991, Kemper et al 1990, McDonald 1998, Pratt et al 1989). However, the most frequent finding in this study was that a correlation between a specific measure and the results of only one or two attention tests occurred. Furthermore, the correlations varied depending on the discourse task used.

As discussed in Chapter 3, each attention test assesses slightly different components of attention, with overlaps between them. From an examination of the correlations it is not possible to determine how the different aspects relate to aspects of the various discourse measures. For example, the FAS word fluency test assesses the ability to sustain behaviour or perseverance, to concentrate and to determine vulnerability to distraction (Albert and Kaplan 1980, Mesulam 1985). It was found that better performance on this test was correlated with more appropriate discourse-grammar, fewer non-specific elements, greater syntactic complexity, more cohesive ties, particularly lexicalisation, and fewer cohesive errors. However it is not clear why there was no correlation between this test and other discourse measures (e.g. sample length or relevance) which may have been expected due to the facets of attention assessed by this test. Furthermore, the discourse measures of specific tasks correlated to a greater extent with particular attention tests (e.g. picture-sequences and the FAS test). It is thus difficult to come to any conclusion regarding the relationship between specific attention tests and discourse measures. The correlations may indeed indicate that a relationship exists. For example, the poorer performance by speakers on the personal-narratives may be partially explained by the lower incidence of correlations with the attention measures. On the other hand, the correlations may equally be a reflection of co-existing strengths and weaknesses. For example, the logical nature of procedures may be a similar skill/strength to that tested on the attention tests, as is evidenced by the greater number of correlations occurring on this task than on the other two tasks. In addition, the type of attention tests used in this study may not relate closely to those attention skills required by discourse processing. What is apparent is that there is no simplistic explanation such as attention skills for discourse variation. Attention may be one of the complex intertwining effects but does not explain the variability in discourse performance on its own. The use of more detailed and sophisticated attention tests may shed more light on this relationship.

9.5 Correlations between discourse measures

Although correlations must be interpreted cautiously, a number of interesting relationships were uncovered. Increased relevance was correlated with more appropriate discourse-grammar. This correlation is corroborated by Myers' (1993) suggestion that speakers may be more irrelevant when they have difficulties with macrostructure. Both increased relevance and more appropriate discourse-grammar were associated with increased syntactic complexity. This may be explained by the fact that the information selected and topicalised at a conceptual level will constrain the selection of syntactic structures (Frederiksen et al 1990). Thus if the information selected is appropriately relevant and reflects the appropriate discourse structure, it will be represented in appropriately structured syntax. Increased relevance was correlated with increased cohesive use (reference, lexicalisation and "and"s). Thus, increased cohesiveness may result in discourse being more comprehensible and therefore more relevant. Therefore, although the notion of relevance continues to be difficult to delineate, even with the detailed definitions provided by researchers such as Sperber and Wilson (1986), the relationships between relevance and other discourse measures can provide additional insight into aspects which contribute to this notion.

Another correlational cluster of interest is that more appropriate discourse-grammar was correlated with longer samples, suggesting that there is a minimum length required for adequately structured discourse and this may relate to McCabe and Peterson's (1990) contention that length is an excellent index of narrative complexity. More appropriate discourse-grammar was also related to increased cohesiveness (particularly in reference and lexicalisation and specifically in the narratives). As discourse-grammar ratings are in part determined by clear identification of characters, locations, objects, etc, adequate cohesion is a prerequisite. Similarly, more appropriate discourse-grammar was related to a decrease in non-specific elements.

An increase in clausal-embedding was found to relate to increased cohesion, specifically lexicalisation, and a decrease in cohesive errors. Clausal-embedding or syntactic complexity reflects the chunking of propositions to form a connected semantic unit (Frederiksen et al 1990). If this stage is appropriately completed, adequate cohesive strategies can be applied to replace content words and thereby increase the understanding of the semantic unit.

Increased lexicalisation was associated with fewer main clauses and more right-branching clauses in the narratives and more right- and left-branching clauses in procedures. Left-branching clauses usually refer back to previously known information whilst right-branching clauses provide new information. More specific lexicalisation (same item, synonyms) may occur in procedures resulting in the correlation between lexicalisation and left-branching clauses. In contrast, narratives may utilise other types of lexicalisation (e.g. collocation or chaining) which may occur in right-branching clauses. This association could be more carefully determined with an examination of the types of lexicalisation occurring in the two types of branching clauses.

Non-specific elements were also correlated with main and right-branching clauses indicating that an increase in these elements related to an increase in main but a decrease in right-branching clauses. Thus an increase in empty phrases and indefinite words may prevent the speaker from using embedded clauses. An increase in non-specific elements was also associated with decreased lexicalisation and total cohesion, suggesting that as more specific cohesive ties are used, a lower incidence of empty phrases and indefinite terms occurs.

Sample length was correlated with content and fluency disruptors in picture-sequences indicating that longer samples related to an increase in these disruptors. Longer samples were also associated with increased syntactic complexity. This may support the contention that if the information required is appropriately selected at a conceptual level and is relevantly represented by syntactic structures, a sufficiently long enough sample is produced.

The possible relationships between different aspects of discourse which have been highlighted by this correlational analysis can provide an additional perspective on the interaction of discourse levels. The importance of this interaction is emphasised by Ulatowska and Olness (2000) who stated that

> *"Discourse is not realized through the additive accumulation of sentence-level structures, but rather through the relationship between and among elements which, in concert, achieve a given discourse function" (p. 249).*

Furthermore, these relationships can provide a starting point for further research (Fine 1999).

9.6 Conclusions

The findings of this study (the significant results and trends) demonstrate that age, SES and the discourse task do have an effect on the discourse samples produced by NBD subjects.

This may explain the conflicting results of discourse analysis which commonly occur in research in neurologically-impaired or intact individuals. In addition, the findings of discourse elicited by means of one sampling technique cannot be generalised. It is apparent that these variables must be examined when assessing discourse. Together with ageing and SES effects, the possibilities for false conclusions from assessments which have not considered these variables are considerable. The findings of such discourse assessments must be considered cautiously and their conclusions can only be taken as tentative.

Furthermore, many variables have a significant effect on only one discourse measure. As results are collated, these single effects may be ignored or considered to be spurious. These individual effects are sometimes described as important in some research and ignored in others, thereby making comparisons between findings even more problematic. Although it is often easier to ignore "rogue" results, these should be further investigated to determine their relevance to discourse performance.

9.7 Summary

This chapter has provided a discussion of the effects that the age and SES of the subjects as well as the characteristics of the discourse sampling techniques may have on the discourse performance of NBD adult speakers. The possible relationships reflected by the correlations between discourse measures and the attention assessment and between the discourse measures themselves have also been explored.

CHAPTER 10
RBD DISCOURSE PERFORMANCE: METHODOLOGY

This chapter describes the methodology for the assessment of the discourse performance of RBD subjects. It presents the aims, criteria for the selection of the RBD subjects and the matching control group and details of the cognitive and communication assessments.

10.1 Aims

- To investigate both quantitatively and qualitatively the narrative and procedural oral discourse of a group of RBD subjects and to compare their performance to that of a NBD control group of subjects

- To assess the status of the RBD subjects' general communication abilities and their attentional mechanisms and to correlate the latter findings with their discourse assessment

- To determine the effect of discourse genre, method of narrative elicitation and topic on each group. (Although the effects of sampling have been determined for the NBD group, this has not been carried out for the sub-group which comprises the matched control group).

- To determine the applicability of the discourse assessment and analysis used to the RBD discourse deficit.

- To investigate the discourse performance of each RBD subject individually to provide an in-depth profile of these subjects and to differentiate any subgroups which may be evident due to the heterogeneity of the subjects.

10.2 Subjects

Criteria for subject selection

The subjects were selected according to the following criteria:-

a) The subjects should have suffered a single lesion of the RH resulting from a cerebral vascular accident.

b) The subjects should be adult males. The reasons for the selection of exclusively male subjects have been discussed in Chapters 2 and 6.

c) They should be in a physically and neurologically stable state i.e. a minimum of six months post onset (Davis 1983).

d) They should be premorbidly right handed. Handedness is important in determining the extent of lateralization of brain functions (Bradshaw 1980, Hecaen, De Agnostini and Monsen-Monte 1981). Ninety to ninety-nine percent of right-handers have their language functions subserved by the left-hemisphere (Springer and Deutsch 1985).

e) They are required to be native speakers of English.

f) They are required to have a minimum of ten years of education as this presupposes adequate language skills and sufficient intelligence to perform the tasks involved in the assessment. Furthermore in RBD patients education has been found to be a significant factor in terms of severity of linguistic disturbances (Joanette et al 1983).

g) They should have no history of previous neurological impairment, psychiatric illness or substance abuse.

h) They should be selected on the basis of RBD (rather than the need for speech and language therapy or hospitalisation) so that a wider perspective on the language contribution of the RH can be obtained

Seventy-eight subjects were identified from a register comprising patients who had suffered cerebrovascular accidents. Seventy-one could not be recruited for this study for the following reasons:-

Subject had suffered previous neurological damage or other cognitive impairments	50%	(39)
Subject had died	6.4%	(5)
Subject was not willing to participate	18%	(14)
Subject with home language other than English	3.8%	(3)
Subject is untraceable/moved	12.8%	(10)

The specific difficulties associated with stroke data banks are discussed in Chapter 15 (Section 15.1).

(Lehman and Tompkins 2000, Trupe and Hillis 1985), rather than only subjects exhibiting more dramatic disorders (McDonald 1993).

i) They should have sufficient visual acuity (corrected or uncorrected) to read a newspaper and their hearing (aided if necessary) should be adequate for conversation in a quiet room.

j) The subjects should be living within the community in their own homes to eliminate the effects of institutionalisation (Leeper and Culatta 1995).

10.3 Description of subjects

10.3.1 RBD subject group

Seven subjects were recruited from a register comprising patients who had suffered cerebrovascular accidents and been admitted to one of three local hospitals. They had all suffered a single RH C.V.A. The consent of the subject's General Practitioner was obtained initially and all subjects participated voluntarily and provided their consent to assessment and the disclosure of relevant medical information (see Appendix 21). They were all living within their own homes either with their spouses or with another family member (e.g. an adult son). The details of the RBD subjects are given in Table 10.1

	AGE	SES	T.P.O.	Site of lesion
DA	70	II	5 years	RH haemorrhage
LR	70	IV	2 yrs, 10 m	R. post-occipital, post. internal capsule, partly fronto-parietal infarct
SM	77	III	3 years	R external capsule and thalamic nucleus infarct
EM	67	III	2 yrs, 11 m	R fronto-parietal cerebral infarct
RG	72	II	3 yrs, 1m	R occipital lobe infarct
AC	77	II	3 years	R temporo-parietal infarct
DG	54	III	2 yrs, 6 m	R parietal infarct

Table10.1: Details of seven RBD subjects

10.3.2 Control group subjects

A subset of the NBD subjects assessed in the first stage of this study were selected as a matched control group (M group). Twelve subjects were matched for age and SES to the RBD group. As each age x SES cell in the NBD group contained two subjects, a single RBD subject of a specific age was matched to both relevant NBD subjects in that cell. For example, the 67 year old RBD (SES III) was matched to the two NBD subjects who were in their sixties and of the same SES (III). The M group (totaling twelve subjects) was therefore slightly larger than the RBD group (seven subjects) but this provided more appropriate matching in terms of age and SES matching. Details of each RBD subject and the age and SES of the matched group subjects is provided in Table 10.2

RBD Age	RBD SES		M Group Age	M Group SES
54	III (1 subject)		50s	III (2 subjects)
67	III (1 subject)		60s	III (2 subjects)
70s	II (3 subjects)		70s	II (2 subjects)
77	III (1 subject)		70s	III (2 subjects)
70	IV (1 subject)		70s	IV (2 subjects)
Total	7 RBD subjects			12 M subjects

II=Managerial III=Skilled Manual IV=Unskilled

Table 10.2: Details of matched control group

10.4 Procedure for the collection of data

The discourse samples were elicited from the RBD group using the same procedure as described in Chapter 7.

Due to the extensive nature of the assessment required, the length of testing for the clinical group ranged from three to nine hours. Thus the number of sessions varied from one to three with the majority of subjects being assessed in one session. To obviate the effects of fatigue and boredom, frequent breaks in assessment or follow-up sessions were suggested and/or taken during each session.

10.5 Assessment of cognition and communication

The RBD subjects were assessed in three broad areas:- cognition and communication, attentional mechanisms and discourse. Their performance on the cognitive/communication and attentional mechanisms was investigated to provide a more careful description as this group is known for its heterogeneity. All standardised assessment tools were administered and scored following the manual instructions. The order of presentation of the tests and discourse tasks was systematically varied for each subject.

10.5.1 Assessment of the cognitive and communication performance of the RBD subjects

a) Cognitive assessments

- *Mini-Mental Status Examination (MMSE) (Folstein, Folstein and McHugh 1975)*

This test is a brief screening method of assessing major cognitive functions. It includes an assessment of orientation, memory, attention, naming, comprehension, writing and figure copying. A single cut-off score is obtained out of maximum of 30. Normal elderly controls achieved scores between 24.6 and 27.6 (Folstein et al 1975). This test has been widely used in the assessment of normal elderly, brain-damaged, dementing and psychiatric populations (Cherney 1990, Lezak 1995). By its very nature, it is not sensitive to milder deficits e.g. mild Alzheimer's disease, particularly if the subjects are well-educated (LaRue and Swanda 1997, Mesulam 1985). The norms for individuals with higher educational levels, regardless of age or sex, are higher (Grigoletto, Zappala, Anderson, Lebowitz 1999). However it is sufficiently reliable to rule out major cognitive deficits which would affect discourse production in brain-damaged subjects.

- *National Adult Reading Test (NART) (Nelson 1982)*

This test is used to determine premorbid IQ. The subject reads a list of irregular English words and from the number of pronunciation errors made, an estimated premorbid IQ can be obtained. The NART is considered to be a reliable test (Davies 1996, O'Carroll 1995) and correlates well with WAIS IQ (Crawford, Parker, Allan, Jack, and Morrison 1991). It is quick and easy to administer although it may cause anxiety in vulnerable groups (e.g. elderly, depressed) (Beardsall and Brayne 1990). The age range for use is between 20 and 70 years and over this age, the use of the NART could be misleading (Nelson 1982).

The NART is based on the assumption that dementing subjects retain relatively unimpaired reading skills. Concerns have been expressed regarding the applicability of this assumption to other clinical conditions as NART performance may be impaired in some clinical populations (e.g. moderate Alzheimer's disease and depression) (O'Carroll 1995).

b) Standardised tests to evaluate communication

- *The Western Aphasia Battery (WAB) (Kertesz 1982)*

The four sections of this battery which determine the Aphasia Quotient (viz. spontaneous speech, comprehension, repetition, naming) were administered to each subject. This provided an assessment of the general receptive and expressive competence of the subjects. This test was selected as it is considered one of the most comprehensive batteries available and it has been well-researched (Davies 1996). It has also been administered to RBD subjects (Bryan 1988).

- *The Right Hemisphere Language Battery (Bryan 1995) (RHLB)*

This battery aims to screen those aspects of communication which have been shown to be affected by RBD. It consists of the assessment of the following:-

metaphor, inferred meaning comprehension, humour appreciation, lexical semantic recognition, emphatic stress production and a conversational discourse analysis. This battery is intended for clinical use and is designed to be "portable and quick and easy to administer" (Bryan 1995, p 12). Thus, although there are areas of RBD communication difficulty which are not assessed or are under-assessed, the RHLB provides details of aspects which may relate to their discourse impairments.

c) Handedness

- *The Edinburgh Handedness Inventory (Oldfield 1971)*

This test provides a simple and brief method of quantifying the handedness of subjects. Preferences for handedness are assessed on a ten item inventory of everyday activities. From this a laterality quotient and decile value can be calculated. As stated above, handedness is important in determining the extent of lateralization of brain functions and to eliminate as far as possible subjects with crossed dominance.

10.5.2 Assessment of attention

As discussed in Chapter 5, deficits in attentional mechanisms are associated with damage to the RH. The complexity of and controversy surrounding attention assessment has been discussed in Chapter 3. The attention mechanisms of the RBD subjects were assessed on the same attention tests as the NBD group i.e. Digit Span Test, FAS Word Fluency Test and the Trail Making Test (see Chapter 7).

10.6 Assessment of discourse performance

10.6.1 Rationale for selection of tasks

The rationale for the selection of discourse genre, method of narrative elicitation and topics for both NBD and RBD subjects has been discussed in Chapter 7.

10.6.2 Specific discourse elicitation methods and materials

The specific discourse methods and materials for the assessment of RBD discourse performance were determined by the results of the NBD discourse analysis. The rationale for this selection is given in Chapter 8.

The eight tasks, which were administered to the RBD subjects using the methodology set out in Chapter 7, are set out below.

i) *Narrative discourse*

a) Two samples were elicited by means of two six-picture-sequences. Although RBD patients may have visual difficulties which may vitiate against the use of visual stimuli, the use or complexity of pictured stimuli has not been reported to affect their discourse performance (Myers and Brookshire 1994,1996). The two specific picture-sequences employed were the "wasp" and "stones".

b) Two samples of personal-experience narratives were elicited by means of an oral request. The two specific topics were the 'frightening' and 'funny' experiences.

ii) *Procedural discourse*

Four procedural discourse samples were elicited from the subjects by means of an oral request to

'change a car tyre'
'replace the glass in a window'
'buy a new jacket or coat'
'teach someone to ride a bike'.

10.6.3 Method of discourse analysis

Each discourse sample was transcribed and analysed in terms of the seven broad areas presented in Chapters 3 and 7, viz.

- relevance/irrelevance of the sample
- structure or discourse-grammar of the sample
- clarity of language
- productivity and syntactic analysis
- clausal structure
- cohesion analysis
- dysfluency.

Interjudge reliability of scoring for both RBD and NBD subjects was presented in Section 7.3.6.

On the basis of these measures, the RBD group's performance was compared to that of the matched group. In addition, due to the reported heterogeneity of the RBD population, each RBD subject's discourse production was investigated individually.

10.7 Summary

This chapter has provided those details of the methodology (descriptions of the RBD subjects and the matched control group, cognitive and communication assessments) which differ from the methodology used with the NBD groups (in Chapter 7). The results of the discourse assessment of the RBD subjects compared to the matched group, as well as the differential effect of discourse sampling on each group, will be provided in the following chapter. Case studies of the RBD subjects will be presented in Chapter 13.

As provided for the neurologically normal subjects in Chapter 8, the significant results are presented for both RBD and M groups, followed by those trends which are demonstrated by the two groups.

CHAPTER 11
RBD DISCOURSE PERFORMANCE:
RESULTS

This chapter provides a statistical comparison of the discourse performance of the RBD group and the Matched (M) group (Section 11.1). The effect of the discourse sampling conditions on each group's performance is then delineated (Section 11.2). The results of the attention assessments for each group are set out, together with correlations between these and the discourse measures used (Section 11.3). Correlations between discourse measures in each group Section 11.4) and the results of the standardised communication and cognitive tests (Section 11.5) are then presented.

11.1 GROUP EFFECTS[77]

A comparison of the discourse performance of the RBD and M groups is summarised in Tables 11.1, 11.2 and 11.3.

<u>11.1.1 Relevance ratings</u>

No significant difference was found between the two groups on the relevance ratings of the combined discourse samples (z=-1.527, p=.127) or the two discourse genres (narratives: z=-1.062, p=.288; procedures: z=-.426, p=.670). The ratings of the discourse elicited by the two methods of narrative elicitation was also not significantly affected by group (personal: z=-.557. p=.578, pictures: z=-.398. p=.691). The discourse of the RBD group was consistently rated as less relevant than the M group. There was no significant effect of group on the relevance ratings of the discourse topics.[78] On all topics (except for the wasp sequence), the RBD discourse was rated as less relevant than the M group.

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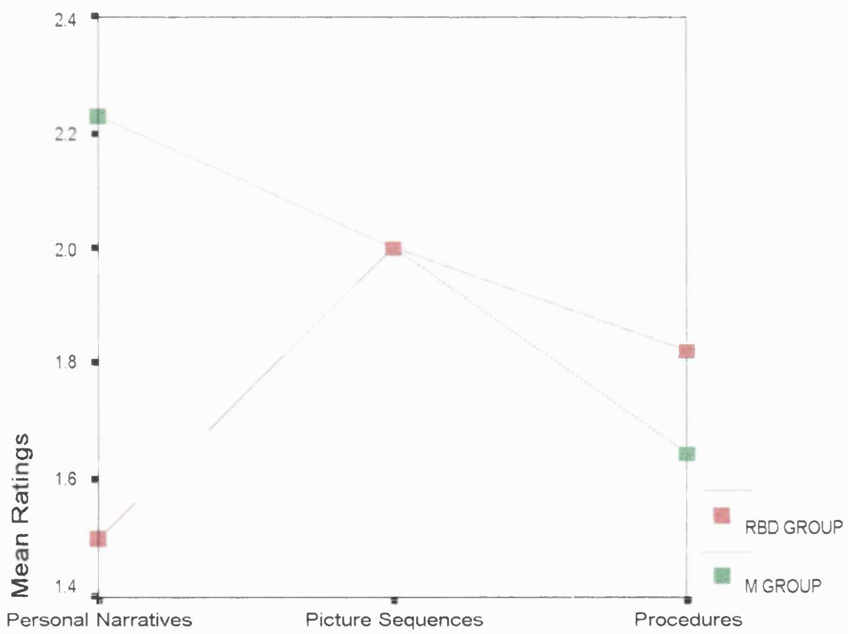
[77] The effect of group was determined using the Mann-Whitney Test with the significance of 0.05.
[78] The exact non-significant results of topics are provided in Appendix A22.

11.1.2 Discourse-grammar

There was no significant group effect on the discourse-grammar ratings of the combined discourse samples (z=-.593, p=.553) or on the narrative or procedural discourse genres (z=-1.443, p=.149; z=-.559, p=.576). In the combined samples and narrative genre, the RBD samples were rated as more appropriate than the M group but less appropriate in the procedures. Of the two methods of narrative elicitation, the personal-narratives of the M group were rated as significantly less appropriate than the RBD group (z=-2.029, p=.042) but not significantly in the picture-sequences (z=-.086, p=.931) (Graph 11.1)[79]



Graph 11.1: Discourse grammar in tasks of RBD and M groups

There was no significant effect of group on the discourse-grammar ratings on the eight individual discourse topics, Both the RBD group's personal-narratives were rated as more appropriate than the M group. Apart from the window

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[79] Only graphs for significant effects of task and topic are provided within the text. Other graphs are presented in Appendices A23 to A27.

procedure, the discourse-grammar of the RBD's other procedural tasks were rated as less appropriate than the M group.

DISCOURSE MEASURE	TOTAL DISCOURSE SAMPLES	NARRATIVE GENRE	PROCEDURAL GENRE
Relevance			
Discourse-grammar			
Length (words)			
T-unit-length	*M>RBD, *NN>RBD	*M>RBD,*NN>RBD	
Clause-length			
Clausal-embedding	?*M>RBD, *NN>RBD	*NN>RBD	*NN>RBD
Main clauses			*NN>RBD
Left-branching cl.			
Right-branching cl.	?*M>RBD, *NN>RBD	*?NN>RBD	*NN>RBD
Non-specific			
Substitution			
Content and fluency		?*RBD>M	
Clarity disruptors	*RBD>M, *RBD>NN	*RBD>M, *RBD>NN	*RBD>M, *RBD>NN
Referential coh.			
Subst. Coh.		*RBD>M, *RBD>NN	
Ellipsis			
Conjunctions			
Lexical ties			
"Ands"			
Connectives			
Total cohesion			
Coh. Errors			
Dysfluencies	?*RBD>M	*RBD>M	

=p<.05[80] ?=approaching significance
RBD=Right brain-damaged group M=Matched group
NN =Neurologically-normal group[81]

Table 11.1: Comparison of results on combined discourse samples and on two genres

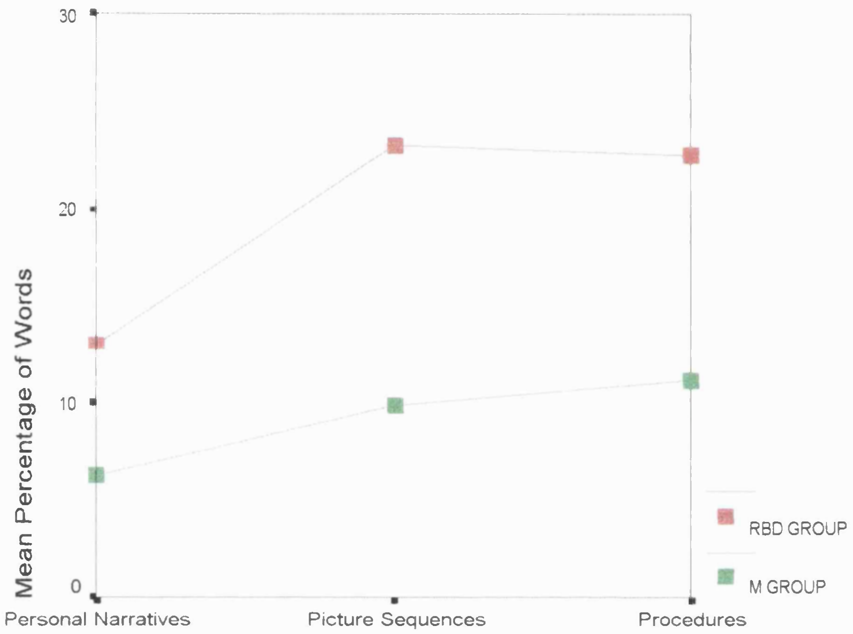
11.1.3 Clarity disruptors

a) Total clarity disruptors

There was a significant group effect on the total number of clarity disruptors occurring in the discourse samples combined (z=-2.620, p=.009) with the RBD group producing more than the M group. Similarly the RBD group produced significantly more than the M group in the narrative (z=-2.621, p=.009) and procedural genres (z=-2.282, p=.022). For the methods of narrative elicitation, the picture-sequences elicited significantly more clarity disruptors from the

[81] To provide additional information, the results of the comparison between the NBD (thirty-two subjects) and the RBD groups are also provided.

RBD group than the M group (z=-2.114, p=.035) (Graph 11.2). The RBD group produced more disruptors than the M group in the personal experiences (but not significantly) (z=-1.775, p=.076).



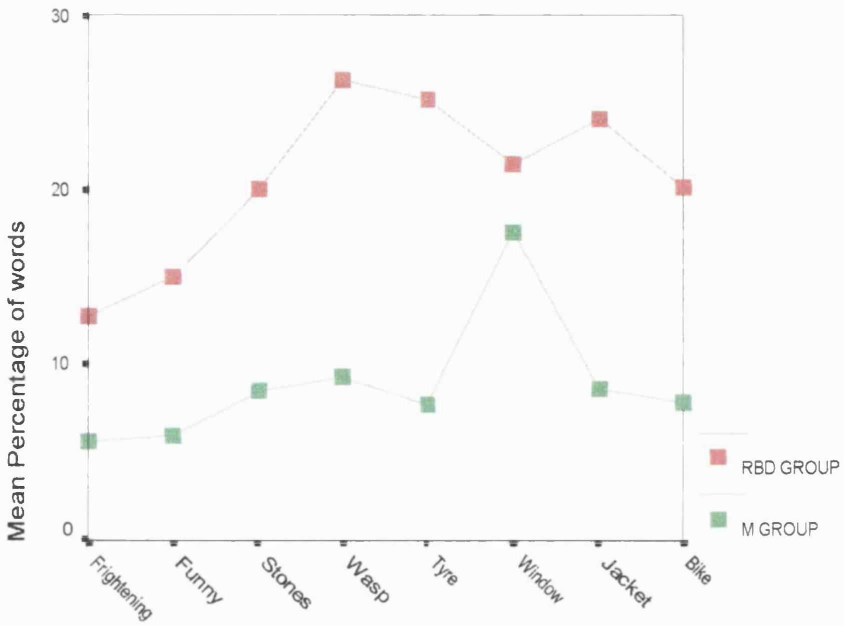
Graph 11.2: Clarity disruptors of tasks by RBD and M groups

There was a significant group effect on the total clarity disruptors on four of the eight topics (funny personal experience: z=-2.248, p=.025, wasp picture-sequence: z=-2.283, p=.022, tyre procedure: z=-3.043, p=.002, bike procedure: z=-2.535, p=.011) (Graph 11.3). The RBD group produced more total clarity disruptors on each topic than the M Group.

b) Non-specific elements

There was no significant group effect on the non-specific elements in the combined discourse samples (z=-.085, p=.933), in the two discourse genres (narrative: z=-.423, p=.673, procedure: z=-.846, p=.398) or in the two methods of narrative elicitation (personal: z=-.338, p=.735, picture: z=-.550, p=.583). The RBD group consistently produced more than the M group. There were no significant group effects on these elements on any of the discourse topics.

Apart from the funny personal experience, the RBD group produced more non-specific elements than the M group.



Graph 11.3: Clarity disruptors in topics of RBD and M groups

c) Substitution

There were no significant group effects on substitution (z=-.592, p=.554). The incidence of substitution was low in all topics and in both groups and only occurred in the procedural samples of both groups (z=-.592, p=.554). The RBD group produced more in each procedural topic than the M group, particularly on the jacket procedure.

d) Content and fluency disruptors

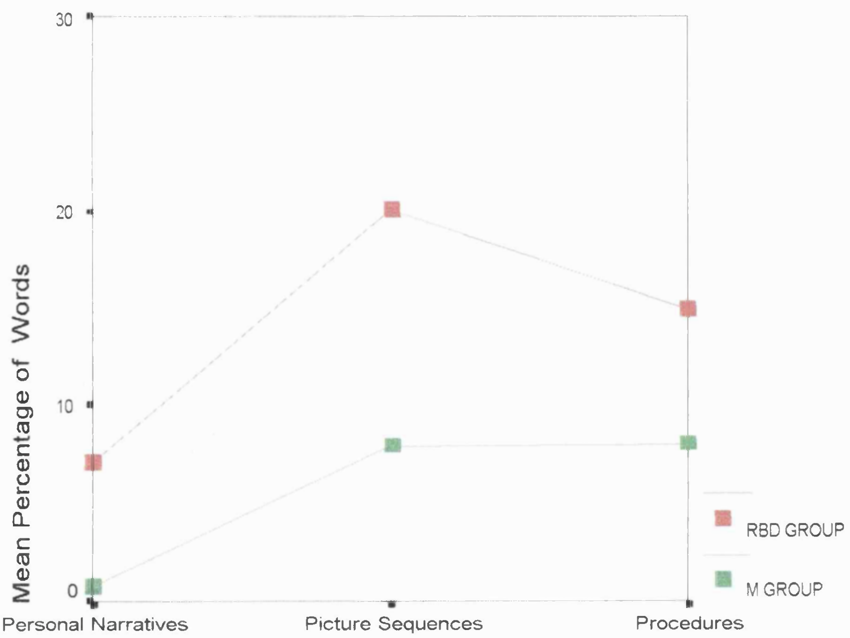
There was no significant effect of group on the content and fluency elements in the combined discourse samples (z=-1.775, p=.076). The group effect on these elements in narratives approached significance (z=-1.945, p=.052) but not in the procedures (z=-1.521, p=.128) with the RBD group producing more than the M group. On the two methods of narrative elicitation, there was a significant group effect on these disruptors in the self-generated narratives (z=-2..687, p=.007) but not the picture-sequences (z=-1.27, p=.201)

(Graph 11.4). On all three discourse tasks, the RBD group produced more than the M group.

MEASURE	PERSONAL NARR.	PICTURE SEQ.	PROCEDURE
Relevance			
Discourse-grammar	*RBD>M		
Length (words)			
T-unit-length	*M >RBD, *NN>RBD	*M ->RBD, *NN>RBD	
Clause-length			
Clausal-embedding	*NN>RBD, *M >RBD	*NN>RBD, *M ›RBD	*NN>RBD
Main clauses		*RBD>M *RBD>NN	*RBD>NN
Left-branching			
Right-branching			*NN>RBD
Non-specific			
Substitution			
Content and fluency	*RBD>M , *RBD>NN		
Total clarity		*RBD>M , *RBD>NN	*RBD>M , *RBD>NN
Referential coh			
Conjunctions			
Subst. Coh.			
Ellipsis			
Lexical ties			
"Ands"			
Connectives			
Total cohesion			
Attempted coh.			
Dysfluencies	*RBD>M		

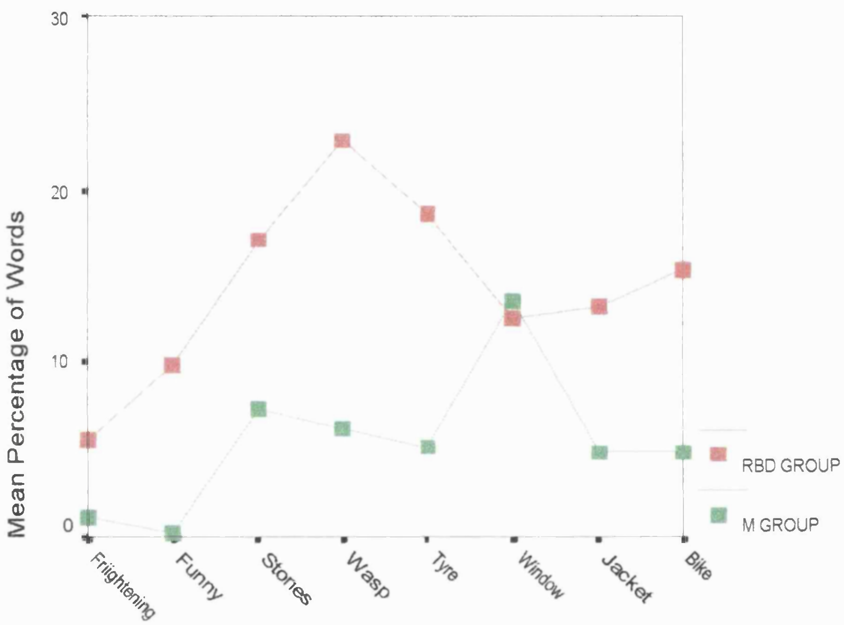
* p<.05
RBD=Right brain-damaged group
M =Matched group
NN=Neurologically-normal group

Table 11.2: Comparison of results on three discourse tasks



Graph 11.4: Content and fluency elements of tasks for RBD and M groups

Four topics demonstrated a significant effect of group on the content and fluency disruptors viz. frightening and funny personal experience (z=-2.064, p=.039, z=-3.038, p=.003), wasp picture-sequence (z=-2.145, p=.032) and bike procedure (z=2.747, p=.006) (Graph 11.5). The group effect on these disruptors in the tyre procedure approached significance (z=-1.932, p=.053). The RBD group consistently produced more than the M group on all but one of the topics.



Graph 11.5: Content and fluency elements in topics of RBD and M groups

11.1.4 Productivity and syntactic analysis

a) Length

There was no significant group effect on the sample length of the combined samples (z=-.254, p=.800) but the RBD had longer samples than the M group. No significant group effect was found on the length of the two genre samples (narrative: z=-.085, p=.933, procedures: z=-1.099, p=.272). The narrative samples of the RBD group were longer than the M group but the procedures were shorter. There was no significant effect of group on the length of the narratives elicited by two different methods. The RBD group produced longer samples than the M group on the personal-narratives with no group difference on the picture-sequence narratives (z=.000, p =1.000, z=-.169, p=.866).

There was no significant difference between the groups on the sample lengths of the individual topics. Apart from the frightening personal-narrative in which the RBD produced longer samples than the M group, the two groups produced similar length samples on all topics.

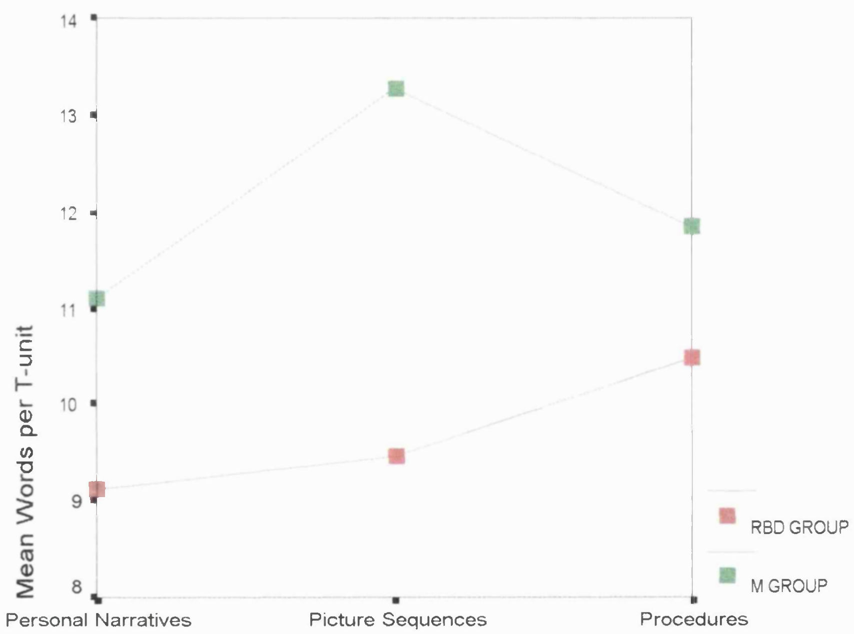
b) T-unit-length

MEASURE	FRIGHT	FUNNY	STONES	WASP	TYRE	WIN.	JACKET	BIKE
Relevance								
D/gramm.								
Length								
T-unit lth		*NN>RB		*NN>RB				
Clause lth								
Cl-embed		*M>RB* *NN>RB		*NN>RB				
Main clauses			*RB>NN	*RB>M *RB>NN				
Left-br. Cl.		*NN>RB						
Right- br. Clauses				*M>RB *NN>RB				
Non-sp.								
Substitution							*RB>NN	
Content/ fluency	*RB>M	*RB>M *RB>NN		*RB>M *RB>NN	?*RB>M			*RB>M *RB>NN
Clarity dis		*RB>M *RB>NN		*RB>M *RB>NN	*RB>M *RB>NN	*RB>NN		*RB>M *RB>NN
Reference								
Subst.Coh.								
Ellipsis		*RB>M *RB>NN						
Conjunct.								
Lexical								
"Ands"	?*M>RB ?*N>RB			?*RB>M				
Conns.								
Cohesion								
Attempted Cohesion				*RB>NN	*RB>M *RB>NN			
Dysfluency		*RB>M *RB>NN						

* p= <.05 ?*=Approaching sig.
RB=Right brain-damaged group M=Matched group NN = Neurologically normal group

Table 11.3: Comparison of results of eight discourse topics

The T-unit-length of the RBD subjects' combined discourse samples was significantly smaller than that of the M group (z=-2.704, p=.005). It was also significantly shorter in the narratives than the M group (z=-2.367, p=.018). A similar but non-significant result occurred in the procedures (z=-1.268, p=.205). There was a significant group effect on T-unit-length in both narrative tasks (personal: z=-2.028, p=.043, picture-sequence: (z=-2.72, p=.038), with the RBD subjects produced shorter T-units than the M group (Graph 11.6). No significant effect of group was found on the T-unit-length of any of the eight topics but the RBD group's were shorter than the M group.



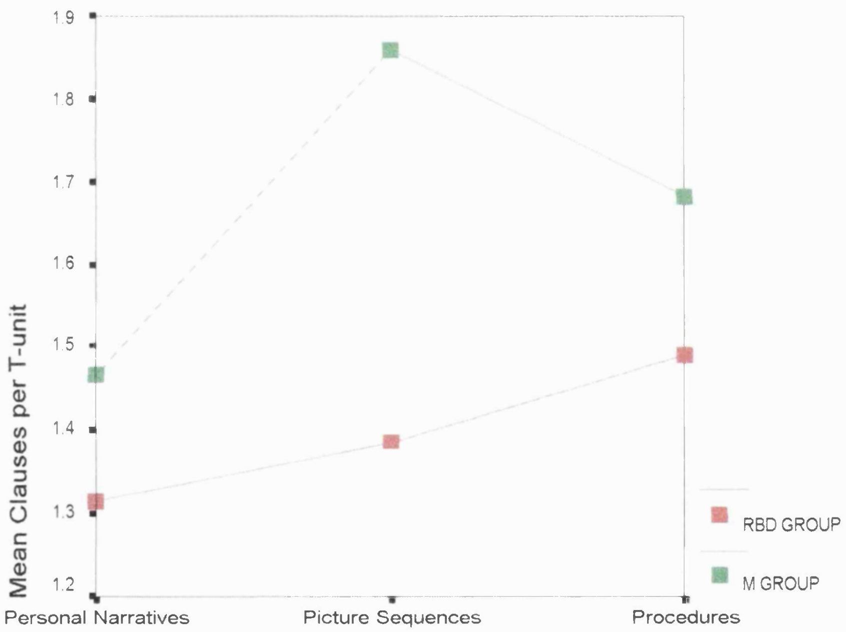
Graph 11.6: T-unit length of tasks by RBD and M groups

c) Clause-length

The RBD group produced (non-significantly) shorter clause-lengths on the combined discourse samples (z=-1.521, p=.128) and in the narratives than the M group (z=- 1.861, p=.063) but longer ones in the procedures (z=-.507, p=.612). There was no significant effect of group on the clause-length of the two narrative tasks (personal: z=-1.566, p=.117, picture: z=-.1903, p=.057) and the RBD narratives had shorter clauses than the M group in these tasks. There was no significant effect on the clause-length of any of the individual discourse topics. The RBD group produced shorter clauses than the M group on all topics except for the tyre and bike procedures.

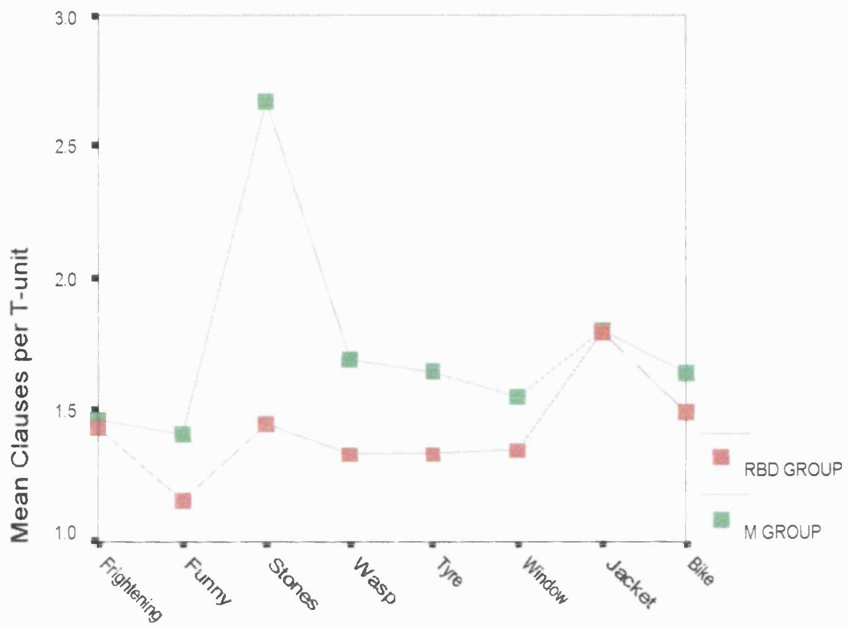
d) Clausal-embedding

In the combined discourse samples, the effect of group on clausal-embedding approached significance (z=-1.946, p=.052) with the RBD group using less embedding than the M group. No significant group effect was found in the embedding of the narrative or procedural genres (z=-1.565, p=.118, z=-1.606, p=.108) with the RBD group again having a lower level. There was a significant group effect in the two narrative tasks (personal: z=-2.291, p=.022; picture: z=-2.071, p=.038) with the RBD subjects producing less embedding than the M group on both (Graph 11.7).



Graph 11.7: Clausal embedding of tasks by RBD and M groups

On the individual discourse topics, there was a significant group effect on the clausal-embedding in the funny personal experience (z=-2.288, p=.022) (Graph 11.8). The RBD group produced less clausal-embedding than the M group on all the discourse topics.

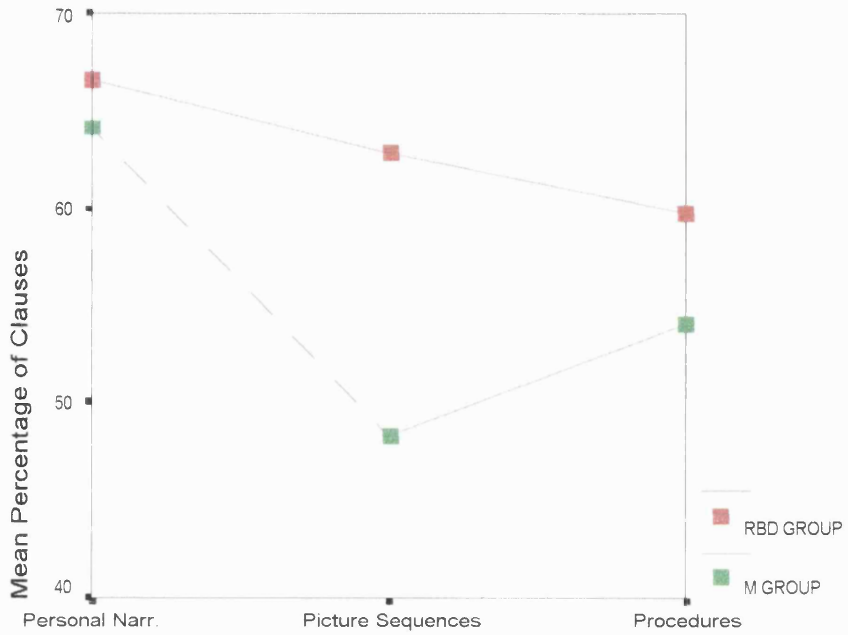


Graph 11.8: Clausal embedding in topics of RBD and M groups

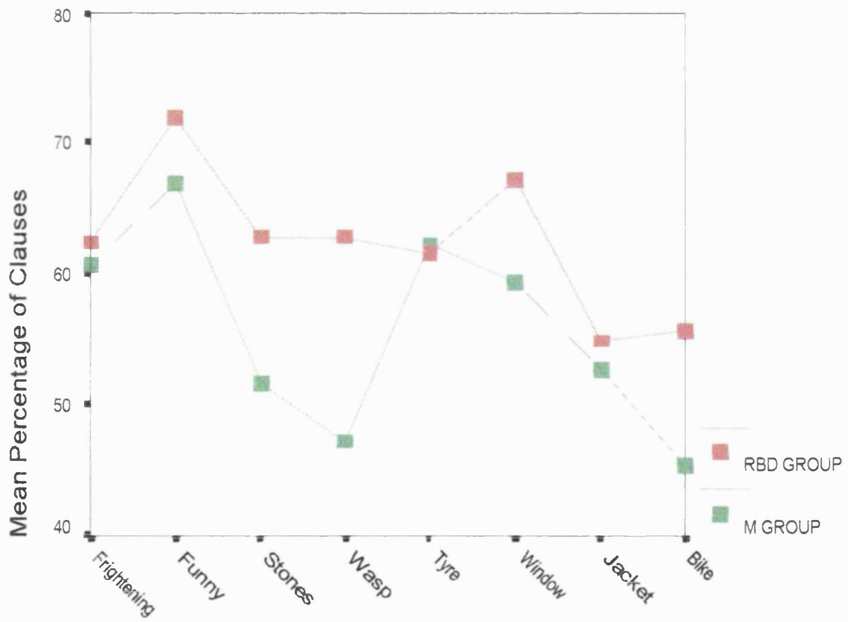
11.1.5 Clausal structures

a) Main clauses

The group effect was not significant for main clauses in the discourse samples combined (z=-1.268, p=.205) or in narrative or procedural samples (z=-1.437, p=.151, z=1.690, p=.091). The RBD group produced more main clauses than the M group. A significant group effect on these clauses was found in the picture-sequences (z=-2.028, p=.043) but not on the personal-experience narratives (z=-.423, p=.673) (Graph 11.9). More main clauses were produced by the RBD group than the M group in the picture-sequences. Apart from the frightening experience and the tyre procedure, the RBD group produced more main clauses than the M group. The RBD produced significantly more than the M group on the wasp sequence (z=-2.41, p=.016) (Graph 11.10).



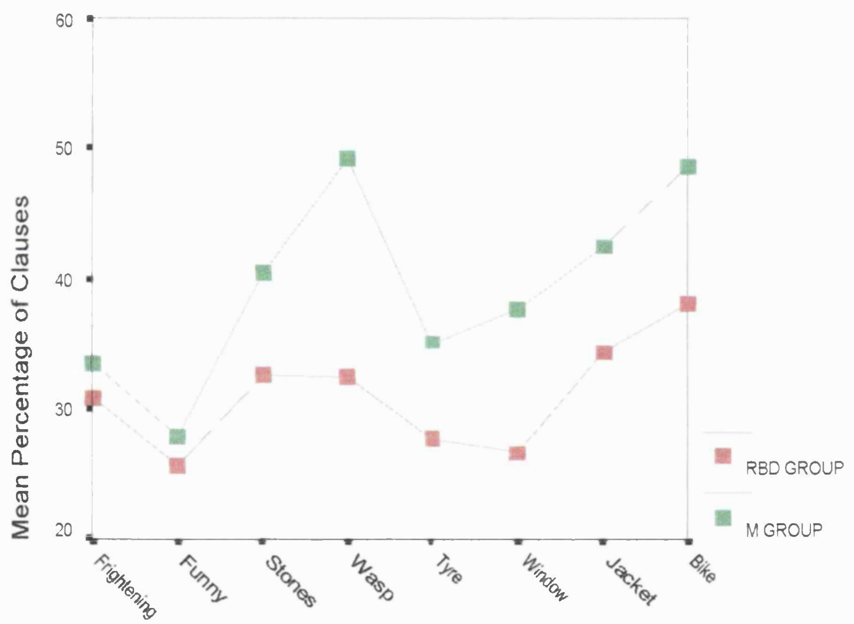
Graph 11.9: Main clauses in tasks by RBD and M groups



Graph 11.10: Main clauses in topics of RBD and M groups

b) Right-branching clauses

On the discourse samples, the effect of group on right-branching clauses approached significance ($z=-1.944$, $p=.052$) with fewer occurring in the RBD than in the M group. No significant effects were observed in the narrative or procedural genres (z=-1.606, p=.108, z=- 1.775, p=.076) but the RBD group produced fewer than the M group. There was no significant group effect on right-branching clauses in the narrative tasks (personal z=-.676, p=.499, picture: z=-1.859, p=.063), with the RBD group producing less than the M group. The RBD group consistently produced fewer than the M group on all eight discourse topics. The RBD group's production on the wasp picture-sequence was significantly less than the M group (z=-2.455, p=.014) (Graph 11.11).



Graph 11.11: Right-branching clauses in topics of RBD and M groups

c) Left-branching clauses

No significant group effect was observed on left-branching clauses in the combined discourse samples (z=-.507, p=.612) or in the procedures (z=- .676, p=.499) with the RBD producing a higher percentage than the M group. No group differences occurred in the narrative genre (z=-.380, p=.704).

The RBD subjects produced more left-branching clauses than the M group in the picture-sequences (z=-.601, p=.548) but no group difference occurred on the personal-narratives (z=-.465, p=.642). There was no significant group effect on these clauses in topics. The RBD group produced more than the M group on four topics and less on two (funny narrative and stones sequence).

11.1.6 Cohesion

a) Total cohesive ties

There was no significant group effect on the total cohesive ties in the combined discourse samples (z=-.254, p=.800) or in the two genres (narrative: -.423, p=.673, procedure: -2.029, p=.042), with the RBD group producing less cohesive discourse than the M group. No significant group effect occurred on the two narrative tasks but the RBD group produced more cohesive discourse in the personal-narratives (z=-1.015, p=.310) and less cohesive discourse in the sequence tasks (z=-.761, p=.446).

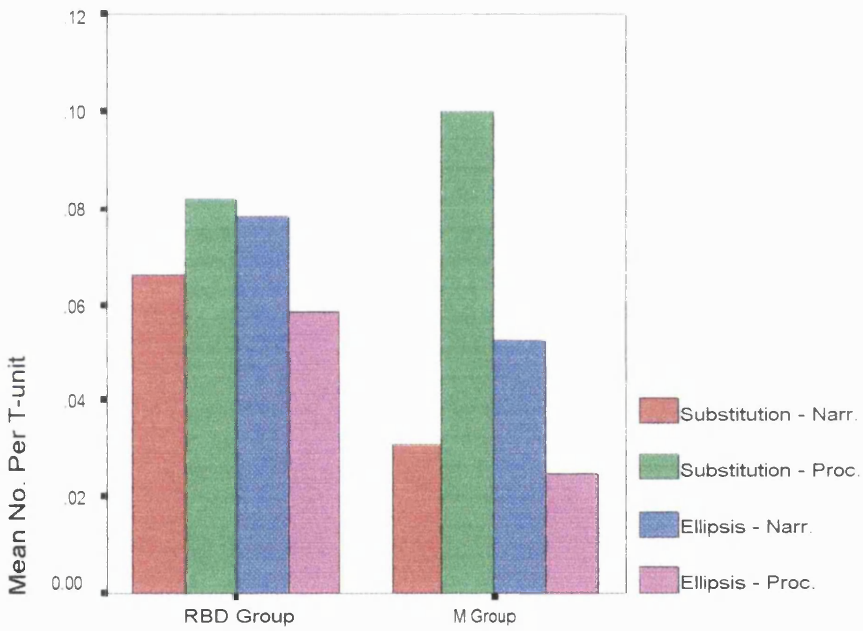
Furthermore there was no significant group effect on the cohesive ties on the eight discourse topics. On the two sequence narratives and tyre and bike procedures, the M group produced more cohesive samples than the RBD group with the reverse on the other topics.

b) Reference

On the first type of cohesion analysed, reference, there was no significant group effect on the combined discourse samples (z=-.254, p=.800) on the two genres (narrative: -.380, p=.704, procedure: -.296, p=.767) or on the two methods of narrative elicitation (personal: z=-.846, p=.398, picture: z=-.423, p=.672). Reference in both groups was similar with an increased amount in their picture-sequences and a reduced amount in the procedures and personal-narratives. Group had no significant effect on reference in the topics and their performance on these was similar.

c) Substitution

There was no significant group effect on substitutive ties in the combined discourse samples (z=-1.480, p=.139) but a significant group effect was found in the narrative genre (z=-2.540, p=.011) but not on the procedures (z=-.933, p=.351). The RBD group produced more in the narratives but less in the procedures. A significant group effect was found in the picture-sequences (z=-2.340, p=.019) but not in the personal-narratives (z=-.768, p=.442) and in both the RBD produced more than the M group (Graph 11.12). No significant effect of group was found on substitution in the topics. The RBD group produced more than the M group on all the narratives but only in one of the procedural topics viz. the tyre procedure. The incidence of substitution was low in all groups and all tasks.



Graph 11.12: Group effect on substitution and ellipsis of two genres

d) Ellipsis

There was no significant group effect on the incidence of ellipsis in the combined discourse samples (z=-.803, p=.422), on both genres (narrative: z=-.169, p=.866, procedure: z=-1.405, p=.160), in the two methods of narrative elicitation (personal: z=-.931, p=.352, picture: z=- 1.405, p=.160) or in the topics. The RBD group produced more in the personal-narratives and procedures than the M group but fewer in the sequences. The incidence of ellipsis was extremely low in both groups and varied considerably with topic. On both personal topics and the tyre and jacket procedures, the RBD group produced more than the M group. A significant effect of group was observed on ellipsis on the funny experience (z=-2.219, p=.026) (Graph 11.12).

e) Lexicalisation

There was no significant group effect on lexical ties in the combined discourse samples (z=-1.183, p=.237), the two genres (narrative: z -1.437, p=.151, procedure: z=-.593, p=.553) or the two methods of narrative elicitation (personal: z=-.594, p=.553, picture: z=-1.650, p=.099). The RBD group produced fewer in the picture-sequences than the M group but performed similarly in the other tasks. Group had no significant effect on lexicalisation in the eight discourse topics. The M group produced more lexical ties than the RBD group on the two picture-sequences and tyre procedure and the RBD group produced more on the window and jacket procedures.

f) Conjunctions, "and" and connectives

No significant effect of group was found on conjunctions in the combined discourse samples (z=-.254, p=.800), the two genres (narrative: z=-.127, p=.899, procedure: z=-.085, p=. 932) or in the two methods of narrative elicitation (z=-.214, p=.830, picture: z=-.128, p=.898). The personal-narratives elicited fewer conjunctions in the RBD than the M group. No significant group effect was found on conjunctions in the topics. Apart from the window procedure, the M group produced more than the RBD group on these.

No significant effect of group was found on the production of "and" in the combined discourse samples (z=-.296, p=.767), the two genres (narrative: z=-.254, p=.799, procedure: z=-.762, p=.446), in the two methods of narrative elicitation (personal: z=-.848, p=.396, picture: z=-1.017, p=.309) or in the topics. The RBD group produced fewer than the M group in the personal-narratives, more in the picture-sequences and similar amounts in the procedures. The RBD group produced more "and"s than the M group in both personal-narratives and in the jacket procedure whilst the M group produced more in both sequences and the bike procedure.

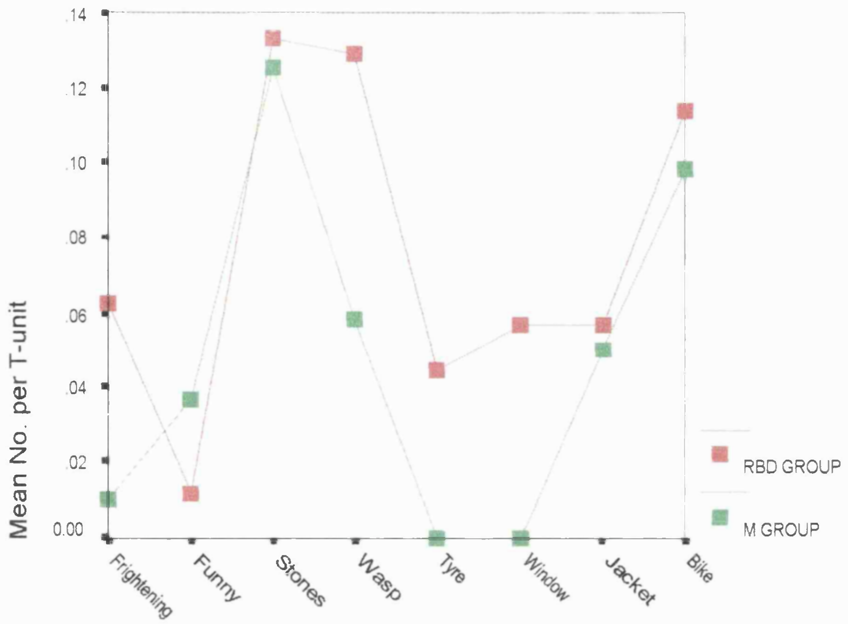
Regarding connectives, no significant differences were observed (z=.000, p=1.000) with the M group producing the same amount as the RBD group on the total discourse samples and in procedural genre (z=-.423, p=.672) but more in the narratives (z=-.169, p=.866). The RBD group produced fewer in the personal-narratives (z=-1.353, p=.176) but more in the picture-sequences (z= -.850, p=.396) than the M group. On the eight topics, the M group produced more connectives than the RBD group in both narratives and on the tyre and jacket procedures whilst the RBD produced more on the two sequences and the window and bike procedures.

g) Attempted cohesion

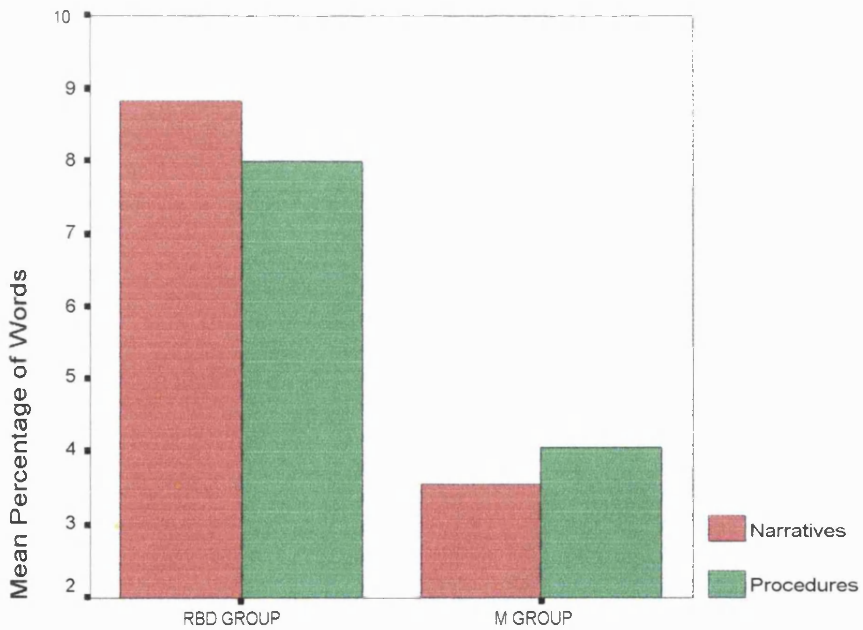
There was no significant difference in attempted cohesive ties on all samples (z=-.805, p=.421), on genres (z=-.786, p=.442, z=-.892, p=.373) or tasks by the groups (personal: z=-.536, p=.592, picture: z=-.659, p=.510). In both genres and in the narrative tasks, the RBD produced more errors than the M group. On the topics, a significant group effect was found on the tyre procedure (z=-2.844, p=.004) (Graph 11.13). On all topics (except for the funny experience), the RBD group produced more than the M group but the incidence was small in both groups and all topics with the M group producing no errors in the tyre and window procedures.

11.1.7 Dysfluency

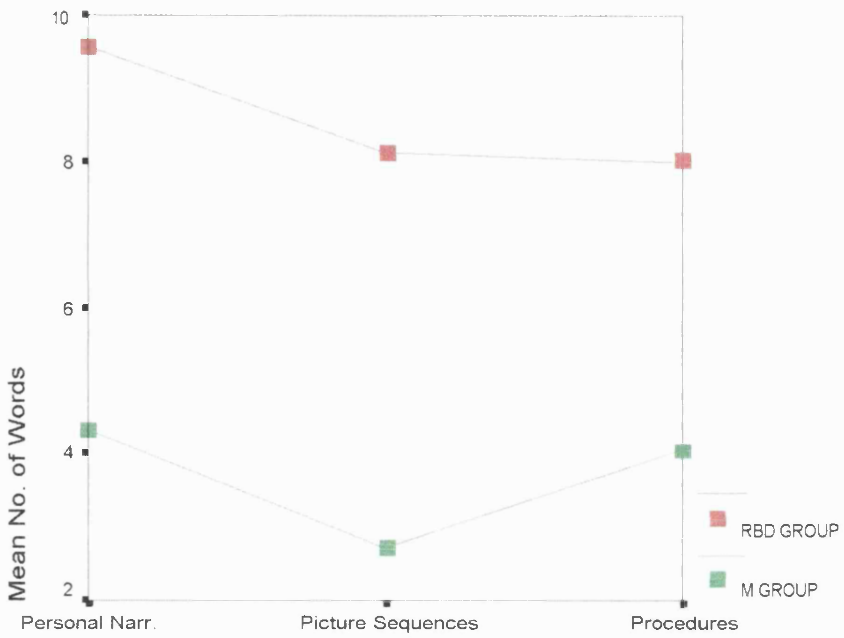
The difference between groups in dysfluency on the combined samples approached significance (Z=-1.944, p=.052). The RBD group produced more dysfluencies than the M group. Group had a significant effect in the narrative genre (Z=-2.197, p=.028) but not in the procedures (Z=-1.690, p=.091) (Graph 11.14). The RBD subjects were less fluent than the M subjects in both genres. In both narrative tasks, the RBD group produced more dysfluencies than the M group. There was a significant difference on the personal-narratives (Z=-2.367, p=.018) but not the pictures (z=-1.649, p=.099) (Graph 11.15). On all topics, the RBD group produced more dysfluencies than the M group and this difference was significant on the funny narrative (Z=-1.967, p=.049) (Graph 11.16).



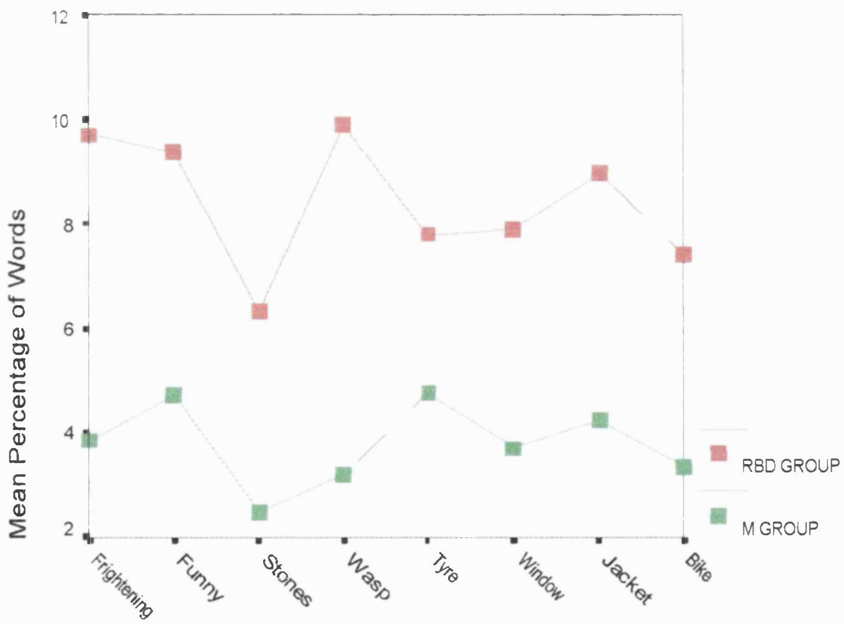
Graph 11.13: Attempted cohesion in topics of RBD and M groups



Graph 11.14: Group effect on dysfluencies in two genres



Graph 11.15: Dysfluencies in tasks by RBD and M groups



Graph 11.16: Dysfluencies in topics of RBD and M groups

11.1.8 Summary of group effects on discourse

The significant results and trends demonstrated on each discourse measure by the RBD subjects compared to the M Group are presented in Table 11.4. In general, the RBD subjects produced less relevant discourse with reduced syntactic complexity (shorter T-units, less clausal-embedding and fewer right-branching clauses). They also produced more total clarity disruptors, non-specific and content and fluency elements, attempted ties and had a higher dysfluency rate. Both groups showed similar referential cohesion use. On certain measures, the RBD group's performance compared to the M group was differentiated by task (e.g. personal-narratives were longer and procedures shorter).

11.2 Effect of genre, task and topic on each group[82]

(Table11.5)

11.2.1 Relevance ratings

No genre effect was found for either group on the relevance ratings although there was a trend in both groups for the personal-narratives to be rated the least relevant and the picture-sequences the most. Topic had a variable effect for both groups and there was a significant effect of procedural topic on relevance ratings (RBD - H=9.146, p=.027; M - H=10.922, p=.012)[83] (Graph 11.17). For the RBD group, the bike topic elicited considerably less relevant discourse than the tyre and window procedures and for the M group the jacket elicited less relevant discourse than the tyre procedure.

---

82 For each group, the effect of genre and narrative task topics (two personal-narratives and two picture sequences) was determined using the Wilcoxon Signed Ranks Test (significance of 0.05). For the effect of task and procedural topic, the Friedman Test was used (P=.05). The Wilcoxon Pairs Signed-Ranks Test was used to make comparisons between the tasks with the significance level determined by the Bonferroni correction. For task (three), the significance level was set at 0.016 (three tasks: 0.05 divided by three comparisons=0.016); for procedural topic, the level was 0.0083 (four topics: 0.05 divided by four comparisons).

83 Only significant results are given in the text. Non-significant results are provided in Appendix A28.

VARIABLE	TOTAL	NARR	PER	PIC	PRO	TOPICS
Relevance						
Discourse Gr.			*			
Clarity	*	*		*	*	* 1 PRO * 1 PIC * 2 PRO
Non-specific						
Substitution						
Content and fluency		App Sig	*			* 2 PER * 1 PIC * 1 PRO App Sig 1 PRO
Prod/Syntax						
Length						
T-unit length	*	*	*	*		
Clause length						
Embedding	App Sig		*	*		* 1 PER
Clausal struc						
Main Clause				*		* 1 PIC
Right-branch clauses	App Sig					* 1 PIC
Left-branching clauses.						
Cohesion						
Reference						
Lexical						
Substitution		*				
Ellipsis						* 1 PER
Conjunction						
"And"						App Sig 1 PER App Sig 1 PIC
Connectives						
Attempts						* 1 PRO
Dysfluency	App Sig	*	*			* 1 PER

* = significant App Sig = approaching significance NARR = Narratives
PER = Personal narratives PIC = Picture sequences PRO = Procedures

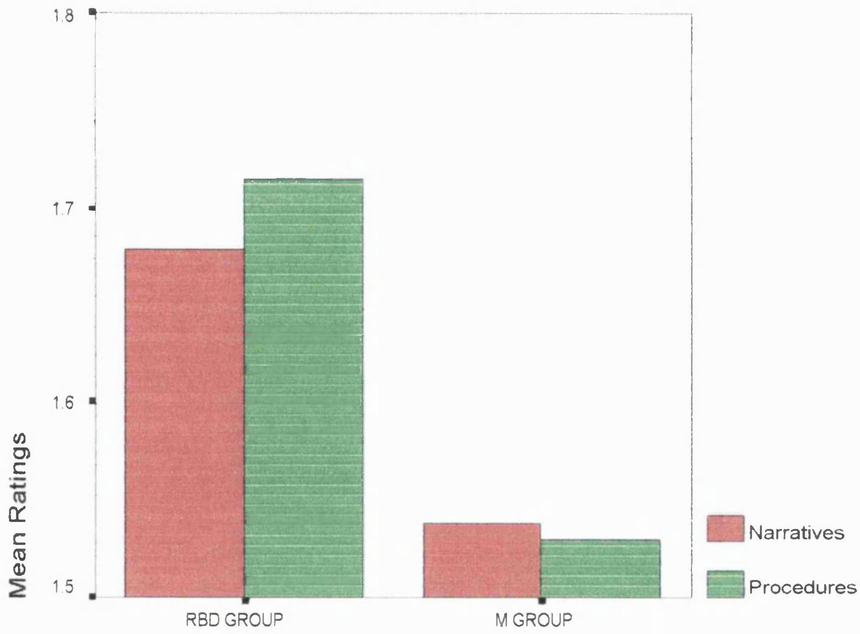
Table 11. 4a: Summary of significant differences between the RBD and M groups

MEASURE	PERSONAL	PICTURE	PROCEDURE	TOPICS
Relevance	decreased	decreased	decreased	1 PIC stable 1 PRO stable
Discourse Gr.	increased*	stable	decreased	1 PRO increased.
Clarity	increased	increased*	increased*	Increased
Non-specific	increased	increased	increased	1 PER stable 1 PIC stable
Substitution	none	none	increased	1 PRO stable
Content/flu.	increased*	increased	increased	1 PRO stable
Prod/Syntax				
Length	increased	stable	decreased	1 PER decreased 1 PRO stable
T-unit-length	decreased*	decreased*	decreased	Decreased
Clause-length	decreased	decreased	increased	2 PRO decreased
Embedding	decreased*	decreased*	decreased	1 PER stable 1 pro stable
Clausal struc				
Main Clause	stable	increased*	increased	1 PER increased 1 PRO stable
Right-br.	decreased	decreased	decreased	Decreased
Left-br.	stable	increased	increased	1 PER decreased 1 PIC decreased 1 pro stable
Cohesion	increased	decreased	decreased	2 PRO increased
Reference	stable	stable	stable	1 PRO decreased 3 PRO decreased
Lexical	stable	decreased	stable	1 PRO decreased 2 PRO increased
Substitution	increased	increased	decreased	1 PRO increased.
Ellipsis	increased	decreased	increased	1 PRO decreased 1 PRO stable
Conjunction	decreased	stable	stable	1 PRO increased 2 PRO decreased
"And"	decreased	increased	increased	2 PRO stable 1 PRO decreased
Connectives	decreased	increased	stable	2 PRO decreased 2 PRO increased
Attempts	increased	increased	increased	1 PER decreased 1 PIC stable 2 PRO stable
Dysfluency	increased*	increased	increased	Increased

PER=Personal experience PIC=Picture-sequences PRO=Procedures

Table 11.4: Summary of results and trends of the RBD Group compared to the M Group

On all topics, the RBD produced the most relevant discourse on the wasp sequence and the least on the bike whilst for the M group, the most occurred on the tyre procedure and the least on the jacket procedure.

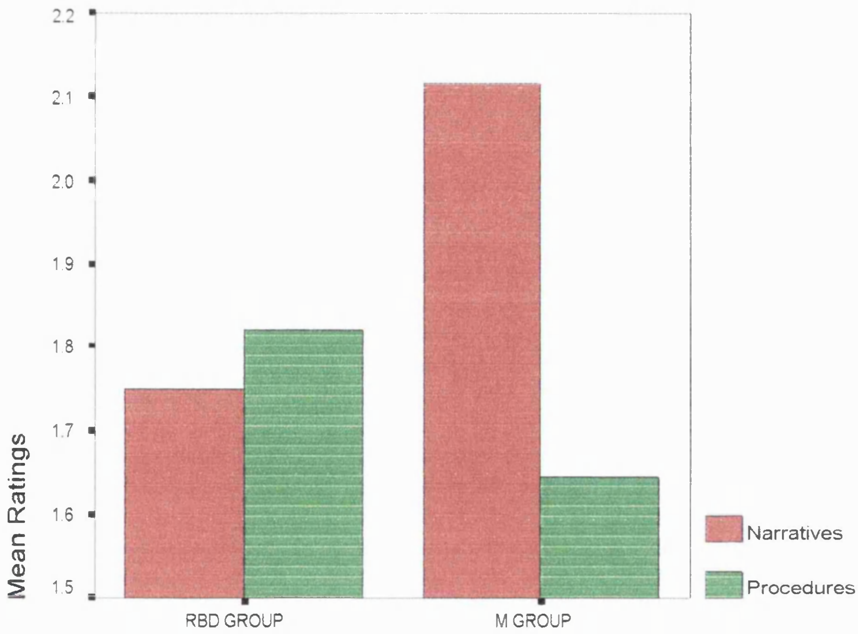


Graph 11.17: Group effect on relevance ratings of two genres

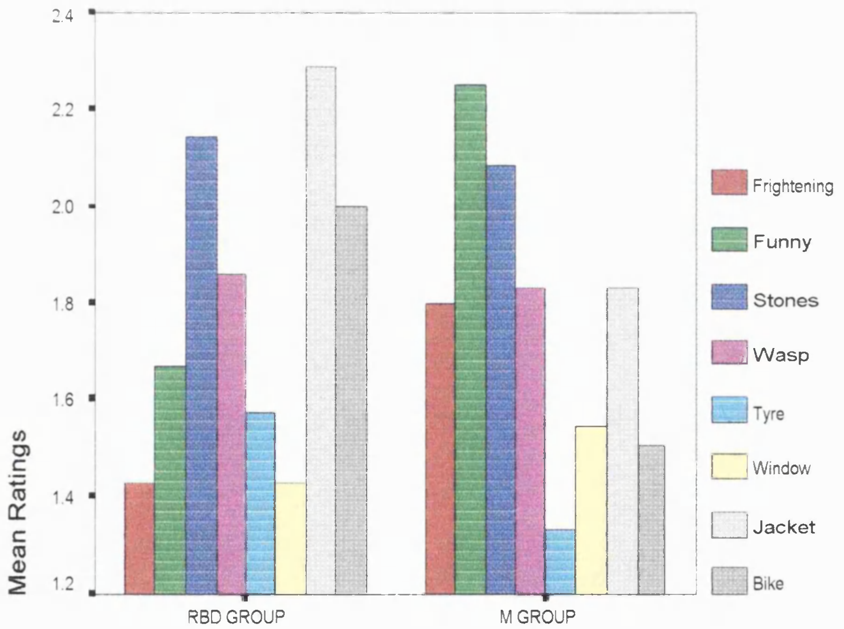
11.2.2 Discourse-grammar

No genre effect was found in the discourse ratings of the RBD group but significantly less appropriate grammar was produced by the M group in their narratives than their procedures (z=-2.401, p=.016) (Graph 11.18). The least appropriate ratings for the RBD group occurred in the picture-sequences and the most in the personal-narratives. For the M group the least appropriate occurred on the personal-narratives and the most on the procedures.

Both groups' performance on the discourse-grammar ratings of the eight topics were broadly similar. There was a significant effect of procedural topic on discourse-grammar in the RBD group (H=11.333, p=.010) (Graph 11.19), with the jacket procedure having considerably poorer ratings than the window procedure. The least appropriate ratings for the RBD and M groups occurred on the jacket procedure and the funny personal experience respectively and the most on the funny personal-narrative and the tyre procedure respectively.



Graph 11.18: Group effect on discourse grammar in two genres

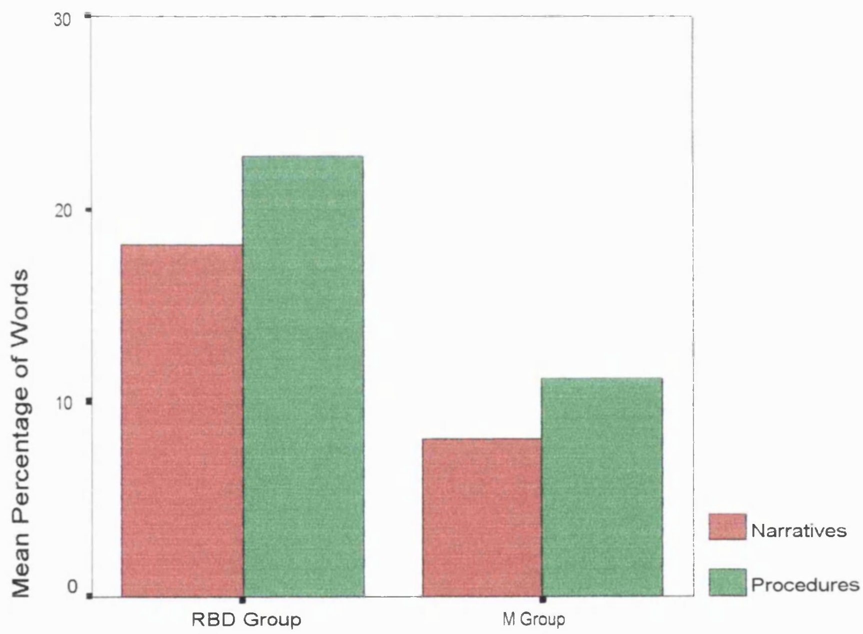


Graph 11.19: Topic effect on discourse grammar of RBD and M groups

11.2.3 Clarity disruptors

a) Total clarity disruptors

For both groups, procedures elicited more total clarity disruptors than narratives, and for the RBD group, this was significant (z=-2.366, p=.018) (Graph 11.20). For the RBD group, more occurred in the procedures and picture-sequences and reduced amounts in personal-narratives, whilst little effect of task was observed in the M group. For the RBD group, both personal topics elicited fewer of these elements than any other topics, with the frightening topic having the least and the wasp sequence having the most. For the M group, topic had little effect on these disruptors apart from an increased amount in the window procedure



Graph 11.20: Group effect on total clarity disruptors in two genres

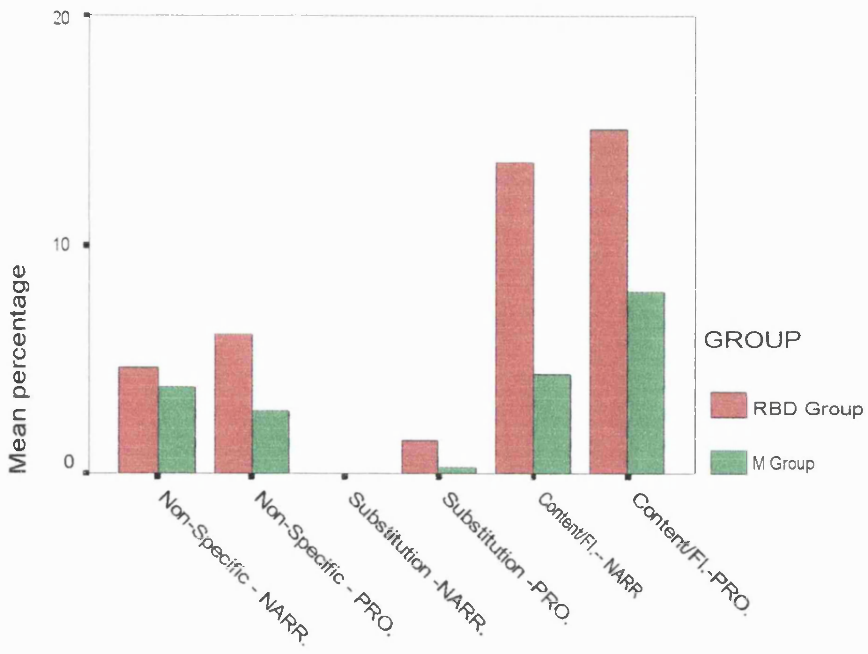
MEASURE	RIGHT BRAIN-DAMAGED	MATCHED GROUP
Relevance	*PRO Topic	*PRO Topic
Discourse-grammar	*PRO Topic	
Length (words)	*Task, *FR>FU	*Task, *PIC>PRO,PER. *WA>ST
T-unit-length		
Clause-length		PRO>NARR,*Task, ?*PIC>PER, *PRO Topic, *BI>TY
Clausal-embedding	*PRO Topic, ?*JA>WI *FR>FU	
Main clauses		*PER>PIC,PRO, *PRO Topic, *TY>BI
Left-branching cl.		*Task
Right-branching cl.		*PER>PIC,PRO
Non-specific		*NARR>PRO, *PER>PIC,PRO
Substitution		
Content and fluency		*PER<PER,PRO
Clarity disruptors	*PRO>NARR	
Referential coh.	*PIC>PER	*NARR>PRO, *PIC>PER,PRO
Subst. Coh.		*PRO>NARR, *PRO>PER
Ellipsis		
Conjunctions		
Lexical ties	*?* PRO>NARR	*PER<PIC,PRO, *TY>BI,JA,WI
"Ands"		
Connectives		*Task
Total cohesion	*Task,	*Task,*PER<PIC,PRO
Coh. Errors		*PRO Topic
Dysfluencies		

p<.05 ?=approaching significance NARR=Narrative genre
PRO=Procedures PIC=Picture-sequences PER=personal-narratives
FR=Frightening personal-narrative FU=funny personal-narrative
WA=wasp picture-sequence ST=stones picture-sequence
TY=tyre procedure WI=window procedure JA=jacket procedure BI=bike procedure

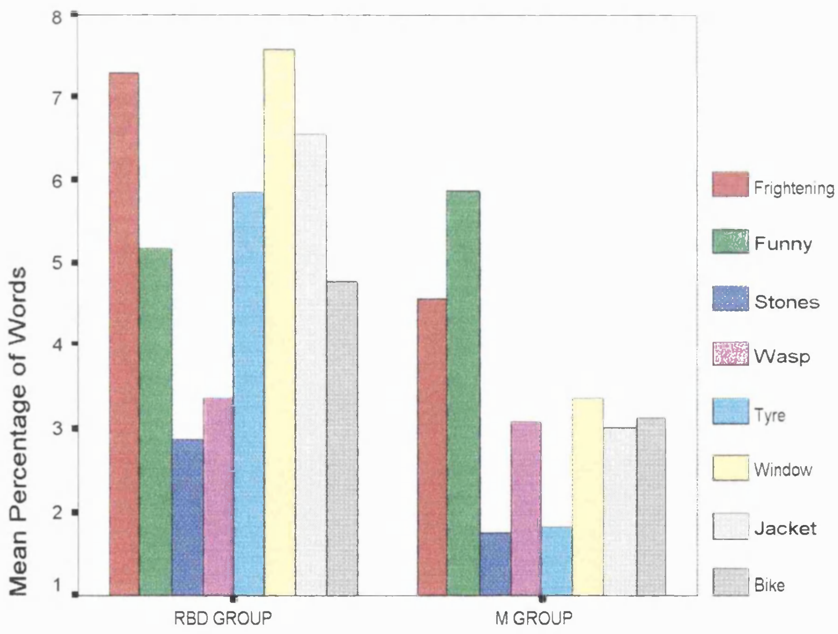
Table 11.5: Effect of genre, task and topic on discourse within each group

b) Non-specific elements

The RBD group produced (non-significantly) more non-specific elements in their procedures than in their narratives, whereas for the M group, the narratives contained significantly more than the procedural genre (z=-2.197, p=.028) (Graph 11.21). For both groups, a higher incidence of these elements was found in the personal-narratives and procedures than in the sequences. There was a significant effect of task on non-specific elements in the M group (H=12.167, p=.002) and their personal-narratives contained significantly more than the picture-sequences (z=-2.510, p=.012) and the procedures (z=2.981, p=.003) (Graph 11.22).



Graph 11.21: Group effect on types of clarity disruptors in two genres



Graph 11.22: Topic effect on non-specific elements in RBD and M groups

Topic had a variable effect on non-specific elements in both groups. The RBD group produced the most on the window procedure and the M group in the funny experience. For both groups, the least were found in the stones sequence.

c) Word-substitutions

Word-substitutions only occurred in the procedural topics of each group and no significant effects were observed. The jacket procedure of the RBD group elicited more than the others.

d) Content and fluency disruptors

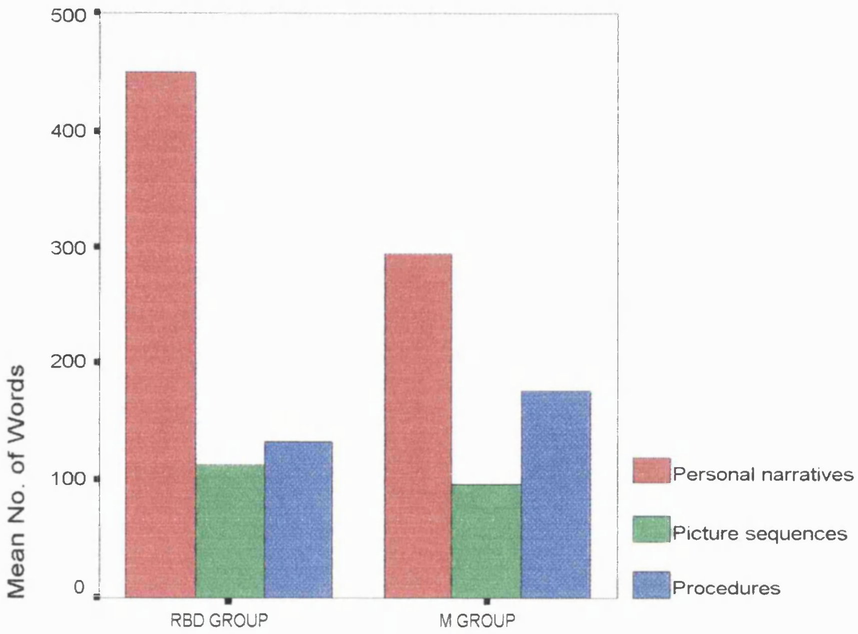
No genre differences were found in the incidence of content and fluency disruptors in the RBD group but a higher percentage was found in procedures than in narratives in the M group. For the RBD group, the highest incidence occurred in the sequences with the least in the personal-narratives. For the M group there was a significant effect of task (H=11.488, p=.003) (Graph 11.21). The personal-narratives contained significantly fewer of these elements than the picture-sequences (z=-2.395, p=.017) and the procedures (z=-2.934, p=.003).

Topic had a variable effect on these disruptors in both groups. For the RBD group, the greatest amount occurred in the wasp picture-sequence and the least in the frightening experience. In the M group, the most occurred in the window procedure and none in the funny personal-narrative.

11.2.4 Productivity and syntax measures

a) Length

Each of the two groups tended to produce longer samples in their narratives compared to their procedures. For both groups, there was a significant effect of task on the sample length (RBD - H=7.630, p=.022, M - H 9.500, p=.009). Among the discourse tasks, the longest samples for both groups were found in the personal-narratives with the least in the picture-sequences. In the M group, the sequences were significantly shorter than the personal-narratives (z=-2.510, p=.012) and procedures (z=-2.432, p=.015) (Graph 11.23).



Graph 11.23: Task effect on sample length of RBD and M groups

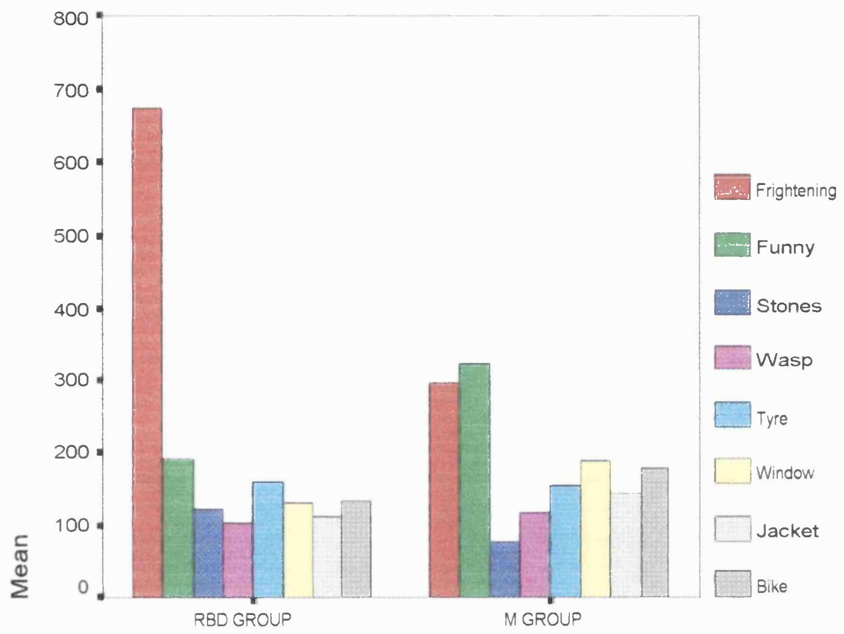
Regarding the topics, RBD subjects produced significantly more words in the frightening than funny experiences (z=-1.992, p=.046). For the M group, a significantly longer sample was noted on the wasp than the stones sequence (z=-2.002, p=.045) (Graph 11.24). Topic had little effect on the length of the procedures in either group.

b) T-unit-length

No significant effects of genre, task or topic were found on the T-unit-length of either group. The RBD group produced longer T-units in their procedures than their narratives, with the reverse in the M group. For the RBD, the longest were found on procedures, followed by the picture-sequences and then their personal-narratives. For the M group, the longest T-units occurred on the sequences, then the procedures and lastly the personal-narratives. Topic had a greater effect on T-unit-length in the M than the RBD group.

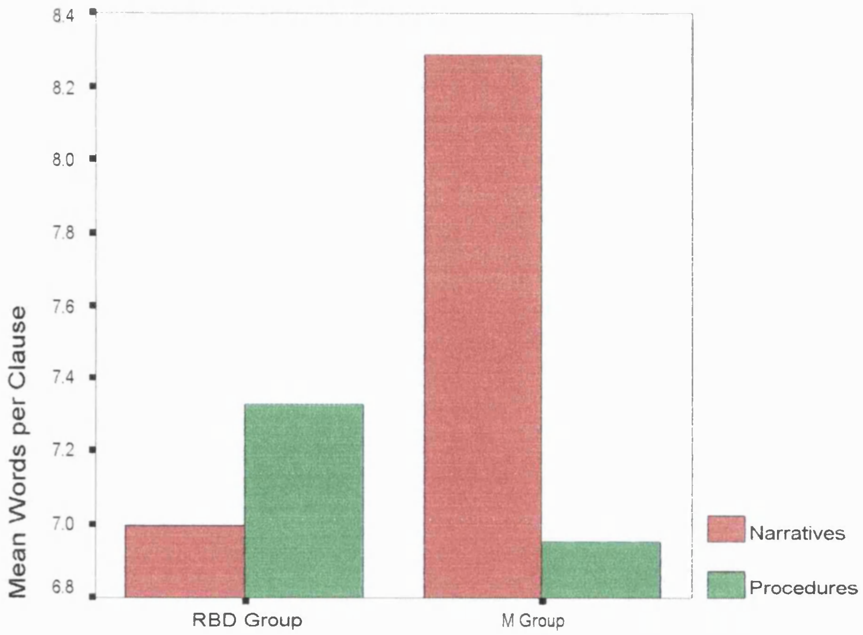
c) Clause-length

In the RBD group, the genre condition resulted in longer clauses in procedures than narratives. For the M group, clause-length was significantly longer in the narratives than in the procedures (z=-2.040, p=.041) (Graph 11.25). For the M group, there was a significant task effect (H=7.167, p=.028) (Graph 11.26). Longer clauses occurred on their sequences than in the other tasks, with the difference with their personal-narratives approaching significance (z=-2.353, p=.019).

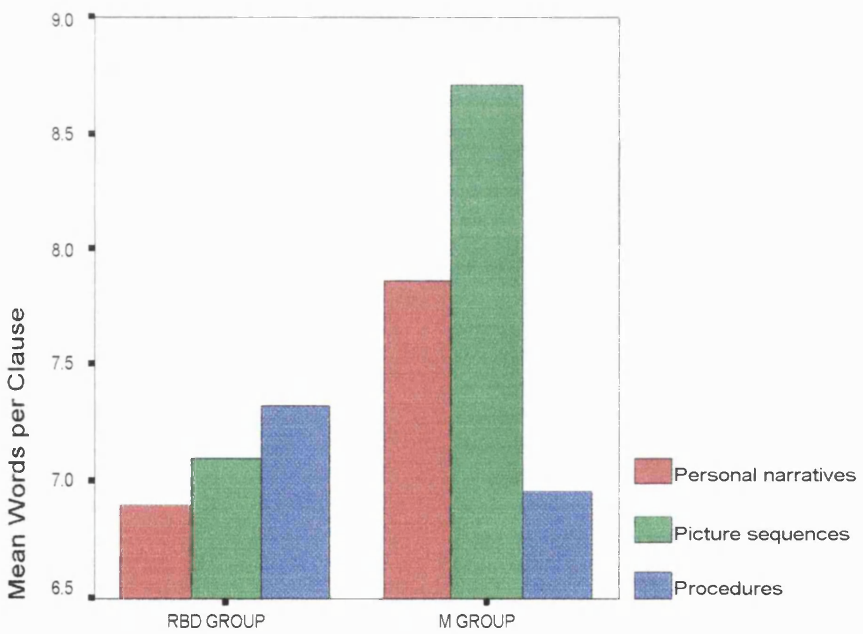


Graph 11.24: Topic effect on sample length of RBD and M groups

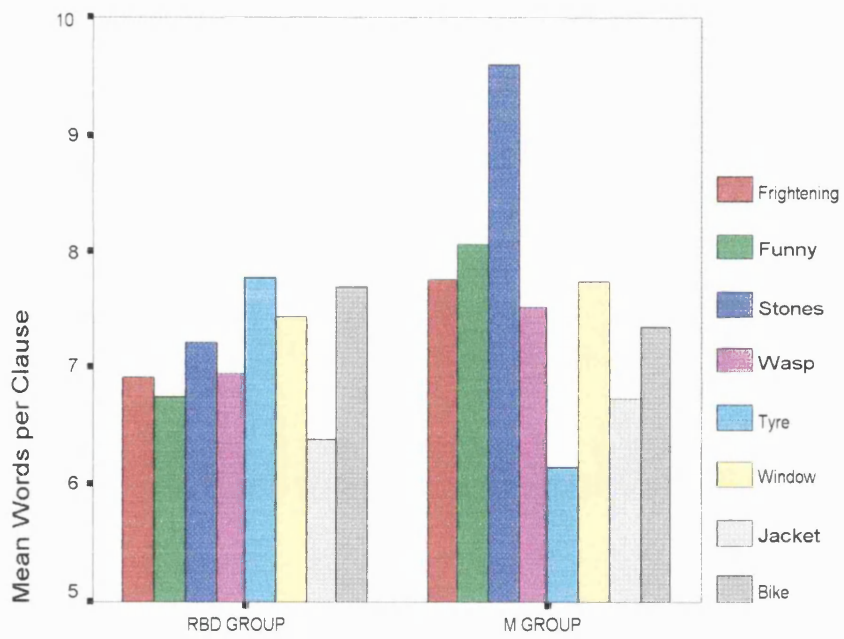
For the M group, there was greater variation in the clause-length of the topics with the stones sequence eliciting longer clauses than the other topics. There was a significant effect of procedural topic (H=11.167, p=.011) with the bike procedure having significantly longer clauses than the tyre one (z=-2.667, p=.008) (Graph 11.27).



Graph 11.25: Group effect on clause length in two genres



Graph 11.26: Task effect on clause length of RBD and M groups

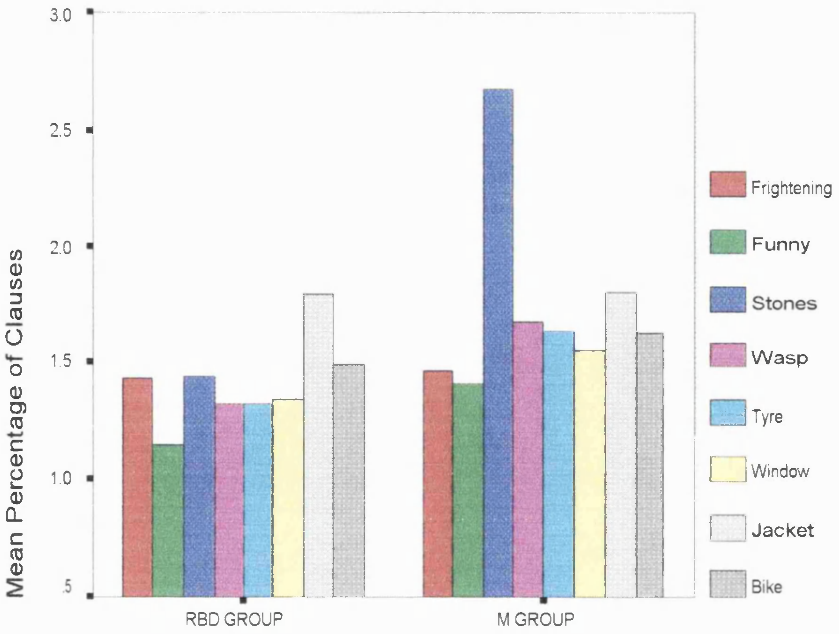


Graph 11.27: Topic effects on clause length of RBD and M groups

d) Clausal-embedding

For the RBD group, more clausal-embedding was found in the procedures than the narratives but no difference in the M group. The RBD group produced fewer in the personal-narratives, more in the pictures and the most in the procedures. For the M subjects, the greatest incidence was found in the picture-sequence, with less in the procedures and the least in the personal-narratives.

Apart from an increased amount of clausal-embedding in the M group's stones sequence, topic had little effect. For the RBD group, topic had a significant effect in the personal-narratives with significantly more occurring in the production of the frightening than the funny narrative (z=-2.003, p=.045). There was also a significant effect of procedural topic on clausal-embedding (H=8.908, p=.031) with the jacket procedure producing substantially more than other procedures (Graph 11.28). The difference between the jacket and window approached significance (z=-2.384, p=.017).



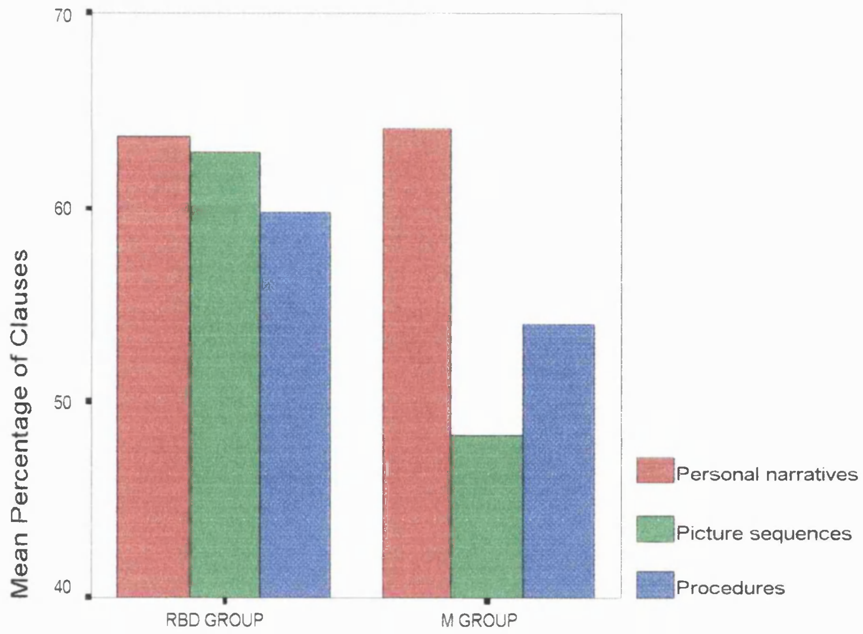
Graph 11.28: Topic effect on clausal embedding of RBD and M groups

11.2.5 Clausal structure

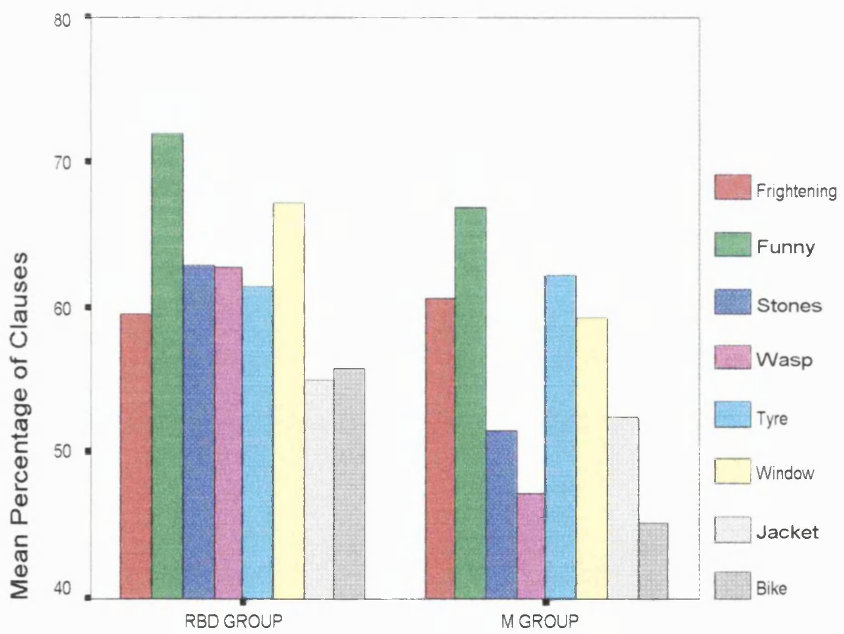
a) Main clauses

For both groups, there was no effect of genre on the incidence of main clauses. There was no task effect for the RBD group but a significant one for the M group (H=11.167, p=.004) (Graph 11.29). The M group produced significantly fewer in their sequences (z=-2.667, p=.008) and procedures (z=-2.746, p=.006) than personal-narratives.

Main clauses in the M group's discourse were more affected by topic than those of the RBD group. There was a significant effect of procedural topic in the M group (H=9.566, p= .023) with their bike procedure containing significantly fewer the tyre (z=-2.668, p=.008) (Graph 11.30).



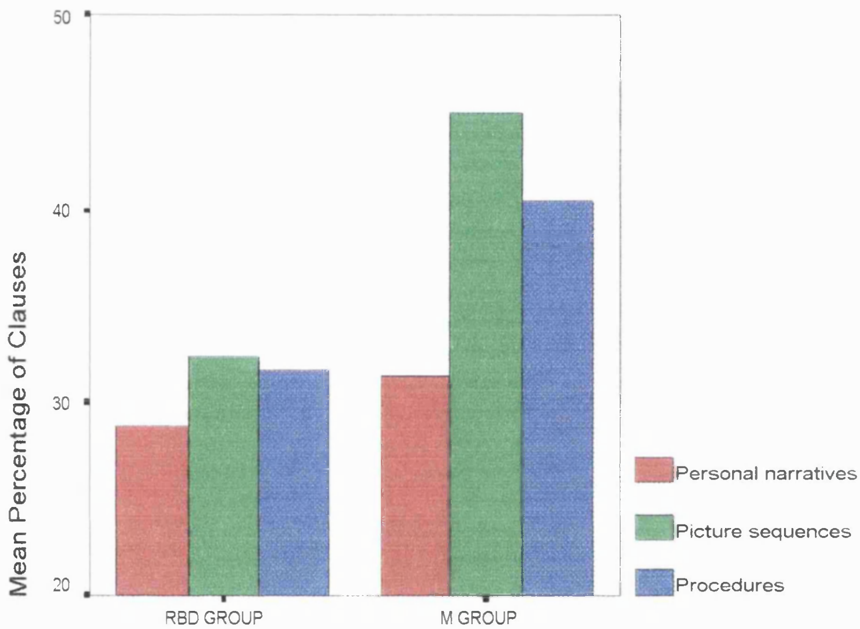
Graph 11.29: Task effect on main clauses in RBD and M groups



Graph 11.30: Topic effect on main clauses of RBD and M groups

b) Right-branching clauses

No genre effect on right-branching clauses was observed in either group. There was no task effect on the production of the RBD group but a significant effect occurred for the M group (H=10.500, p=.005). The M group produced significantly more in the sequences (z=-2.667, p=.008) and procedures (z=-2.589, p=.010) than on their personal-narratives (Graph 11.31).

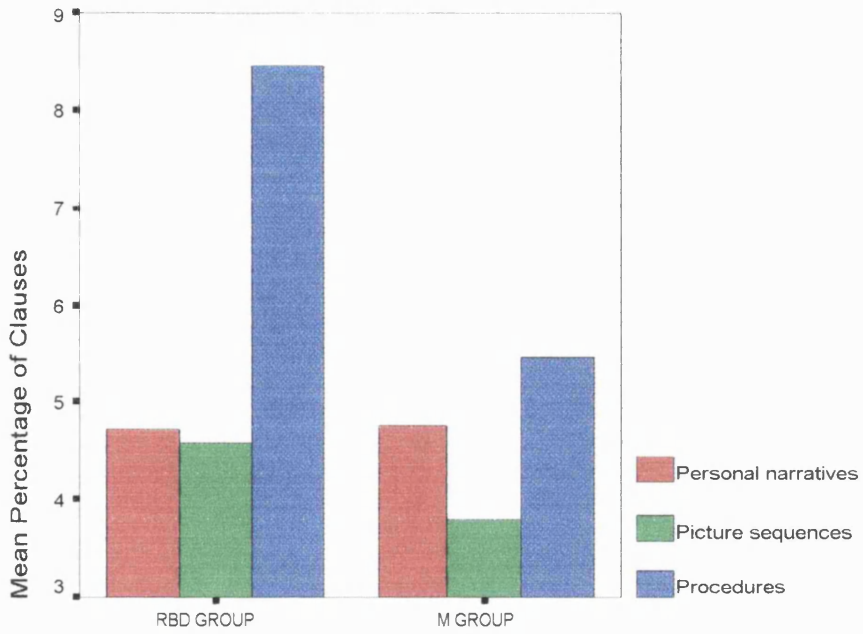


Graph 11.31: Task effect on right-branching clauses in RBD and M groups

No significant topic effect on the incidence of right-branching clauses was found for either group with a trend for the relative incidence on the topics to be similar, with the highest in each case in the bike procedure and the lowest in the funny experience.

c) Left-branching clauses

No significant genre effect was found in either group for the incidence of left-branching clauses. For both groups, more occurred in the procedures with the two narrative tasks having similarly reduced amounts. For the M group, there was a significant effect of task (H=7.447, p=.024) (Graph 11.32).



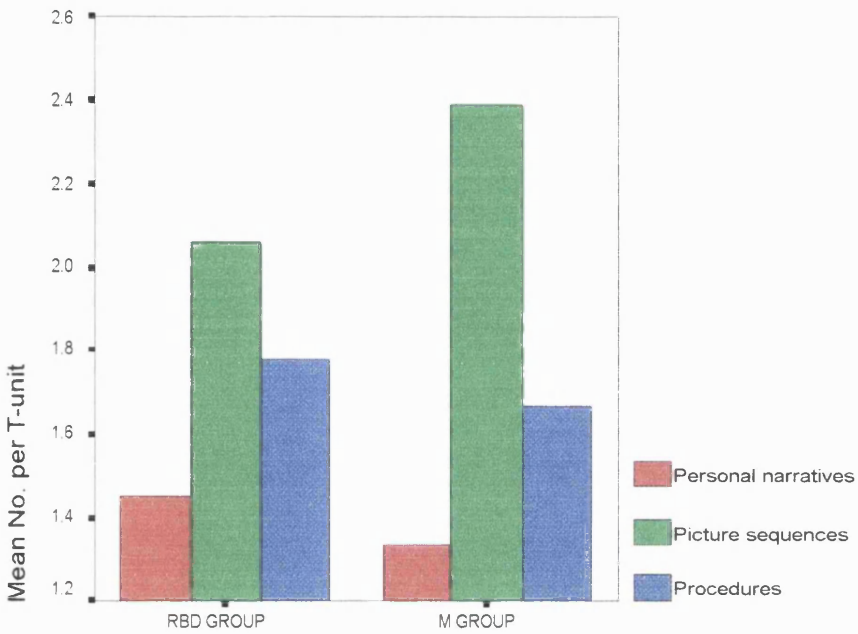
Graph 11.32: Task effect on left-branching clauses in RBD and M groups

Topic had a considerable effect on the production of left-branching clauses in both groups. For the RBD group, considerable variation occurred in the procedural topics whilst for the M group, more variation occurred in the narratives. For the RBD group the greatest percentage of these clauses occurred in the jacket procedure and the least in the funny narrative. For the M group, the most occurred in the stones sequence and the least in the tyre procedure.

11.2.6 Cohesion

a) Total cohesive ties

For the RBD group, genre had no effect on the total cohesive ties but for the M group, a higher number were found in the narratives than the procedures. A significant effect of task was found on total cohesive ties in RBD subjects (H=6.000, p=.05) and in M group (H=12.167, p=.002) (Graph 11.33). For both groups most occurred in the sequences then procedures with personal-narratives having the least. For the M group, the personal-narratives contained significantly less than the sequences and procedures (z=-2.983, p=.003) and procedures (z=-2.589, p=.010).

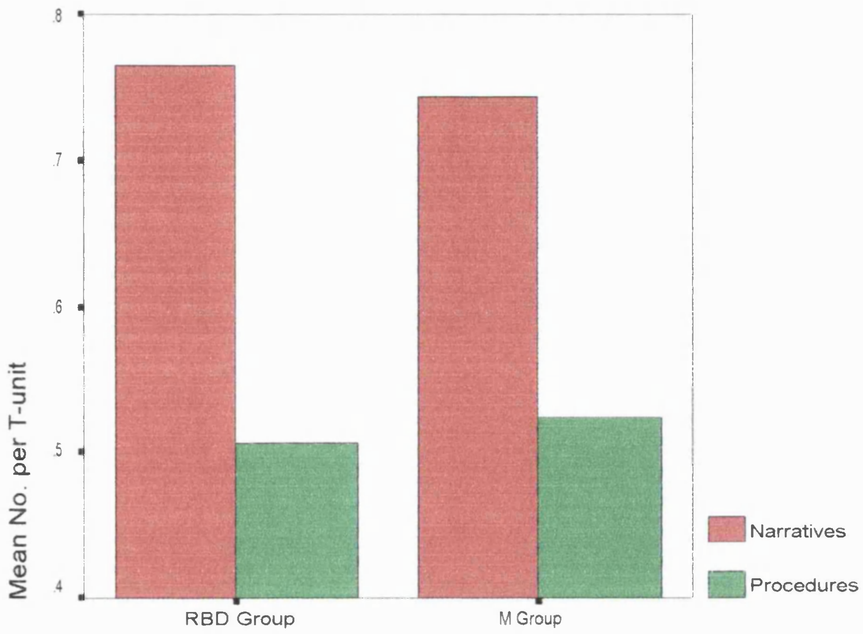


Graph 11.33: Task effect on total cohesion of RBD and M groups

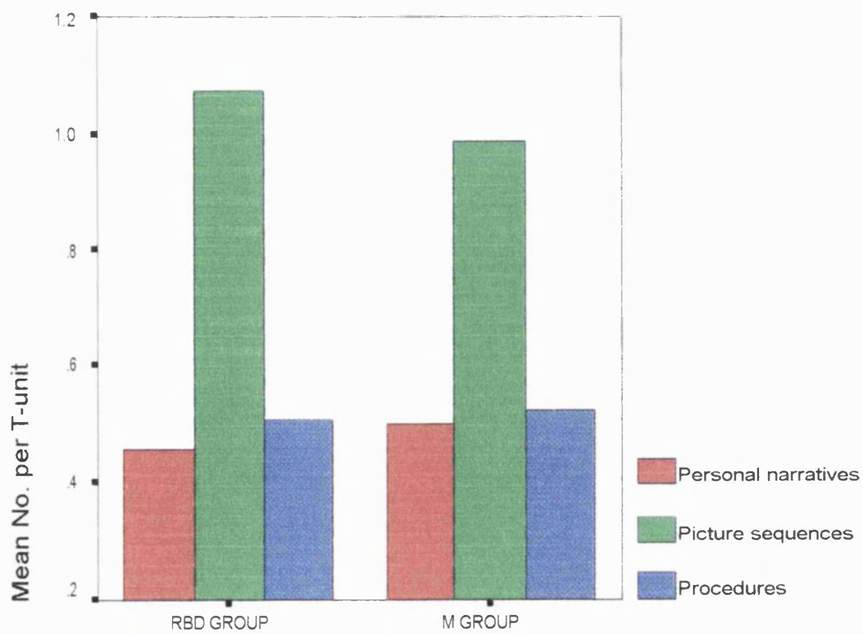
Topic had a variable effect on cohesive ties in both groups' samples. For both groups, the wasp sequence contained the most cohesive ties of any topic. For the RBD the least ties occurred in the frightening experience and for the M group in the funny experience.

b) Reference

For both groups, more referential ties occurred in narratives than in procedures. This difference was significant for the M group (z=-2.040, p=.041) (Graph 11.34). For both groups, there was a significant effect of task (RBD - H=8.000, p=.018; M - H=10.167, p=.006) (Graph 11.35). More reference occurred in the sequences with similarly reduced amounts in the personal-narratives and procedures. RBD subjects produced significantly more in the sequences than in personal-narratives (Z=-2.384, p=.017). The M group produced significantly more in the sequences than on personal-narratives (z=-2.824, p=.005) and procedures (z=-2.432, p=.015). The two groups mirrored each other's performance on the incidence of reference on the topics. For both groups most occurred on the wasp sequence.



Graph 11.34: Group effect on reference in two genres



Graph 11.35: Task effect on reference of RBD and M groups

c) Substitution and ellipsis

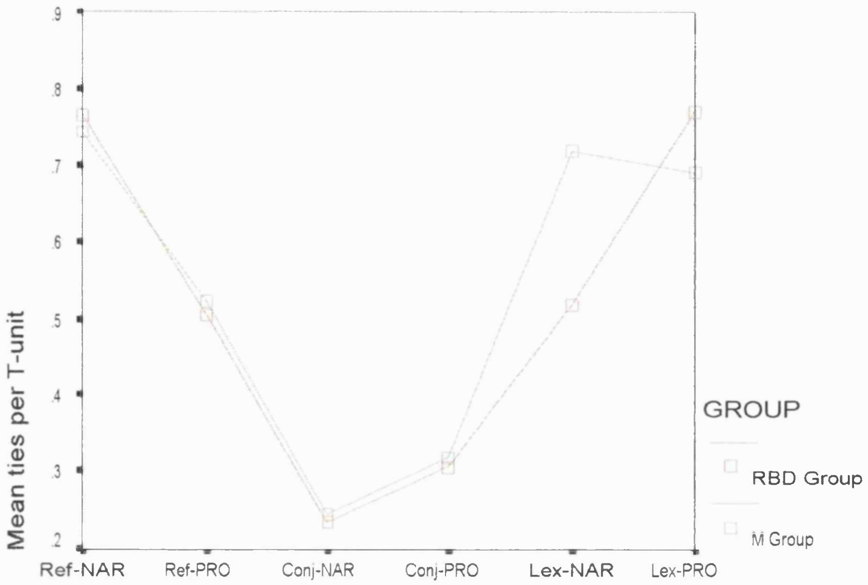
Substitutive and elliptical cohesion occurred infrequently in both groups. Genre and task had little effect on the RBD group. In contrast, the M group produced significantly more in their procedures than their narratives (z=-2.667, p=.008) (Graph 11.12) and had similarly reduced substitution in both narrative tasks.. A significant effect of task was found in the M group (H=10.609, p=.005), with significantly more occurring in procedures than personal-narratives (z=-2.707, p=.007) (Graph 11.12).

Genre and task had little effect on ellipsis in the M group but the RBD group produced considerably more in the personal-narratives than the sequences and procedures

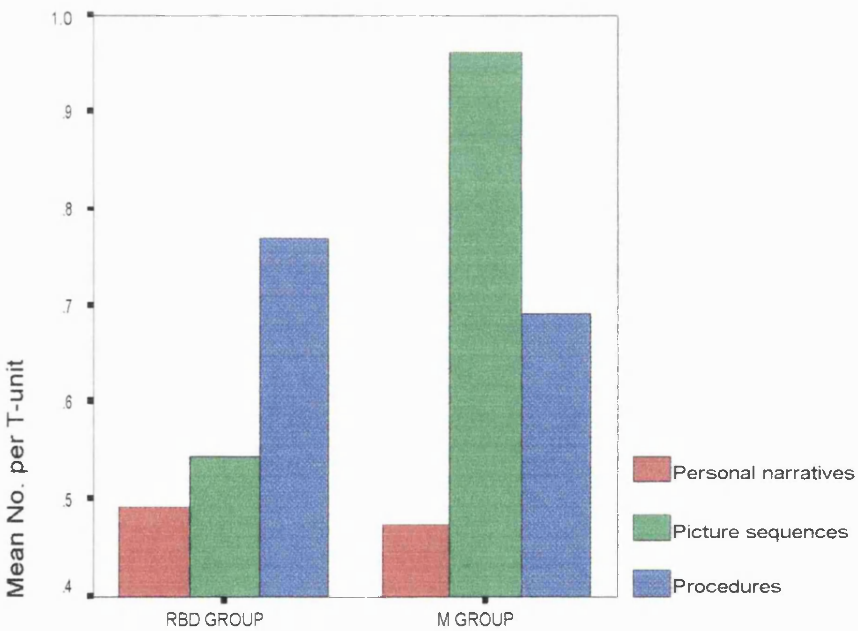
d) Lexicalisation

No genre effect was observed on lexicalisation in the M group's discourse but for the RBD group, a greater number occurred in the procedures than the narratives. The difference between the procedural and narrative genres approached significance in the RBD group (z=-1.947, p=.051) (Graph 11.36). There was a trend for the RBD group to produce the most lexicalisation in procedures with both narrative tasks showing similarly reduced amounts. For the M group, there was a significant effect of task (H=7.447, p=.024) (Graph 11.37) with significantly fewer in their personal-narratives than their sequences (z=-2.747, p=.006) or procedures (z=-2.403, p=.016).

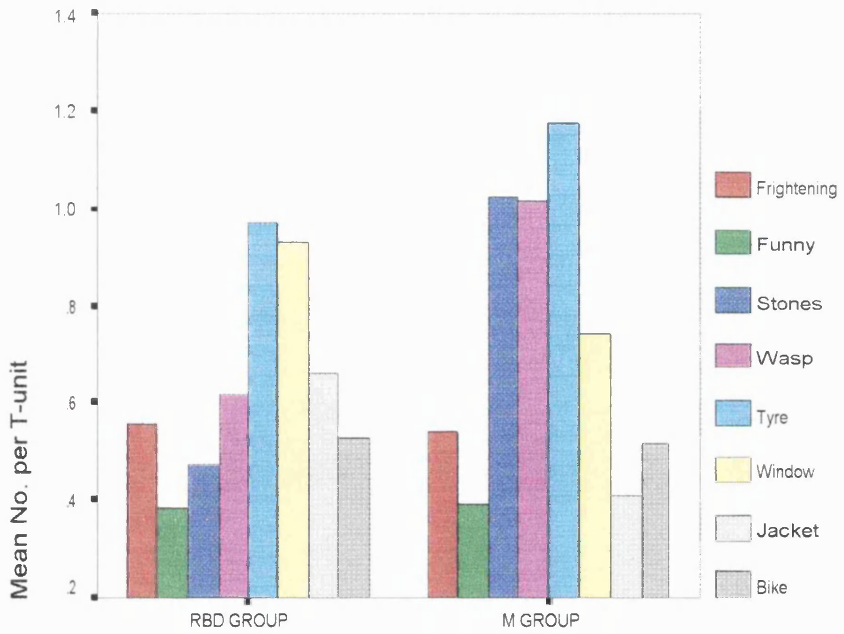
No topic effect on lexicalisation was found for the RBD group. This group produced the most on the tyre and window procedures. There was a significant effect of procedural topic in the M group (H=17.748, p=.000) (Graph 11.38). The tyre procedure contained significantly more than the window (z=-2.803, p=.005), jacket (z=-2.810, p=.005) and bike procedures (z=-2.905, p=.004).



Graph 11.36: Group effect on types of cohesion in two genres



Graph 11.37: Task effect on lexicalisation on RBD and M groups



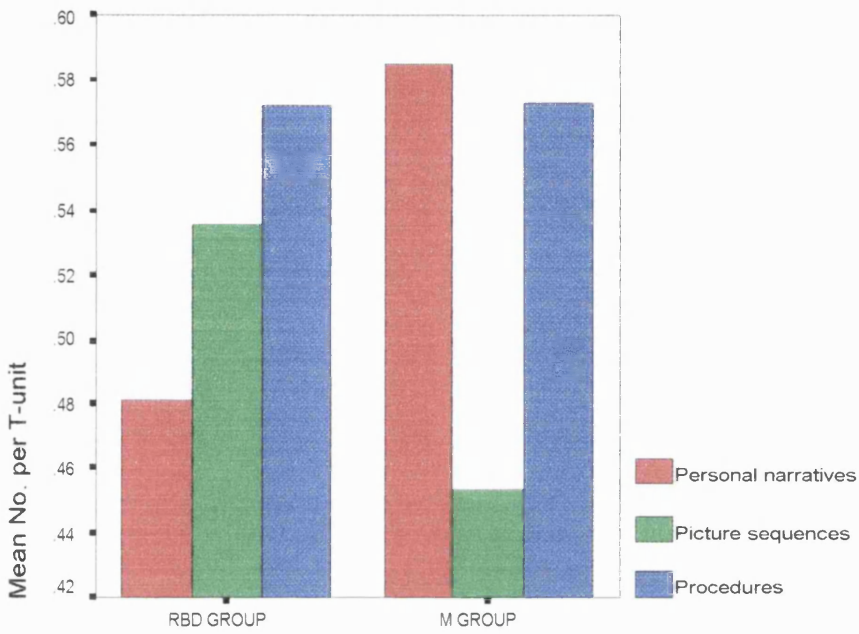
Graph 11.38: Topic effect on lexicalisation of RBD and M groups

e) Conjunctions, "and" and connectives

For both groups, similar amounts of conjunctions were found in both genres and the greatest number occurred on the procedural task with less in the personal-narratives and the least in the sequences. The two groups mirrored each other's performance in the topics, apart from an increased incidence in the RBD group's window procedure. For both groups the least amount occurred in the wasp picture-sequence and the most in one of the procedures (window for the RBD group, window and jacket for the M group).

For both groups, no genre effect was found on the incidence of "and"s. The RBD group produced the most in the sequences and similarly reduced amounts in the personal-narratives and procedures. The M subjects produced the most in the personal-narratives and the least in the picture-sequences. The production of "and" was variable for both groups on the topics.

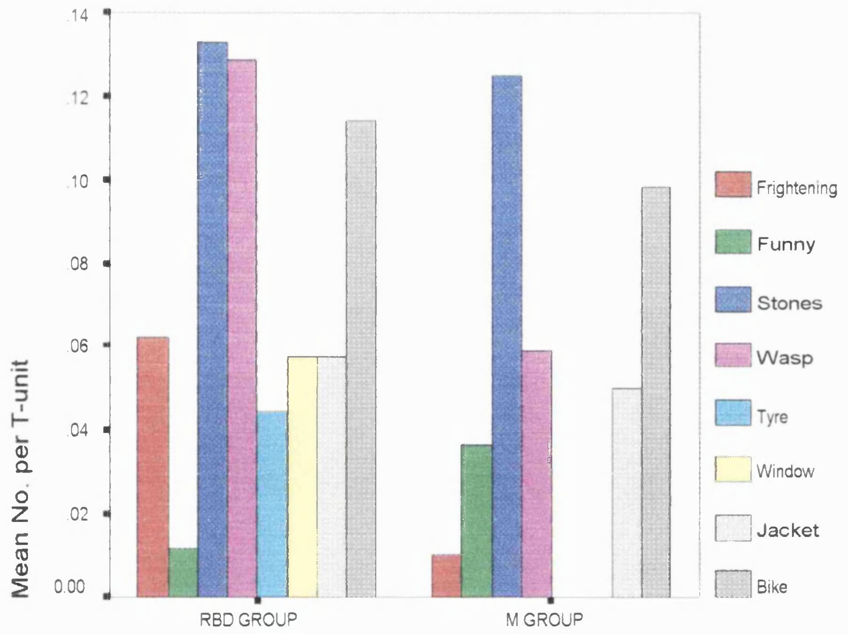
For both groups, more connectives were found on procedures than on narratives. Whilst RBD subjects produced the most on procedures and the least on personal-narratives, the M group produced the most on the personal-narratives and the least on sequences. For the M group, there was a significant effect of task (H=6.167, p=.046) (Graph 11.39). The occurrence in the topics was variable in both groups. The greatest amount occurred in the window procedure for both groups and the least on the tyre procedure and funny narrative (RBD group) and the wasp sequence (M group).



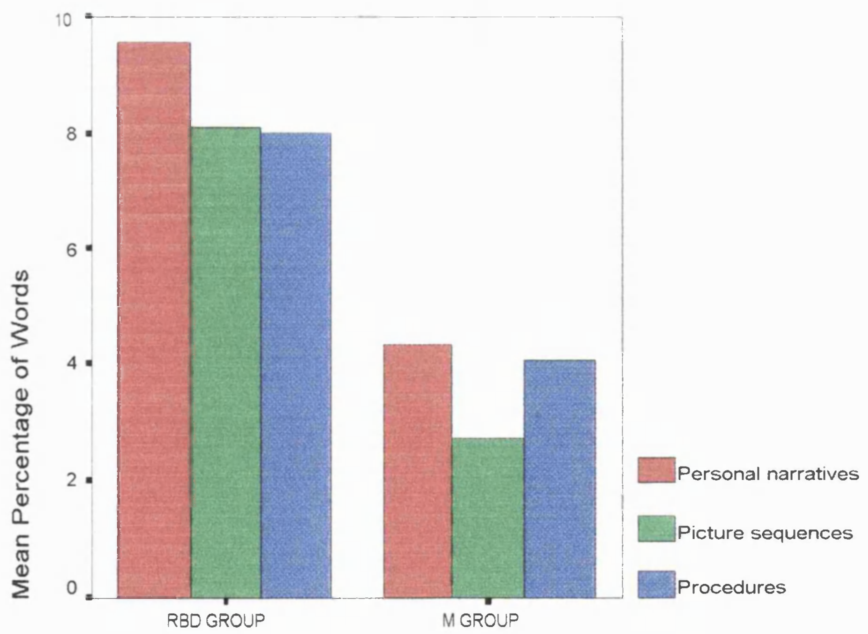
Graph 11.39: Task effect on connectives in RBD and M groups

f) Attempted cohesion

No genre effect was found on the incidence of cohesive errors for the RBD group whilst more occurred in the narrative than the procedural genre in the M group. For both groups, most errors occurred in the picture-sequences with reduced amounts in the other tasks. The effect of topic was variable for both groups with the stones sequence eliciting the most. The least for the RBD group was found in the funny experience whilst the M group produced no errors in the tyre and window procedures. There was a significant effect of procedural topic in the M group (H=9.571, p=.023) (Graph 11.40).



Graph 11.40: Topic effect on attempted cohesion in RBD and M groups



Graph 11.41: Task effect on dysfluencies in RBD and M groups

11.2.7 Dysfluency

For the RBD group, there was no effect of genre, method of elicitation or topic on dysfluencies.

Although there was no significant genre or topic effect for the M group on dysfluencies, a significant effect of discourse task occurred (H=7.167, p=.028) (Graph 11.41). The picture-sequences elicited the least dysfluencies.

11.2.8 Summary of sampling condition effects

The hierarchy of task performance on each measure by the two groups is presented in Table 11.6. The task eliciting the greatest amount of each measure occurs at the head of the list. On certain measures, the hierarchy of task results was similar for each group e.g. relevance, sample length, cohesive ties, reference, attempted ties, etc. On other measures, the relative incidence differed between the two groups, e.g. the most appropriate discourse-grammar was produced in the RBD personal-narratives but in the M group's procedures. This also occurred on other measures e.g. content and fluency elements, T-unit-lengths, clausal-embedding, lexical cohesion, ands, connectives. On certain measures (clause-length, dysfluency rates, main and right-branching clauses), the RBD subject showed no task differences whilst this occurred rarely in the control group (clarity disruptors). The use of task and topic hierarchies during assessment and treatment will be discussed in Chapter 14.

MEASURE	RIGHT BRAIN-DAMAGE	MATCHED GROUP
Relevance	PICTURE-SEQUENCE PROCEDURES PERSONAL	PICTURE-SEQUENCE PROCEDURES PERSONAL
Discourse-grammar	PERSONAL PROCEDURES PICTURE-SEQUENCE	PROCEDURES PICTURE-SEQUENCE PERSONAL
Clarity disruptors	PICTURES and PROCEDURES PERSONAL	NO DIFFERENCES
Non-specific	PERSONAL PROCEDURES PICTURE-SEQUENCE	PERSONAL PROCEDURES and PICTURES
Substitution	PROCEDURES (None in Personal and Pictures)	PROCEDURES (None in Personal and pictures)
Content and Fluency	PICTURE-SEQUENCE PROCEDURES PERSONAL	PROCEDURES and PICTURES PERSONAL
Productivity and syntax		
Sample length	PERSONAL PICTURES and PROCEDURES	PERSONAL PICTURES and PROCEDURES
T-unit-length	PROCEDURES PERSONAL and PICTURES	PICTURE-SEQUENCE PROCEDURES PERSONAL
Clause-length	NO DIFFERENCES	PICTURE-SEQUENCE PERSONAL PROCEDURES
Embedding	PROCEDURES PERSONAL and PICTURES	PICTURE-SEQUENCE PROCEDURES PERSONAL
Clausal structure		
Main clauses	NO DIFFERENCES	PERSONAL PROCEDURES PICTURE-SEQUENCE
Left-branching	PROCEDURES PERSONAL and PICTURES	PROCEDURES PERSONAL and PICTURES
Right-branching	NO DIFFERENCES	PICTURE-SEQUENCE PROCEDURES PERSONAL
Cohesion	PICTURE-SEQUENCE PROCEDURES PERSONAL	PICTURE-SEQUENCE PROCEDURES PERSONAL
Reference	PICTURE-SEQUENCE PROCEDURES PERSONAL	PICTURE-SEQUENCE PROCEDURES PERSONAL
Lexical	PROCEDURES PERSONAL and PICTURES	PICTURE-SEQUENCE PROCEDURES PERSONAL
Substitution	PICTURES and PROCEDURES PERSONAL	PRO PERSONAL and PICTURES
Ellipsis	PERSONAL PROCEDURES PICTURE-SEQUENCE	NO DIFFERENCES
Conjunction	PROCEDURES PERSONAL PICTURE-SEQUENCE	PROCEDURES PERSONAL PICTURE-SEQUENCE
"And"	PICTURE-SEQUENCE PERSONAL and PROCEDURES	PERSONAL PROCEDURES PICTURE-SEQUENCE
Connectives	PROCEDURES PICTURE-SEQUENCE PERSONAL	PERSONAL PROCEDURES PICTURE-SEQUENCE
Attempted ties	PICTURE-SEQUENCE PROCEDURES PERSONAL	PICTURE-SEQUENCE PROCEDURES PERSONAL
Dysfluency	NO DIFFERENCES	PERSONAL and PROCEDURES PICTURE-SEQUENCE

Table 11.6: Hierarchy of task results for each group

11.3 Results of attention tests and their correlation with discourse measures

11.3.1 Results of attentional assessment of RBD and M subjects

	Forward Digit Span	Backward Digit Span	Mean Digit Span	FAS Word Fluency	Trail-Making Part A	Trail-Making Part B
RBD GROUP	8.29 (1.98)	6.0 (1.92)	7.14 (1.8)	39.14 (11.48)	1.46 (0.8)	2.93 (0.72)
M GROUP	9.17 (1.03)	7.00 (1.48)	8.08 (1.2)	45.67 (16.23)	0.81 (0.26)	1.79 (0.7)
U Sig.	30.00 p=.296	24.5 p=.131	25.0 p=.148	38.0 p=.773	19.0 p=.052	7.0 p=.015*

*=significant Standard deviations are given in brackets.

Table 11.7: Results and significance levels (using the Mann-Whitney U Test) of RBD and M subjects on attention assessment

No significant differences were found between the RBD and M groups on the digit span and the fluency tests (Table 11.7)[84]. The RBD group performed less well on all attention tests than the M group. A significant difference occurred between the two groups on Part B of the Trail-Making test and approached significance in Part A. On both parts, the RBD group had a longer completion time (i.e. a poorer performance) than the M group. On most tests, the greater standard deviations of the former group indicate that their performance was more variable.

11.3.2 Correlations between attention and discourse measures for RBD and M groups[85]

As stated previously, only those aspects that indicate a clustering of correlations between a number of measures will be discussed here.

The RBD group's discourse-grammar ratings for procedures were negatively correlated with the Digit Span measures (Table 11.8), suggesting that those

[84] For graphs depicting these results, see Appendix A29.
[85] The non-parametric correlational test, Spearman's rho, was used. For complete correlational matrices and details, see Appendix A30.

RBD subjects with higher Digit Span scores produced procedures rated as more structurally appropriate.

Regarding sample length, the RBD subjects with better digit spans and poorer Trail-Making Test results tended to produce longer samples. Limited correlations in clausal structure occurred in the RBD group. The RBD group demonstrated a positive correlation between left-branching clauses in the sequences and Digit Span measures, suggesting that more left-branching clauses occurred in picture-sequences produced in those subjects with better Digit Span measures.

For this group, correlations between the incidence of attempted cohesive ties and the three Digit Span measures, suggesting that those subjects with higher Digit Span scores produce fewer cohesive errors. This was also particularly evident in the picture-sequences.

For the M group, the relevance ratings of the personal-narratives were correlated with the Digit Span and FAS Word Fluency tests, indicating that M Group subjects with higher scores produced personal-narratives that were rated as more relevant.

Non-specific elements in the M group were correlated with some attention measures (Backward Digit Span and the FAS test) and in the procedures (Trail-Making Tests). Thus those subjects with better attentional test results may produce fewer non-specific elements. Content and fluency disruptors were also correlated with the Digit Span test suggesting that those subjects with greater attention scores produced more content and fluency disruptors

For the M group, clausal-embedding was correlated with Digit Span and in the personal-narratives, also with the Trail-Making Test. Therefore those M group subjects who performed better on the attention measures used more clausal-embedding. Better performance on the Trail-Making Test was related to increased right-branching but fewer main clauses. Their increased scores on the Digit Span test was also associated with fewer main clauses in the personal-narratives. A correlation also occurred between FAS fluency and the main clauses so that those subjects with more main clauses had a poorer performance on this test.

The M group demonstrated correlations between attempted ties and the three attention tests, suggesting that fewer such errors were produced by those subjects who performed better on these tests. This was particularly evident in the picture-sequences

11.3.3 Summary of correlations between attention and discourse measures

The RBD group's results on the attention assessments correlated with a smaller number of discourse measures than the M group. Furthermore, fewer clusters of results tended to occur for the RBD group with correlations occurring on individual tests and discourse measures. For both groups, substantially more correlations were found on the picture-sequences.

	Digit Span - Forward		**Digit Span Backward**		**Digit Span Mean**		**FAS Fluency**		**Trail Making A**		**Trail Making Part B**	
	RBD	**M**	**RBD**	**M**	**RBD**	**M**	**RBD**	**M**	**RBD**	**M**	**RBD**	**M**
TOTAL SAMPLES		CF -Att	-Att	Nsp CF -Att	-Att	CF Clt -Att		Nsp Coh Lex -Att	Att		Cnn	-Rbr And Att
PERSONAL	CF	-Rel	Lth	-Rel Clt -Mcl	Lth	-Rel Rbr		-Rel -Mcl	Lth Rbr			-Rbr Mcl
PICTURES	Lbr -Att	Cla CF -Cnn -Att	-Att	-Att	Lbr -Att	CF Clt -Att		-Rel -Nsp -Mcl Lex -Att	Cl. TU Ref	-Clt Att		-Clt
PROCED.	-DG	CF -Mcl	Lth	CF	-DG	CF -Mcl	Clt -Mcl -Att	-Nsp		Nsp Att	Nsp TU And	Mcl Att

Rel=Relevance
Nsp=Non-specific elements
Clt=Clausal-embedding
Rbr=Right-branching
Ref=Referential cohesion
Att=Attempts
DG=Discourse-grammar
CF=Content and Fluency disruptors
Cl=Clause-length
Lbr=Left branching
Cnn=Connectives
Coh=Total Cohesion
Cla=Clarity disruptors
Lth=Length
TU=T-unit-length
Mcl=Main clauses
Lex=Lexical ties

Table 11.8: Significant correlations between attention and discourse measures for both groups

11.4 Correlations between discourse measures of the RBD group[86]

The inter-correlation between the results of the discourse measures of the RBD group are presented in Table 11.9. Few correlations were recorded and limited clustering occurred. Due to the inherent difficulties of correlational research and the small subject group, only those correlations between discourse measures which could clarify specific RBD discourse difficulties were examined so that spurious conclusions could be avoided. These are discussed in Chapter 12.

11.5 Cognitive and Communication assessments

SUBJECT	W.A.B. A.Q.	N.A.R.T. Full-Scale IQ	MMSE	R.H.L.B.
S1	99.2	127	30	Both Metaphor tests =-3SD
S2	97	94	29	1 Metaphor = - 1SD.
S3	94.2	124	30	Stress and Discourse = -1SD.
S4	90.4	105	26	Both Metaphors -3SD. Inference, Humour, Stress = -1SD
S5	86.4	122	29	Inference = -1SD
S6	97.8	119	29	Humour = -1SD
S7	94.8	117	30	1 Metaphor, Discourse = -1SD
MEAN	94.3	115.4	29	

WAB = Western Aphasia Battery NART = National Adult Reading Test
MMSE = Mini-Mental State Examination RHLB= Right Hemisphere Language Battery

Table11.10: Results of standardised communication and cognitive tests.

[86] For complete correlational matrices and details, see Appendix A31.

	REL	D.G	NW	WT	WCL	CLT	MA	LEF	RGH	NSP	SUB	CON	CLA	REF	SBN	ELL	COJ	AND	CNN	LEX	ATT	COH
REL	-------																					
DG		------																				
NW		-**	-------																			
WT				-----																		
WCL				-------	-------																	
CLT				-------		-----																
MA				-------		-------	-------															
LEF				-------	-**	-------	-------	-------														
RGH		-*		-------		-------	-------		-------													
NSP										-------												
SUB											-------											
CON												-------										
CLA													-------									
REF			*											----								
SBN	-*														------							
ELL																-----						
COJ				*													-------					
AND																		-------				
CNN																	-------	-------	-------			
LEX				*	*			-*									**			-------		
ATT											-*										-------	
COH					*			-**						-------	------	------	-------	-------	-------	------		-------
DYSF					*			-*														

REL=Relevance DG=Discourse grammar CLA=Total Clarity disruptors NSP=Non-specific CON=Content and fluency CLT=clausal embedding
WCL=Clause length WT=T-unit-length COH=Total cohesion REF=Reference COJ=Conjunction LEX=Lexicalisation
ATT=Attempted cohesion DYSF=Dysfluencies *p<.05(2-tailed)[87] **p<.01 (2-tailed)

Table 11.9: Correlational matrix for RBD subjects on all discourse samples

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[87] The non-parametric correlational test, Spearman's rho, was used to examine the relationships between discourse measures and attention.

Most subjects scored above the aphasia quotient cutoff of 93.8. Two subjects scored below this - both S4 and S5 demonstrated impairments on the repetition and word fluency sub-tests and S5 also had a reduction in scores on the spontaneous speech sub-tests. Therefore, most subjects did not demonstrate deficits in the comprehension and production of language as examined by the W.A.B. The group's mean AQ of 94.3 was similar to the mean of 92.5 reported for RBD subjects (Horner et al 1992).

All subjects fell within the normal range on the MMSE and for the Full-Scale IQ using the NART. On the MMSE, all subjects scored within or above the range for both ageing subjects (24.6-27.6) and RBD subjects (17-27) (Folstein et al 1975, Cherney 1990). Areas of deficit on the RHLB were commonly on the Metaphor, Stress or Humour sub-tests.

All RBD subjects achieved a minimum score of 90% (L.Q. = 95) on the Edinburgh Handedness Inventory, indicating that they were strongly right-handed.

11.6 Summary

This chapter has presented a comparison of the discourse performance of the RBD and M groups. In addition, the effect of task and topic on each group's discourse production has also been set out. Both group's attention assessment results and the correlation between these and the discourse measures have been provided. The results presented here will be discussed in Chapter 12.

CHAPTER 12
RBD DISCOURSE PERFORMANCE
DISCUSSION OF RESULTS

This chapter provides a discussion of the comparative performance of the RBD group and the Matched (M) group. The effect of the tasks on the discourse production of each group is also considered. Possible explanations for the RBD discourse deficit are discussed and a potential account is proposed, based on the discourse model presented in Chapter 1. The RBD subjects are discussed as individual case studies in Chapter 13.

12.1 Group comparisons

A comparison of the RBD and matched control groups indicated that the relevance ratings of the discourse of the former group were lower than the matched group on all tasks and most topics. This finding replicates previous studies which reported reduced relevance by RBD subjects on a variety of discourse tasks as assessed on rating scales (e.g. Bloom et al 1993a, Lojek-Osiejuk 1996). The relevance ratings profile used in this study also provided details on the exact source of the irrelevance manifested by the RBD group. The most commonly occurring reasons were additional and excessive detail, insufficient content and the inclusion of broadly related but not specifically appropriate information (Chapter 13). These findings are supported by previous studies which found RBD subjects to be impaired in aspects related to relevance, e.g. global coherence (Joanette et al 1990), embellishments or elaborations (e.g. Cherney and Halper 1997, Roman et al 1987, Wapner et al 1981), excessive detail (e.g. Bihrle et al 1988, Myers 1993) and insufficient information (e.g. Davis et al 1997, Diggs and Basili 1987, Joanette et al 1989, Joanette and Goulet 1990, Mackenzie et al 1997a).

The discourse-grammar ratings of the RBD samples were differentiated by task. The RBD subjects' personal-narratives were rated as more appropriate than the matched control group. This is corroborated by Solberg (1990) whose RBD subjects produced adequate superstructure in personal-experience narratives. Furthermore, RBD subjects have been observed to perform story arrangement tasks appropriately (e.g. Huber and Gleber 1982). Results of investigations into the structure of a variety of other discourse tasks (e.g. narrative recall, video retelling etc) have been similar or conflicting (see Chapter 6). However the RBD subjects' performance on these cannot be directly compared with the present study. Although it could be hypothesised that the open-ended nature of the personal-narratives would elicit less appropriate and less complete discourse structure in the RBD group, this was not demonstrated here. Thus the personal relevance of the personal-narratives used in this study may have enabled them to perform better than on the less personally relevant picture-sequences. The importance of personal relevance and the RH is discussed in Section 12.2.

The discourse-grammar of the picture-sequences produced by the RBD group were rated as similar to the matched group, replicating the finding of Joanette and Goulet (1990). It would be hypothesised that the structure, content and sequence of events on this task would provide a sufficient framework for their narratives. However, the effect of structure on their performance may be a spurious explanation (see Section 12.2). In addition, RBD subjects have performed worse than normal groups on picture-sequence tasks (e.g. Rivers and Love 1980, Osiejuk 1989).

The procedural structure of the RBD group was rated as less appropriate than the M group. This was due to a reduced number of or insufficient details on essential and optional elements and also incomplete procedures (see Chapter 13). Impairments in procedural discourse production have been widely observed in RBD subjects due to fewer steps and incomplete procedures (e.g. Roman et al 1987, Sherratt and Penn 1990). McDonald (2000) reported a similar number of essential and total steps in RBD procedures, although the task used was simple compared to this study. The specific procedural topic used also affected the appropriateness of the ratings (as was also noted by Roman et al 1987), reinforcing the importance of topic choice.

Myers (1993) has proposed that RBD subjects are more irrelevant when they have difficulties with macrostructure. Whilst relevance and discourse-grammar were positively correlated in all tasks for the M group, this occurred only in the picture-sequences of the RBD group. These correlations suggest that as the discourse-grammar of these samples becomes more appropriate, they are rated as more relevant. However, Myers' proposal does not appear to hold for the RBD subjects who produced their most relevant but least appropriately structured discourse in the picture-sequences and the converse in the personal-narratives. Their performance on the picture-sequences may be related to the method of discourse elicitation itself (see Section 12.2). In the personal-narratives, the narrative discourse structure was adequately provided but the known impairments these subjects have with personal relevance resulted in them having difficulty in determining which information to select.

The subjective impression of RBD discourse as elaborated, imprecise, non-specific and repetitive is confirmed by the objective measures used in this study. The RBD group produced significantly more total clarity disruptors than the matched group in all samples. It is problematic to compare these findings to previous research due to the different categories and definitions of disruptors and the concept of clarity that have been used. An examination of the types of clarity disruptors revealed that the RBD subjects produced more non-specific elements than the matched group on all samples. This finding is in keeping with previous studies (e.g. Bloom et al 1993a, Cherney 1990), although some studies have not found an impairment in particular aspects of this category (e.g. Boyarsky 1985, Glosser and Deser 1992). These elements are considered to contribute to the continuity of discourse (Ripich and Terrell 1988) but their excessive use may disrupt meaning and may reinforce the notion that RBD subjects are "hyperfluent" because naturally occurring pauses are filled, possibly leading to the turn-taking difficulties already documented in these subjects. Content and fluency elements were also produced more frequently by the RBD in all samples. Similar findings have been reported in a variety of discourse tasks and genres (e.g. Cherney 1990, Lojek-Osiejuk 1996) but not for specific aspects in other types of discourse task (see Chapter 6).

Overall the RBD group produced longer samples which correlates with descriptions of them as verbose or excessive in spontaneous speech (e.g. Gainotti et al 1983, Gardner et al 1983, Myers 1994). However a closer examination of the results indicates that one of the factors affecting the sample length may be the discourse task used. The RBD group's personal-narratives were longer than the matched group, shorter in the procedures but similar on the picture-sequences. Although it would appear that the more structured picture-sequence task enabled the RBD group to produce samples of an appropriate length, previous investigations have produced anomalous results. Therefore the supportive structure provided by the picture-sequence narratives cannot be the only factor affecting the RBD discourse findings. The specific topic used may be a factor. For example, the frightening personal-narratives elicited considerably longer samples in most of the RBD subjects. This may relate to the interest value of this topic (see Chapter 2) or to the RBD's reported impairment in emotional processing, including the fact that emotional content suppressed their pragmatic performance (Bloom et al 1993a, Borod et al 2000 (Chapter 6). It is thus difficult to come to any conclusion regarding narrative length in RBD subjects as the results are clearly dependent on task factors and subject variables.

The length of the samples was negatively correlated with discourse-grammar for the RBD group (narratives only) and the matched group (picture-sequences only). Thus these longer samples were rated as having more appropriate discourse-grammar. This may suggest that there is a minimum length required for adequately structured discourse and shorter samples may result in less appropriate discourse-grammar. This may relate to McCabe and Peterson's (1990) contention that length is an excellent index of narrative complexity.

The syntactic complexity of the RBD group, as assessed on three measures, was found to be reduced compared to the matched control group. Clause-length however was differentially affected by task with shorter clauses occurring in narratives and longer clauses in procedures. Reduced clause-length in narratives may reflect the reduced qualification produced by RBD subjects previously reported by Joanette et al (1984, 1986). Further investigations are needed to clarify this point. T-unit-length was significantly shorter in the RBD than in the matched groups in all discourse samples, reflecting both the decrease in clause-length and in embedding. Reduced syntactic complexity has been previously observed in narrative, picture-sequence and procedural discourse (Joanette et al 1984, 1986, Sherratt and Penn 1990).

The significant reduction in and trends to decreasing syntactic complexity demonstrated by these RBD subjects requires explanation. It has generally been concluded that RBD subjects have little or no difficulty at the linguistic level (i.e. at the word and sentence level) (Bloom 1994, Glosser 1993, Glosser and Deser 1992, Myers 1993, Tompkins 1995). An explanation for their syntactic performance in this study may be due to the small sample size or lesion localisation. However only two of the seven subjects studied here continued their education beyond the minimal school leaving age. Thus as a group they can be considered as having a lower educational level which mirrors the finding regarding RBD subjects reported by Mackenzie et al (1997a, 1997b). Syntactic levels were found to be reduced in unskilled subjects compared to those in SES1 (Chapter 8). Although the RBD group was compared to a group matched for age and SES, the co-existence of SES and RBD may have exacerbated the syntactic complexity deficit. The reduction in syntactic level in the RBD group also mirrors the effect of age (Chapter 8). This will be discussed below.

Another possible explanation for the RBD group's decreased syntactic complexity may lie in their increased clarity disruptors. A negative correlation was found between clausal-embedding and non-specific elements in procedures, and between embedding and clarity disruptors in the picture-sequence, suggesting that as these clarity disruptors increased, embedding decreased. However, the M group demonstrated a greater clustering of correlations between embedding and clarity disruptors and yet they produced more clausal-embedding and fewer clarity disruptors than the RBD group. Thus, until further investigations are completed, the only conclusion that can be drawn regarding these two aspects of discourse is that they are co-existing difficulties.

Regarding clausal structure, the RBD group produced more main and fewer right-branching clauses than the control group on all samples, a finding which was comparable to subjects of a greater age or a less skilled group (as above). However, although the RBD subjects had less subordination overall, they produced a higher incidence of left-branching clauses, particularly in procedures. This is in direct contrast to the performance of older and less skilled subjects. An explanation for this finding is not clear-cut. Kemper and her colleagues (e.g. Kemper 1988, Kemper et al 1989, 1990) have shown that a decrease in left-branching clauses is correlated to working memory limitations as measured on the Digit Span Test. The RBD subjects in this study had similar Digit Span scores to the M group, suggesting that Kemper's explanation cannot account for this finding. The topics used to elicit discourse had a variable effect on this measure with greater, lower or similar quantities occurring. Thus the conflicting results may be the result of task and topic selection or an artifact or the small subject group and its heterogeneity.

The RBD group produced more cohesive discourse on the personal-narratives but less on the other tasks. Davis et al (1997) and Eccles (1991) also did not find significant differences in cohesion on various discourse tasks. The RBD group's use of referencing was similar to the matched group. This has been corroborated in their narrative production (Boyarsky 1985, Davis et al 1997, Uryase et al 1990) and in their appropriate use of anaphora to link sentences (Brownell et al 1992). However, both a reduction and increase in referencing has been noted in picture-sequences and story recall (Bloom et al 1995b, Cherney and Halper 1994). The RBD group produced a comparative reduction in lexical cohesion in the picture-sequences. To correctly identify between the two male characters in this task, both referential and lexical ties are necessary to render the referents clear to the listener. For both groups, a positive correlation between referencing and lexicalisation in the picture-sequences suggested that as one type increased in this task, so did the other. In contrast to the matched group, the RBD subjects did not increase their use of lexical ties, resulting in increased cohesive errors. Uryase et al (1990) have also observed a reduction in lexicalisation in video retelling which they explained in terms of a reduced need to repeat key terms if the discourse was short. This explanation is not applicable in the present study as both groups employed less lexicalisation with the longer samples elicited by the personal-narratives. The repetitiveness ascribed to RBD discourse cannot be related to increased lexicalisation and is more likely to be due to the reiteration of phrases, sentences and ideas (as discussed above).

The RBD subjects' conjunctive use was only lower than the matched group in the personal-narratives. This may be ascribed to RBD subjects' overreliance on encyclopaedic information, resulting in the procedural information provided by certain connectives not being accessible to these subjects (Dipper et al 1997). These connectives may not have been the ones predominantly used in the picture-sequences and procedures due to the nature of the relationships (causal) within them. The increased use of "and" in the picture-sequences of this study has also been noted by Cherney and Canter (1990a) and Sherratt (1988) but not by Bloom et al (1995a).

The RBD group produced more cohesive errors than the matched group on most topics. Cohesive errors have been observed more frequently in these subjects in a variety of genres and tasks, including those similar to the tasks used here (e.g. Bloom 1994, Cherney 1990, Eccles 1991, Joanette et al 1984, Joanette and Goulet 1990, Sherratt 1990). Nevertheless, no such increase has also been noted (Boyarsky 1985, Davis et al 1997).

The increase in non-specific elements (indefinite terms and deictic terms) by the RBD group may be attributable to a decrease in referential or lexical ties. However no correlation between these measures was found. In contrast, a cluster of correlations in the M group indicated that as lexicalisation increased, non-specific elements decreased. Therefore, for the RBD group, the increased incidence in these elements would appear to occur regardless of their cohesive skills. In addition, no correlation was found between the incidence of non-specific elements and cohesive errors in either group.

RBD subjects have frequently been described as "hyperfluent" but in this study, they demonstrated a trend towards more dysfluencies than the matched group with significantly more in the narrative genre, specifically in the personal-narratives. Dysfluency has not been examined to any extent in this group, apart from single-case studies demonstrating increased dysfluency (Ardila and Lopez 1986, Horner and Massey 1983). Thus their perceived hyperfluency may be due to increased clarity disruptors (as discussed above), rather than fewer dysfluencies.

12.2 Discourse sampling effects on the performances of each group

The incidence of specific aspects of discourse measured in this study varied by task and subject group. Due to space restrictions, the discussion here will focus on the three tasks used, rather than the eight individual topics which may have demonstrated differing and/or conflicting results. The effect of task and topic on discourse production has not been extensively examined in RBD subjects and thus comparisons to previous research are limited. Tompkins (1995) has stated that each method of elicitation incorporates different demands on cognitive resources and these demands must be borne in mind when interpreting results.

For both groups the most relevant discourse was elicited by means of the picture-sequence narratives and the least in the personal-narratives. Thus the most relevant discourse was produced on the more structured discourse tasks and the least in the least constrained. This finding has been supported by previous research in which RBD subjects produced a more relevant quantity of information in picture-sequences than procedural discourse (Cherney and Canter 1990), with the latter containing additional information (Cherney 1990).

The RBD subjects produced more appropriate discourse-grammar in the personal-narratives than the procedures with the picture-sequences being rated the least. A similar finding of greater difficulty in picture-sequences than procedures has been noted (Lojek-Osiejuk 1996). It would be hypothesised that even if these subjects have difficulty in providing a discourse schema on a less structured task, the structure and sequence of events on a picture-sequence task would provide sufficient framework for their narratives. However neither group produced the most appropriate discourse-grammar on this type of task. The increased difficulty which both groups had on this task may reflect the inapplicability of this method of discourse elicitation. Thus they may not have considered it appropriate to provide adequately structured narratives *because* the structure was provided. Furthermore, although these sequences were selected on the basis of being appropriate and relevant to adults, the task itself is not ecologically valid. If retelling such a narrative is not an appropriate communicative event and therefore not relevant to the subjects, they may not provide adequate narratives. Wirz's (1993) comments regarding the performance of NBD subjects on standardized assessments is applicable here.

> *"Communication, perhaps more than any other behaviour, has - as a vital prerequisite - the need to communicate, and if that need is absent one must ask how representative the resulting behaviour really is". (p 11).*

The ecological validity of the task specifically to RBD subjects may have particular importance. Vanhalle, Lemieux, Joubert, Goulet, Ska and Joanette (2000) reported that the degree of naturalness of the situational content of the task influenced the performance of these subjects in processing indirect speech acts.

Furthermore, it has been hypothesised that familiarity processing or personal relevance is implicated in the behavioural deficits associated with the RH (Van Lancker 1991, 1997) and this has affected RBD discourse performance (Rehak et al 1992b, Sohlberg 1990). Thus the personal relevance or interest value of discourse elicitation tasks used with RBD subjects may affect their ability to produce an appropriate discourse structure and, in this study, it may have enabled them to perform better than on those less personally relevant.

The RBD subjects produced more clarity disruptors in procedures and picture-sequences than personal-narratives, as previously noted by Sherratt and Penn (1990). Although the matched group's performance on these measures did not vary by task, the picture-sequence task for both groups elicited fewer non-specific elements but more content and fluency disruptors than the personal-narratives and procedures. The content provided by the picture-sequences may have enabled them to be more specific in their discourse but the unfamiliarity/lack of ecological validity of the task may have elicited more comments. In a related finding, Cherney (1990) found fewer non-specific clauses in her RBD subjects' story recall and picture description tasks than procedures.

Task had a similar effect on the length of the samples in both groups with longer personal-narratives being produced and shorter ones on the picture-sequences and procedures. Thus the two more constrained tasks would appear to have had limiting effect on sample length for both groups. On the syntactic complexity measures, the RBD group produced their longest T-units and most embedding in the procedures but demonstrated no variation in clause-length, thereby replicating the finding of Sherratt and Penn (1990). The lack of difference in clause-length between the two narrative tasks suggested that the structure and content provided by the visual stimuli did not increase nominal and verbal complexity nor clausal-embedding or T-units. In contrast the matched group produced considerably greater syntactic complexity in the picture-sequences. The visual perceptual impairments frequently associated with RBD may be detrimental to their performance on a visually-based task although this has not been unequivocally demonstrated (Chapter 6). However, no such impairments were recorded or reported by the RBD group.

The RBD subjects produced similar percentages of main clauses and right-branching clauses regardless of sample type. This is comparable to their performance on clausal-embedding, possibly reflecting structural differences in the tasks as discussed above. In contrast the M group produced fewer main and more right-branching clauses (and more clausal-embedding) in their picture-sequences. However both group produced their highest incidence of left-branching clauses in the procedures which may indicate the predominant temporal and causal propositional relationships expressed in this genre.

The effect of task for both groups on the incidence of total cohesive ties was similar with the picture-sequences being the most cohesive and the personal-narratives the least. This configuration also held for both groups in the incidence of reference. This suggests that the picture-sequences required the speaker to use referential ties, rather than other means (e.g. descriptions or lexicalisation) to provide a link to the referent. However in this task, the M group also produced their highest incidence of lexical ties, but this occurred in the procedures of the RBD group. As previously described, both reference and lexicalisation were needed in the picture-sequences. However, it is obvious that the RBD subjects did not increase the amount of lexicalisation in this task, possibly resulting in the increased cohesive errors on this task. Both groups produced their greatest number of cohesive errors in the picture-sequences. This suggests that the content provided by the visual presentation required them to be more specific (cf non-specific elements) than in the other two tasks in which they could use other forms of qualification or identification to link referents. Davis et al (1997) found a similarly low cohesion ratio (number of complete ties to clear elements) in both groups in picture-sequences which they ascribe to the fact that as these are in view of the listener, there is less need for referents to be identified. In the present study, the picture-sequences were (purposely) placed in view solely of the speaker. Although the picture-sequences were not in view of the listener, it is not possible to determine if the speaker bore in mind the fact that the listener knew the referents depicted in the sequence and therefore did not have to clearly differentiate between them.

Perhaps the explanation for both groups' increased errors on the picture-sequences lies elsewhere. Both the picture-sequences used in this study were specifically selected to depict two male characters (this fact was emphasised as part of the task directions). The presence of these two male characters should have alerted the subjects to the need for clearer referencing or increased re-lexicalisation. In contrast, the personal experiences were recalled using the first person singular and possibly other characters who could be easily identified. The production of procedural discourse is mostly presented in the imperative tense (with or without pronouns). Therefore the difficulty that both groups had on the picture-sequence may relate to need to differentiate between the two male characters by using referential ties. Although the picture-sequences used here were specifically selected to incorporate two characters of the same gender in order to assess referencing skills, this is an area that requires further investigation in both normal and RBD subjects.

Both groups produced the lowest incidence of conjunctions in the picture-sequences and the highest in procedures, indicating the logical and temporal sequencing of this genre. The RBD group produced the most "and"s in the picture-sequences compared to the other two tasks whilst the matched group produced the least in the picture-sequences and the most in the personal-narratives. The greater use of this least marked conjunction by the RBD group in this task may reflect the difficulties that they had reflecting with the propositional relationships (see Section 12.3).

The incidence of dysfluencies in the discourse of the RBD group remained unaffected by the differing demands of the tasks. In contrast, the matched group had significantly fewer dysfluencies in the picture-sequences than the other two tasks. The exact type of dysfluencies exhibited by the RBD subjects in each task may have differed and require further examination.

12.3 Is there an explanation for the RBD subjects' discourse deficits?

As has been discussed, the effects on discourse performance of the age and SES of subjects as well as the discourse sampling methods employed are considerable. In addition, subjects suffering from RBD have produced discourse which demonstrated differences to control subjects who were closely matched for age and SES. The question to be addressed now is whether there is a possible explanation for the variety of discourse difficulties exhibited by the RBD subjects. Potential explanations will be presented and explored.

12.3.1 Potential explanations of the RBD discourse impairments

Firstly, do the effects of ageing and SES correspond in any way to the effects of RBD? RBD subjects' discourse performance demonstrated similar trends on certain measures of discourse performance to that of the effects of ageing and of SES (see Table 12.1). It must be remembered that whilst the trends appear similar, the RBD subjects' performance deficits were more extreme on all measures as their results were compared to age- and SES-equivalent subjects.

VARIABLE	PERSONAL			PICTURE			PROCEDURE		
Relevance	R	A	S	R	A	S	R	A	S
Discourse Grammar							R	A	S
Clarity disrupters	R		S	R	A	S	R	A	S
Non-specific	R		S	R	A		R	A	
Substitution	R	A	S						
Content/flu.	R		S	R	A		R	A	S
Prod/Syntax	——	——	——	——	——	——	——	——	——
Length	R	A		R	A	S	R		SS
T-unit length	R	A	S	R	A	S	R	A	S
Clause length							R		S
Embedding	R		S	R	A	S	R		S
Clausal structure	——	——	——	——	——	——	——	——	——
Main Clause	R	A		R	A		R		S
Right-branching	R		S				R		S
Left-branching									
Cohesion				R	A	S	R	A	S
Reference	R		S	R		S	R	A	S
Lexical	R		S	R	A	S			
Substitution	R	A							
Ellipsis				R	A	S			
Conjunction				R	A	S	R	A	
"And"	R	A	S				R	A	
Connectives	R		S						
Attempts				R	A	S			
Dysfluency	R	A					R		

Key: R=RBD subjects performed less well than M group
A=Trend to decreased performance with age (from 50s to 80s).
S=Trend to decreased performance from professional to unskilled.

Table 12.1: The effects of right brain-damage, age and SES on discourse measures.

As discussed in Chap. 6, more rapid deterioration of right than left hemisphere functions have been put forward as an explanation for RH communication deficits. This ageing hypothesis has had limited previous support and the results of the present investigation do not provide any additional corroboration. Although there were similarities between the RBD and ageing subjects, there were also many differences. Furthermore, as Gardner et al (1983), Roman et al (1987) and Wapner et al (1981) have already observed, RBD has a qualitatively different effect to age. Additional research may shed further light on lateralized ageing. Similarly, RBD subjects and less skilled subjects performed less well on certain measures. Nonetheless, the former's performance was more extreme than the latter as the RBD subjects were matched to the M group for SES. Thus the effect of poorer education and fewer employment and training opportunities did not have as great an effect on discourse performance as RBD itself did. It has been suggested that education results in increased lateralisation of language representation in the brain (Lecours et al 1988) (see Chapter 5) and therefore RBD and SES would be expected to have a similar effect on discourse. This is clearly not the case here and reduced SES cannot on its own provide an explanation for RBD subjects' impaired discourse performance. As stated previously, discourse is a high-level language task and the importance of education levels or SES must be borne in mind when examining subjects with any neurological impairment.

Secondly, most of the RBD subjects in this study performed within normal limits on the tests of cognitive status, IQ level and general communicative functioning. Thus their discourse deficit was observed in the presence of normal or near-normal functioning. Therefore the cognitive skills implicated in discourse performance were not adequately assessed by these tests and such assessments do not shed any additional light on the RBD subjects' discourse impairments.

Thirdly, impaired attentional skills are widely reported following RBD and have been considered as a possible underlying deficit in RBD communication difficulties (see Chapter 6). This study attempted to address the interaction of these attention deficits and discourse performance by assessing the subjects' attentional mechanisms. Attention declined significantly with age on all three tests and with SES on two. Bearing in mind the previous discussion of the effects of ageing and SES and the fact that RBD subjects performed even more poorly than the most aged or least skilled subjects, an even greater deficit in RBD attention skills may be regarded as having considerable merit as an explanation for their communication deficits. However, the RBD subjects performed similarly to the control group on two attention tests which are considered to assess concentration, sustained attention and working memory (see Chapter 2). These brain-damaged subjects only performed significantly worse on the Trail-Making Test which assesses the ability to attend whilst inhibiting responses and resisting interference (Mesulam 1985). Furthermore attention tests emphasise slightly different components of attention and there is often overlap amongst them (see Chapter 2). Thus it is not clear exactly which aspects of attention may be implicated in the RBD discourse deficit. Another important point to bear in mind is that the Trail-Making test is highly vulnerable to the effects of brain injury and also to lateralized strokes (regardless of hemisphere) and can also provide a rough index of the patient's executive functions level (Prigatano et al 1986). Thus a poorer performance on this test could be the result of any brain-damage, not specifically to the RH. Some discourse impairments observed in RBD subjects (less essential information and more off-topic utterances) showed an increase with a decrease in general cognitive status (Cherney and Canter 1992).

It can thus be concluded from this study that deficits in attention cannot be the sole underlying mechanism to explain RH discourse impairment. Tompkins, Bloise, Timko and Baumgartner (1994), in their discussion of the role of working memory and inferencing, consider that the major risk of a working memory/cognitive resources perspective is that it can be too seductive. However, they continue to state that the potential power of resource explanations of brain-damaged patients' performance requires more rigorous work to investigate the nature of the resource deficit itself, its associations between component processes, resources and performance, the interaction between speed of processes and resource limitations, etc.

Although a deficit in attention or sub-components of attention cannot be the sole determinant of RBD impairment, it may be one of a number of underlying causes or a contributory factor or it may interact with other underlying deficits to provide an explanation. For example, a positive correlation was observed between personal-narrative length and Part A of the Trail Making Test i.e. a poorer performance on this test is correlated with longer samples. Part A of the test is considered to measure sustained attention in which the RH frontal lobes and parietal lobes have been implicated (Foster et al 1994, Tompkins 1995). Therefore, a reduction in performance on this part of the test may contribute to the significantly excessive length of the personal-narratives by the RBD subjects. However, in contrast, *poorer* sustained attention results on Part A correlated with *longer* clauses and T-units and *increased* referencing on the picture-sequences. Their better performance on Part B (considered to assess alternative attention) correlated with an increased incidence of non-specific clauses and more "ands" in procedures and with longer T-units in personal-narratives. As can be observed, there is not a straightforward explanation of the performance of RBD subjects on attention measures. Recent developments into the nature and composition of attention itself may provide clearer concepts and assessments for clinical populations. Recently, many theorists have incorporated an executive function into their models of attention. This provides overall control of the attentional processes and co-ordinates the various attentional processes when more complex or novel tasks arise (Baddeley 1990, Baddeley, Cocchini, Della Sala, Logie and Spinnler 1999, Shallice 1988, Whyte 1992). Its exact nature has been debated but it is agreed that simultaneous tasks require special management (Hartley 1992). Such tasks may include discourse processing. Thus more detailed attention assessments are needed to determine what input specific attentional mechanisms have to the RBD discourse deficit.

None of these explanations can on their own account for RBD performance. A potential explanation for the discourse impairments demonstrated by this group is now presented.

12.3.2 A model-based explanation of RBD discourse impairments

The discourse impairments exhibited by the RBD subjects in this study are quantitatively and qualitatively different to those exhibited by older and by less skilled subjects. This combination of impairments is also unique to the RBD population although certain deficits may be found in other brain-damaged populations. To account for this, a modified version of Frederiksen et al's (1990) stratified model of discourse processing was used (Figure 12.1). It is proposed that a deficit at the level of the selection and topicalisation of information may account for their discourse impairments (Sherratt 2000b) (indicated in colour in Figure 12.1). At this stage of processing the information to be communicated needs to be selected from the fully specified conceptual structure and then arranged in the order it should be conveyed. These processes are performed on the basis of assumptions made about the communicative situation and about the listener's prior knowledge and inferences. Furthermore, the information needs to be topicalised to reflect the distinction between shared and new information and to indicate the priority of the information. The selection of topics is necessary to constrain the order in which information is introduced (Frederiksen et al 1990). Information regarding the listener and the communicative context is provided by interaction with the pragmatic/judgement aspect of cognition. An impairment at this level may account for the following discourse impairments which were documented in this study.

Firstly, the RBD subjects' difficulties with the relevance and quantity of information provided can be attributed to a deficit at this level of processing. In the model, earlier stages of processing lead to long and detailed discourse which then needs to be selected and topicalised according to contextual and listener needs. These decisions are directed by the interaction with the pragmatic/judgement aspects of cognition. RBD subjects have been reported to have an impairment in determining shared knowledge and also in using an appropriate level of detail (discussed below). If they have difficulty in appropriately selecting and prioritising information to be conveyed, the discourse provided would be irrelevant and the amount of information conveyed would be inappropriate.

Secondly, an impairment in the selection and topicalisation of information in RBD subjects can also account for the general decrease in syntactic complexity (reduced clausal-embedding, shorter T-units) and in right-branching clauses, and the increased use of main clauses. Recent emphasis has been placed on the hypothesis that linguistic structures should be evaluated for the role that they play in marking or signaling the conceptual structure of a text (Frederiksen et al 1990). Discussing aphasic discourse, Ulatowska and Olness (2000) state that

> *"any discourse measure should be carefully examined for the assumptions it makes about the relationship between sentence-level skills and discourse production" (p 249).*

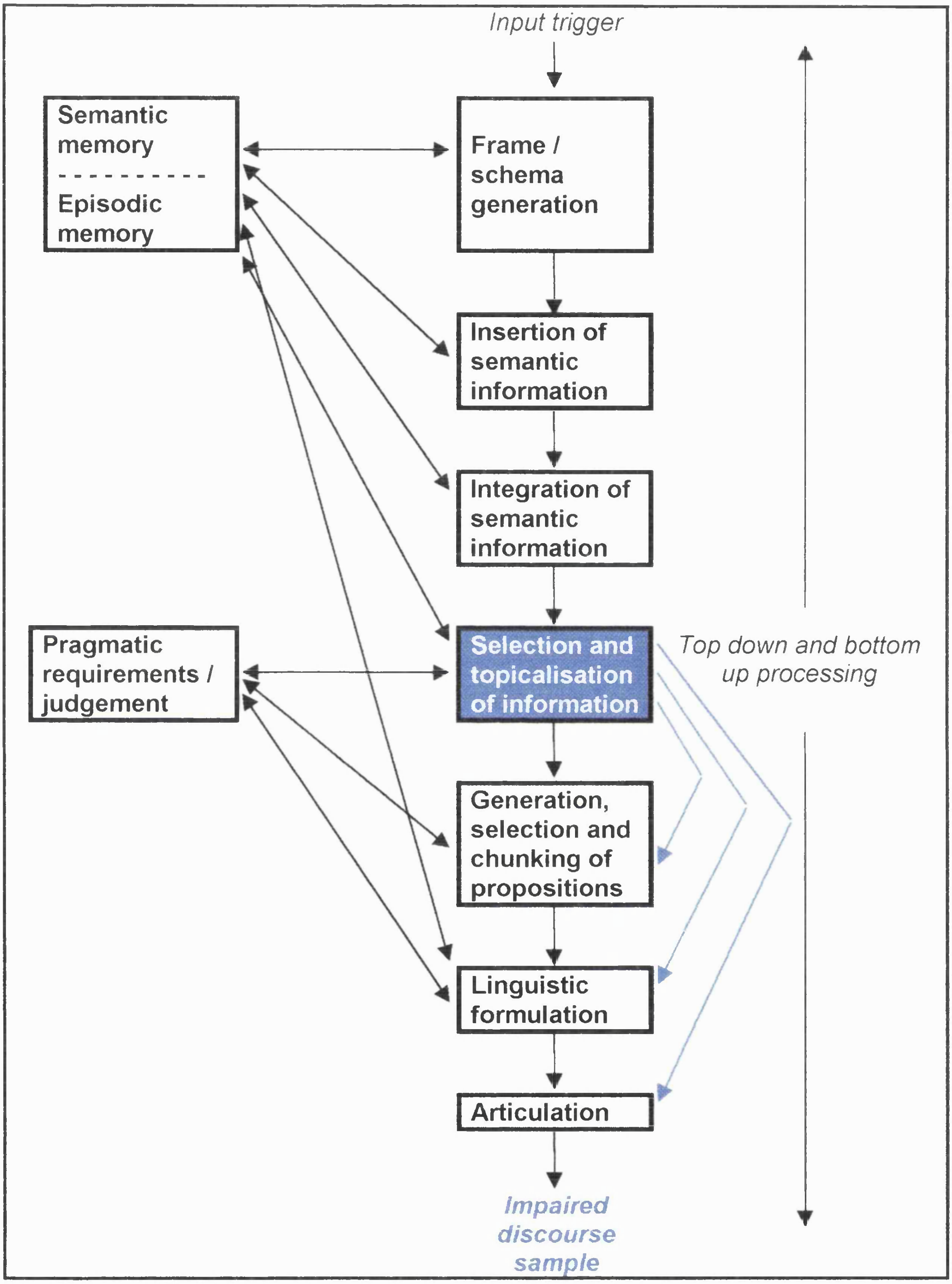

Figure 12.1: Modified version of Frederiksen et al's (1990) stratified model of discourse processing

The selection of topics and assumptions about shared knowledge influence and are necessary to constrain the aspects of sentence structure used to express information in text (Caplan 1992, Frederiksen et al 1990). If the information is not appropriately selected and topicalised, the propositions which are generated cannot adequately reflect this syntactically. Evidence for the relationship between the conceptual and syntactic levels has come from a variety of sources. Studies into discourse comprehension have shown that the specific syntactic aspects used (e.g. prepositions, verb aspects, first-mentioned participants, proper names) enable the listener to determine which the important events for understanding the text's event structure are and thus for constructing a mental model of the situation being described (Fayol and LeMaire 1993). Furthermore,

> *"these linguistic cues seem to act as indicators of the cognitive operations to be carried out, that is, to focus one's attention on one particular aspect or another, to stop focusing one's attention on that aspect, and so on." (p 16).*

In discourse production, stories by children demonstrated that whether information remains in a topical position across clauses at the linguistic level depends on the narrative frame constituents at the conceptual level (Bracewell 1986). Information which is topicalised in a speaker's message will be given some kind of priority treatment in grammatical encoding, usually as a subject, and other entities of importance will tend to be encoded in a major grammatical function (Levelt 1989). The topic encoded as a subject typically refers to old or given information whilst objects refer to new or comment information (MacWhinney 1982). Therefore the subject of a sentence is typically shorter and syntactically less complex than predicates because subjects are more often lexicalised and pronominalized whereas objects are more likely to be expanded and elaborated (Bates and MacWhinney 1979). For example, causal clauses tend to be more elaborate and explicit and tend to express information that is new (Degand 2000). Thus important topicalised information is usually presented in main clauses whilst less important of background information is presented in embedded clauses (Bever and Townsend 1979). If topicalisation is impaired, it would be expected that RBD subjects would use fewer embedded clauses, which they in fact do. This explanation is corroborated by the fact that RBD subjects were not impaired in their ability to recall main ideas but had difficulty with peripherally related information (see Chapter 6). Joanette et al (1986) also reported few complex propositions in RBD subjects' picture-sequences. Frederiksen et al (1990) propose that this result may indicate a dysfunction at the propositional level or it may reflect a dysfunction at a frame level that has consequences for productions at the proposition level.

In addition, the importance of syntactic structure and its relationship to meaning cannot be overlooked.

> *"The meaning of a sentence crucially depends on its representation, which establishes what relations its lexical items bear to each other" (Schneiderman and Saddy 1988, p 51).*

If RBD subjects have difficulty in producing the necessarily complex syntactic structures to convey meaning, then this may impinge on their overall difficulty in producing relevant and concise discourse as well as providing appropriate discourse-grammar.

The third aspect of discourse production to be accounted for is the use of connectives (conjunctions, including “and”). The propositions generated during discourse production are related to each other by particular kinds of links and relations to form a semantic network such as goal relations, thematic relations, causal relations, location relation, temporal order relations and others (Stemmer and Joanette 1998). Renkema (1993) considers discourse relations to be the cement between the blocks/propositions of discourse. These relations are expressed implicitly or explicitly by verbal expressions. Thus conjunctions, inter alia, are the explicit expression of the links and relationships between propositions at the conceptual level (Frederiksen and Stemmer 1993). For example, temporality or temporal order relations at a conceptual level will be expressed by means of temporal conjunctions, verb tense, temporal adverbial phrases, simple linear concatenation, etc. (Ulatowska and Olness 2000).

If the RBD subjects have a deficit at the level of selection and topicalisation of information, they will have difficulty determining the relations and links between the propositions which are generated and thus use either fewer or less marked connectives. In this study, RBD subjects did produce discourse with less clausal-embedding, more main clauses and fewer right-branching clauses than the M group and therefore used fewer connectives. Furthermore, the RBD group's personal-narratives contained the least connectives of the three tasks whereas the M group's contained the most. It could thus be proposed that the RBD group had more difficulty reflecting the relationships between propositions in this task. A related finding is pertinent to this point. Trabasso et al (1984) demonstrated that constructing causal chains was important in understanding narratives and that the recall of events increased as the number of connections an event had increased. From this, if the RBD had a problem at the level of selection of information, they would have difficulty in determining causal relationships and reflecting this relationship in the use of connectives. This would therefore result in poorer recall and reproduction of their personal-narratives. In contrast, on the picture-sequences where the content and causal relationships were provided, the RBD subjects were able to produce adequately connected discourse.

The use of "and" is also of relevance here. "And" is considered to be the least marked conjunction and it is often difficult to determine when it is used cohesively or not (Halliday and Hasan 1976). "And" may be used as a continuant or place-holder or it may indicate that the speaker had difficulty in providing a conjunction which would reflect the relationship between the propositions, thus rendering the relationship unclear. The incidence of this conjunction was low in the RBD group's personal-narratives but high in their picture-sequences and procedures. The low use of "and" (and other conjunctions) in the personal-narratives may reflect the difficulty they may have in determining the relationships between the concepts, whilst their increased use in picture-sequences and procedures may indicate an <u>attempt</u> to demonstrate the propositional relationships in discourse which is more structured.

Fourthly, the RBD subjects demonstrated an increased incidence of content and fluency disruptors (repetition, comments and personalisations) in their discourse production. If an impairment occurs at the processing level proposed here, their increased use of comments and personalisations may indicate the difficulties that they are having in selecting the relevant information to supply discourse appropriate to the requirements of the discourse task and communicative context. Their greater use of repetition may be a stalling device to provide more processing time whilst they attempt to provide the appropriate syntactic structure to reflect the topicalisation of information.

In the fifth instance, a deficit at the level of selection and topicalisation of information should not result in a lower incidence of cohesion (apart from conjunctions discussed above). The specification of words within sentences and the replacement of content words with cohesive markers takes place at the level of linguistic formulation. The RBD subjects only demonstrated a limited decrease in cohesion and some increase in attempted ties. Renkema (1993) discussed research that suggests that both grammatical knowledge and pragmatic factors play a role in the interpretation of reference. Thus, even if the RBD subjects are impaired in their ability to differentiate between shared and new information (including referents), they may have sufficient grammatical knowledge to provide adequate cohesion.

Finally, a deficit at the level of selection and topicalisation of information may also explain the increased use of dysfluencies by the RBD subjects. The type of dysfluency occurring must be taken into account. Dysfluencies such as part word and word repetitions may be difficult to account for in terms of such a deficit. However, the type of dysfluencies which were predominantly used by the RBD subjects (false starts and incomplete mazes) may reflect either the difficulties that they have in selecting appropriate information or in formulating appropriate syntactic forms to reflect the topicalisation of information to be communicated.

Thus the results of the RBD subject groups support the view of a breakdown at the level of selection and topicalisation of information, a hypothesis that can also be supported by evidence from other sources. Firstly, this level operates on the basis of assumptions about the communicative situation and the listener's knowledge and inferences i.e. information provided by the pragmatic/judgement aspect of cognition. Previous investigations have concluded that RBD subjects have an "impaired appreciation of listener needs" (Myers 1994, p 520), have difficulty in taking the perspective of the interlocutor and in-having an awareness of the latter's knowledge (Brownell et al 1997, Kaplan et al 1990, Klonoff et al 1990, Tompkins 1995). They are considered to have variable abilities in producing utterances that are sensitive to the needs of the listener i.e. discourse tailoring (Sabbagh 1999). In a related finding, RBD subjects judged tangential conversation as normal significantly more often than control subjects indicating that RBD subjects may suffer from a breakdown in those components of their mental models which deal with judging intention and appropriateness in conversation (Rehak et al 1992a). This impairment exhibited by RBD subjects relates to the "theory of mind" explanation of their difficulties (see Chapter 6) which has received experimental support (Winner et al 1998). As stated by Tompkins (1995), social awareness should receive more attention and exploration.

Secondly, support for a deficit at this conceptual level may come from attention tests. These brain-damaged subjects performed significantly worse than the NBD subjects on the Trail-Making Test which assesses the ability to attend whilst inhibiting responses and resisting interference (Mesulam 1985). At the level of selecting and topicalising information the speaker needs to pay attention to and choose his information from the fully specified conceptual structure. This would also incorporate the need to inhibit information which is not appropriate to the communicative context or listener. As Wilson and Sperber (1991) state,

> *"an individual with finite processing resources, who is aiming to maximise relevance, should pay attention to the phenomena which, when represented in the best possible way, and processed in the best possible context, seem likely to yield the greatest possible contextual effects in return for the available processing effort" (p 588).*

Thus the breakdown suggested at the selection and topicalisation level may receive support from the RBD attentional impairments as assessed in this study. These impairments may also be linked to the fact that on many measures, these subjects did not adapt or adjust their performance to the constraints of the task. This was particularly evident in the picture-sequences.

Thirdly, RBD subjects have been reported to have difficulty determining an appropriate level of detail and provide excessive and unnecessary detail (see Chapter 6). They also have significant deficits in conciseness (i.e. informative without conveying excessive detail). It has been reported that the RH additionally maintains activation for more peripherally related information (Richards and Chiarello 1997). Although either hemisphere can support the activation of strongly related meanings, peripherally-activated semantic information may be initially activated only by the RH. These findings provide support for the fact that RBD subjects may not have difficulty selecting strongly related information (e.g. main ideas) but are impaired in choosing that information which is peripheral (and therefore less strongly relevant) and therefore more dependent on the nuances of the communicative context and the listener's needs.

The explanation of the RBD discourse breakdown given above is of an exploratory nature at this stage and all aspects require further clarification and investigation (see Chapter 14). However, as this level has been pinpointed as a potential source of RBD discourse breakdown, it could become the focus for future research. Whether the precise details can hold in the light of future investigations or not, the crucial importance of the use of a multi-level discourse model to examine and explain discourse deficits remains.

12.4 Summary

This chapter provided a discussion of the comparison of the RBD and M group's discourse performance, taking into account the effect of the discourse sampling techniques. Possible interpretations of their discourse production were discussed and a potential account based on the discourse model was presented. In-depth investigations of each individual RBD subjects can be found in the following chapter (13).

CHAPTER 13
RBD DISCOURSE PERFORMANCE
CASE STUDIES

This chapter presents the differentiation of the RBD subjects into three sub-groups, based on their case-studies. The incorporation of these sub-groups into the model-based explanation of RBD discourse deficit (Chapter 12) is also discussed. Summaries of their individual discourse performance on the three tasks are then provided

13.1 Introduction

The results of the RBD group have been presented in the previous chapter. However both the reported heterogeneity of the RBD population and the variability observed during data analysis suggested that the group results were obscuring their individual performance. Therefore they were investigated separately and three potential sub-groups were identified on the basis of the defining characteristics of their discourse performance.

13.2 Possible sub-groups of subjects[88]

Three sub-groups were identified and are detailed below. On certain measures (e.g. syntactic complexity), the individual subjects mirrored the performance of the group as a whole but other measures (e.g. length, dysfluencies) differed substantially between sub-group. Thus deficits in particular aspects of discourse may be common to all RBD subjects with sub-groups demonstrating strengths or deficits in other aspects.

There does not appear to be any relationship between the site of lesion of the subjects and the characteristics of the sub-groupings. This may reflect Muller's (1992) contention that "there is no reason to assume that the boundaries of

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[88] Personal details of the RBD subjects are provided in Chapter 10.

vascular supply are identical to those of 'cognitive modules' or functionally specialized 'centres' "(p 464).

13.2.1 Group I (S3 and S7)

Their discourse was characterised by

- mostly adequate relevance and discourse-grammar but a reduction on the picture-sequences.
- decreased length of output
- reduced syntactic complexity.
- increased clarity disruptors, particularly content and fluency disruptors.
- adequate cohesion in all tasks but a decrease in the incidence of "and", conjunctions and connectives.
- limited incidence of dysfluencies.

They both demonstrated a similar performance on the cognitive, communication and attention tests (apart from the Trail-Making test).

13.2.2 Group II (S1 and S2)

Their discourse was characterised by

- mostly relevant and appropriately structured discourse.
- lengthy output on narratives.
- predominantly adequate or slightly reduced syntactic complexity
- increased use of content and fluency disruptors.
- adequate use of all cohesive ties and few cohesive errors.
- an increase in dysfluencies, particularly in the personal-narratives.

They demonstrated a similar performance on cognitive and communication tests (apart from NART IQ). S2 performed less well on the attention measures than S1.

13.2.3 Group III (S6)

His discourse performance was considered to fall within the normal range, despite some reduction in attention measures and RHLB scores. This finding is expected in the light of the fact that only one-half of RBD subjects would experience communication difficulties.

13.2.4 Remaining subjects (S4 and S5)

These two subjects demonstrated some similarities (increased dysfluencies, increased clarity disruptors but not the same types) but could not be appropriately categorised into a separate sub-groups or into the three sub-groups discussed above. They may represent additional groupings and require further investigation.

13.3 Incorporation of the sub-group results into the model-based explanation of RBD discourse deficit

The in-depth investigation of the discourse of the RBD subjects has provided additional insight into the heterogeneous nature of their discourse deficits. The results obtained could be ascribed to individual variation rather than the effects of RBD. However, the advantage of using more than one discourse genre, task and topic means that individual variation could be taken into consideration but the overriding effects of RBD could still be extracted and sub-groups delineated. If only a small number of samples had been elicited from the subjects, the possibility of the results purely reflecting individual variation would have risen substantially.

Although the individual performance of these subjects varies and the sub-groups may appear diverse, their discourse deficits can be incorporated into the explanatory account given in Chapter 12. Many of the deficits which are common to all sub-groups (e.g. syntactic complexity) have been explained by the deficit at the level of selection and topicalisation of information of the discourse processing level. In addition, this can also account for Group 1 supplying too little information and Group II producing too much in their personal-narratives. Furthermore, both insufficient and excessive detail as demonstrated by these two sub-groups is implicated in the relevance ratings. The account given may also explain the variable use of dysfluencies by these sub-groups. Thus the varying performance of this RBD group can be understood and rationalised using the proposed processing model.

13.4 Summaries of the discourse performance of each subject

These summaries are presented individually below. Their results on each task as assessed on each discourse measure have been compared to the M group using the modified t-test (Crawford and Howell 1998) (see Appendix A32). Full details and discussion of the subjects' discourse performance are provided in Appendix A33.

13.4.1 SUBJECT 1 (S1)

S1, aged 70, had suffered a haemorrhagic RH CVA five years previously. He had a degree in chemistry and had been the managing director of a manufacturing company until his retirement. He lives with his wife and is involved charity activities. He has never received any speech or language therapy. He presents with a left-sided hemiplegia. On testing, he demonstrated an impairment in the comprehension of metaphor.

Description of discourse

Although S1 was able to provide adequately relevant picture-sequences and procedures, his personal-narratives were rated as less relevant. This was due to the inclusion of considerable additional information, in the form of lengthy digressions into other personal-narratives (funny, embarrassing), procedures (chartering a plane, driving lessons and test) and descriptive discourse (migraine attack, celebration plans) (see flow-chart in Appendix A33). He was able to return to the main theme of the narrative after each digression. The discourse-grammar of S1's discourse samples was rated as appropriate.

The length of S1's personal-narratives were more than twice as long as the maximum produced by the M group, with his frightening experience containing more than four times the longest samples of any of M group subject. His picture-sequences and procedures were also excessively long (about twice that of the M group). The length of the frightening narrative can be accounted for by the number of digressions incorporated into it. For all tasks the high incidence of direct speech and the repetition of ideas and personal value judgements contributed to the length.

S1's syntactic complexity was decreased in both narratives but increased in the procedures. Thus the reduction in embedding is task/genre dependent and does not indicate that he is unable to produce more complex syntax. His percentage of main and right-branching clauses was similar to the M group, as were his left-branching clauses in the narratives but he produced more than twice the amount in the procedures. The incidence of these clauses is task and topic dependent and he does not appear to have difficulty producing left-branching clauses per se.

S1 produced considerably more clarity disruptors than the M group in all three discourse types, particularly in the personal-narratives. Non-specific clauses were reduced compared to the M group whilst the incidence of content and fluency disruptors was substantially higher in all three discourse tasks, particularly in the personal-narratives. The latter contained three times the upper limit of the M group.

On most measures of cohesion, S1 performed similarly to the M group. He also produced a similar configuration of increased cohesion in the picture-sequences and reduced cohesion in the personal-narratives. Whilst his use of conjunctions was adequate in the picture-sequences and the procedures, it was substantially higher in the personal-narratives. His incidence of attempted cohesion was similar to the M group and he produced no cohesive errors in five of the eight tasks.

Overall, S1 produced more dysfluencies on all three tasks than the M group and substantially more in the personal-narratives. His dysfluency scores for each discourse task mask the variability of these elements which ranged from 1.9% (window procedure) to 11.1% (jacket procedure).

13.4.2 SUBJECT 2 (S2)

S2, aged 71, had suffered a "moderate sized right posterior-occipital, right posterior internal capsule and partly right fronto-parietal non-haemorrhagic infarct" almost three years previously. He had left school at fourteen and had worked as a market trader all his working life. He lives with his adult son and has continued to work for five hours a day, six days a week. He has never received speech and language therapy. He has reduced power and sensation in his left side. On testing, he demonstrated some impairment in metaphor comprehension.

Description of discourse

S2 produced appropriately relevant personal-narratives and procedures but his picture-sequences were reduced in relevance due to a lengthy personalized digression in one sequence (55% of the total sample). The discourse-grammar of the S2's personal-narratives was rated as more appropriate and the picture-sequences and procedures were rated as similarly appropriate than the M group.

Whilst both the narrative tasks were similar in length to the M group, one of his picture-sequences was considerably longer due to the inclusion of the personalised digression (mentioned above) and the summaries of the task which he provided. No major differences were found between the two groups on the length of the procedures. However the mean length masks the variability of the procedural topic samples which ranged from 101 words (jacket) to 239 (tyre).

S2 demonstrated somewhat reduced syntactic complexity on all tasks compared to the M group. Unlike the M group which had reduced embedding in the personal-narratives and increased embedding in the picture-sequences, he produced similar clausal-embedding regardless of task or topic. His production of main and right-branching clauses was similar to the M group but his personal-narratives contained a higher number of left-branching clauses.

The total clarity disruptors and content and fluency elements produced by S2 considerably exceeded the upper range limit of the M group in each task with varying amounts in each topic. He produced more non-specific elements than the M group in the procedures (although these varied widely by topic) but similar amounts in the other tasks. He demonstrated a similar configuration to the M group of decreased content and fluency disruptors in the personal-narratives and increased amounts in the other tasks.

No differences in most measures of cohesion were observed between S2 and the M group, although the procedural topics elicited a considerable range. Of the three tasks, only reference in the personal-narrative was higher than the M group. S2 produced more referential cohesion in the picture-sequences than the other two tasks, a similar configuration to the M group. Although he produced adequate lexicalisation, the proportions on each task did not mirror that of the M group as he had less of these ties in his picture-sequences rather than the increase observed in the M group compared to the other tasks. As both reference and lexicalisation are necessary to differentiate between the two male characters in the picture-sequences, S2's reduced lexicalisation may have contributed to increased cohesive errors. The decreased lexicalisation co-occurred with an increase in content and fluency disruptors. Therefore his ability to use lexicalisation may have been compromised by the increase in clarity disruptors.

S2's production of conjunction and "and" was similar to the M group, although "and" occurred more frequently in the procedures and varied widely by topic. His connectives were substantially increased in the procedures compared to the other two tasks and in contrast to the lack of difference by task shown by the M group. S2 used more substitution in the personal-narratives and more ellipsis in the procedures than the M group, although the incidence was extremely small.

S2 produced a similar number of cohesive errors in the narratives to the M group but an increase in the procedures. However, the task mean obscures the variability by topic, with errors ranging from zero (in the frightening narrative and two procedures) to 0.5 errors per T-unit (in the wasp sequence - reduction in lexicalisation).

S2 produced more dysfluencies than the M group in the procedures (particularly in the window and jacket procedures) but not in the narratives.

13.4.3 SUBJECT 3 (S3)

S3, aged 77, had suffered a right external capsule and thalamic nucleus infarct three years previously which had left him with a left hemiparesis and mild dysarthria (which does not affect the intelligibility of his speech). He had fourteen years of schooling and had worked as a toolmaker on the railways until his retirement. He lives with his adult son. He had received two weeks of speech and language therapy for his dysarthria immediately following his CVA. On testing, he demonstrated some deficits on the stress and discourse sub-tests of the RHLB.

Description of discourse

His personal-narratives and procedures were rated as adequately relevant but the picture-sequences as less relevant due to the fact that the stones picture-sequence consisted of a brief sample which only gave the gist of the narrative. The discourse-grammar of his personal-narratives and procedures was rated as similarly appropriate to the M group but his picture-sequences were rated as less.

The sample length on all tasks was substantially reduced compared to the M group,-with one picture-sequence (stones) containing only eighteen words.

Although his discourse samples were reduced in length, he maintained the task configuration of the M group (longer personal-narrative samples, shorter procedures and even shorter picture-sequences).

S3 demonstrated a decreased ability to produce appropriate syntactic complexity on all tasks compared to the M group. Clause-length was particularly reduced in the picture-sequences and clausal-embedding further reduced in the personal-narratives. He was able to produce complex syntax on some topics but did not frequently do so as is evidenced by none or virtually no embedding on four topics. S3 produced more main clauses and fewer right-branching clauses than the M group in all three tasks. The incidence of left-branching clauses in his discourse samples was substantially greater than that of the M group on all tasks, with a wide range of incidence in the procedures. The increased use of left-branching clauses did not compensate for the fact that overall S3 produced fewer dependent clauses.

S3 produced substantially more total clarity disruptors in the personal-narratives than the M group, similar amounts on the procedures but less on the picture-sequences. Thus on the more constrained task he was able to produce discourse with greater clarity. His increased use of clarity disruptors in the personal-narratives in relation to the other two tasks is in direct contrast to the M group which produced more of such elements in the picture-sequences and procedures.

No differences were observed between S3 and the M group on the incidence of non-specific clauses in all tasks but he produced a high percentage of content and fluency clauses on the personal-narratives and less in the picture-sequences. Once again, the task means obscure the true variability in his discourse. On some topics, none of these elements occurred (e.g. jacket procedure) whereas on other topics, they accounted for more than twenty percent (e.g. frightening experience, tyre procedure).

The total cohesive ties produced by S3 were similar to the M group in the personal-narratives and procedures but considerably less in the picture-sequences. His reduction in total cohesion in the picture-sequence compared to the other tasks is in direct contrast to the M group. His referential cohesion was increased in the procedures reflecting a lack of re-lexicalisation. His lexical ties were similar to the M group in the personal-narratives and procedures and none occurred in the picture-sequences, reflecting the difficulty which he has with this task.

Although S3 produced a similar quantity of conjunctions to the M group in the procedures, he used none in the two narrative tasks. His use of "and" in all tasks was adequate but connectives were reduced in both narrative tasks. S3 provided more substitution and ellipsis than the M group in the personal-narratives which contributed to their brevity. He produced fewer cohesive errors than the M group on the two narrative tasks but considerably more in the procedures. The incidence in the latter corresponds to a reduction in lexicalisation.

S3 demonstrated a decreased incidence of dysfluencies compared to the M group in the personal-narratives, none in the picture-sequences and more in the procedures.

13.4.4 SUBJECT 4 (S4)

S4, aged 67, had suffered a right frontoparietal cerebral infarct almost three years previously. He presented with no residual physical difficulties and had not received any speech and language therapy. He had attended school until the age of 14 and had been employed within the shoe manufacturing industry for his entire working life. He lives in his own home with his adult son. He demonstrated impairments in metaphor comprehension, inferencing, humour and stress on the RHLB. His reduced AQ was due to lower scores on the repetition and word fluency sub-tests.

Description of discourse

Although S4's narrative tasks were rated as similarly relevant to the M group, his funny experience was rated as mostly irrelevant (description rather than narrative). His procedures were rated as considerably less relevant because he provided descriptive information that was broadly related to the topic but not the requested procedure. The discourse-grammar of both of S4's narrative tasks was adequately structured, although his "funny" experience was rated as "mostly inappropriate"(see above). The discourse-grammar of all four procedures was rated as mostly inappropriate, a considerably lower rating than the M group. This was due to the fact that he tended to digress into descriptions of related topics and not complete the relevant procedure.

S4 produced shorter discourse samples than the M group on the personal-narratives (less than half the length of the M group). The length of samples on the other tasks was similar to the M group. His procedures ranged in length from 80 (tyre) to 267 words (jacket), indicating that length was more affected by topic than genre or task.

S4 produced syntax of somewhat reduced complexity to the M group, apart from a substantially increased clause-length in the procedures. This was due to the increased incidence of non-specific elements in the procedural clauses, resulting in longer but less meaningful clauses. Although he was able to produce more complex syntax in some samples, his high dysfluency rate and increased use of non-specific elements may have prevented more frequent use. S4 tended to produce more main and fewer right-branching clauses in all three tasks. He demonstrated very limited use of left-branching clauses with only two topics (procedures) containing any.

S4 produced substantially more clarity disruptors on all tasks than the M control, particularly on the personal-narrative and procedures. This finding, together with shorter samples, resulted in his discourse being reduced in content. Non-specific clauses were considerably more frequent in all three discourse tasks than the M group. In contrast to the M group, he produced extremely few content and fluency elements.

S4's discourse samples were more cohesive than that of the M group, particularly in the procedures. He provided similar quantities of reference, lexicalisation and substitution to the M group. A similar result was noted for connectives in the personal-narratives and procedures with an increased incidence in the picture-sequences. S4 produced similar cohesive errors on the personal and picture-sequence narratives to the M group but an increase on the procedures.

S4 had a greatly increased dysfluency rate on all three tasks with even his minimum rate being above the M group mean. Even the supportive framework of the picture-sequences was not sufficient to decrease his dysfluencies.

13.4.5 SUBJECT 5 (S5)

S5, aged 73, had suffered a RH CVA three years previously, resulting in a "large low attenuation area involving the occipital lobe consistent with right posterior cerebral artery territory infarct". He had attended university and received a first-class mathematics degree. Before retiring, he had worked mainly as a secondary school teacher and lives alone. He has not received any speech and language therapy. He had mild residual hemiparesis and no visual difficulties were recorded or reported. On the RHLB, he demonstrated some impairment in inferencing and on the WAB, he had difficulty on the spontaneous speech, repetition and word fluency sub-tests.

Description of discourse

The relevance of all S5's discourse tasks were rated as less relevant than those of the M group and were substantially less relevant in the personal-narratives. The latter finding was due to him digressing to descriptions of related topics. His discourse-grammar was rated as appropriate although he had considerable difficulty on one of the picture-sequences.

His sample length was within the M group's range although his picture-sequences and procedures were shorter due to him producing comments on the task rather than the task itself. Although his syntactic complexity on the three measures was within the M group's range, it was somewhat reduced on all tasks, even in the picture-sequences which usually elicited greater complexity.

S5's production of the personal-narratives and procedures contained similar amounts of main and right-branching clauses to the M group. In the picture-sequences he produced an excessively high number of main clauses and a corresponding decrease in right-branching clauses. The incidence of left-branching clauses on all three tasks was within the range of the M group but the incidence varied by topic.

S5's clarity disruptors were reduced in personal-narratives but substantially increased in the picture-sequences and procedures. The incidence of non-specific clauses was similar to the M group in all tasks but his content and fluency elements were greatly increased in the picture-sequences due to the comments on the task. A feature of two of S5's procedures was the high incidence of word-substitutions which was not observed in other subjects.

Although S5's use of total cohesive ties and types of cohesion was somewhat reduced, it was within the M group range. He produced substantially fewer "and"s in the procedures. His narrative tasks contained no cohesive errors and his procedures an extremely small amount. He produced considerably more dysfluencies than the M group in all three tasks, particularly on the picture-sequences (p=.0005).

13.4.6 SUBJECT 6 (S6)

S6, aged 77, had suffered a RH tempero-parietal infarct three years previously from which he had no residual physical disabilities. He has not received any speech and language therapy. He had left school at fourteen and worked within the advertising sector all his working life until his retirement. He lives with his wife. He demonstrated some impairment in humour on the RHLB.

Description of discourse

S6's discourse was rated as similarly relevant for all three tasks as the M group and he did not demonstrate any specific difficulty on any topic. He achieved discourse-grammar ratings similar to or better than the M group on all tasks. His relatively less appropriate rating on the picture-sequences related to the limited or non-existent evaluation given on the picture-sequences.

He produced somewhat shorter samples on the picture-sequence and procedures than the M group but longer personal-narratives. His syntactic complexity and percentages of main and right-branching clauses was similar on all tasks to the M group. The lack of left-branching clauses in the picture-sequence was balanced by an increased incidence of right-branching clauses but he was able to produce left-branching clauses in personal-narratives and procedures.

S6 produced less total clarity disruptors in the personal-narratives and similar amounts to the M group in the other tasks. Non-specific elements and content and fluency disruptors occurred in similar mounts to the M group on all tasks, apart from an increased incidence of the former in his procedural tasks.

S6 produced somewhat more total cohesive ties, reference and lexicalisation than the matched group in all tasks. As for the M group, he produced more cohesion in the picture-sequences than the other two tasks. He produced considerably more conjunctions and connectives in the two narrative tasks and more "and"s in the picture-sequences and procedures. There was considerable variation per topic on these measures. Apart from a considerably greater incidence of substitution in the picture-sequences, he produced similar substitution and ellipsis cohesion to the M group. The incidence of cohesive errors in his discourse was similar to the M group and he made no errors on any of the procedural topics.

S6's personal-narratives contained substantially more dysfluencies than the M group but similar amounts on the two other more constrained tasks

13.4.7 SUBJECT 7 (S7)

S7, aged 54, had suffered a right parietal infarct two and a half years previously. He had a residual left-sided hemiparesis and had not received any speech and language therapy. He had left school at sixteen and had worked as a skilled manual worker in the engineering and construction industries.. He lives with his wife and is unemployed due to his physical impairments. He demonstrated difficulties on the metaphor and discourse sub-tests of the RHLB.

Description of discourse

The relevance of S7's discourse was rated as similarly appropriate to the M group's although his frightening personal experience was rated as mostly inappropriate because he provided a description rather than a narrative. He provided adequately appropriate discourse-grammar on the narratives but this was not on the procedures because of reduced essential and optional steps.

S7 produced substantially shorter discourse samples than the M group on all tasks, with his mean for procedures being below the M range limit (due to the lack of details provided). Unlike the other subjects, his personal-narratives were not the longest of the tasks that he produced although his frightening experience was his longest sample. Although he maintained adequate clause and T-unit-lengths in the procedures, these were reduced on the narrative tasks compared to the M group. His clausal-embedding was somewhat reduced on the narrative tasks with a wide range on the procedural topics.

S7 had similar percentages of main and right-branching clauses to the M group in the personal-narratives and procedures. However in the picture-sequences he produced substantially more main clauses and a correspondingly decreased incidence of right-branching clauses. Left-branching clauses were considerably increased in the procedures. The high procedural mean of these clauses masks the range from zero in the jacket procedure to fifty percent in the tyre procedure. Furthermore in the procedures, these clauses were often contained within the comments on the task.

S7 produced substantially more total clarity disruptors than the M group on the picture-sequence narratives and procedures. Although he demonstrated fewer in the personal-narratives compared to the other tasks (as the group did), his decrease was more marked. His production of non-specific clauses was reduced in the two narrative tasks and non-existent in the procedures. In contrast, a comparison with the group indicates that his incidence of content and fluency disruptors was substantially increased in all tasks, with two tasks containing three to four times the M group mean.

No differences were found between S7 and the M group on total cohesive ties in all three tasks and he demonstrated a similarly increased amount in the picture-sequences. In the narrative tasks, he maintained adequate referential cohesion but provided less in the procedures due to the lack of essential steps and the increase in clarity disruptors. His use of lexical cohesion, conjunctions and substitution were within the M group's range although his lexicalisation on the procedures varied widely by topic. His production of "and" and connectives was substantially reduced in the personal-narratives and procedures compared to the M group. He produced more ellipsis in the procedures than the M group. He also produced more cohesive errors in the personal-narratives and a substantial variation with topic was found. He produced more dysfluencies than the M group in the personal-narratives but none at all in the procedures

13.5 Summary

This chapter provided in-depth information regarding the individual RBD subjects and presented three sub-groups into which they could be categorised. These results were incorporated into the account of RBD discourse deficit proposed in Chapter 12.

CHAPTER 14
KEY FINDINGS AND CLINICAL IMPLICATIONS

This chapter provides a summary of the key findings of the study and discusses the clinical implications arising from them.

14.1 INTRODUCTION

This study examined the oral narrative and procedural discourse of thirty-two NBD male subjects to determine the effects of age, SES and discourse sampling methods. Their discourse was analysed in terms of seven broad areas reflecting the stages of a multi-layered discourse model. The results of the discourse measures were inter-correlated and also correlated with attention status tests. A group of male RBD subjects were assessed on a sub-set of tasks (which were selected by determining their imperviousness to age and SES) and their discourse was analysed as before and compared to a matched control group.

14.2 KEY FINDINGS

14.2.1 The effect of age (Summary in Table 8.5)

The subjects in this study were divided equally into four age groups (50s, 60s, 70s and over 80s). The findings of the study with respect to age can be divided into three categories. Firstly, certain discourse measures remained unchanged with ageing. Clause-length and clausal-embedding remained largely unaffected by age. Similarly, the incidence of main and right-branching clauses tended to remain static with age (apart from an increase in main clauses with age on the picture-sequence task). No ageing effect was observed in the discourse length of the more structured picture-sequences and procedures whilst older subjects produced longer samples in the self-generated personal experiences.

Secondly, specific discourse measures demonstrated a decline with age. These were relevance and discourse-grammar ratings, T-unit-length (which reflects both phrasal and clausal complexity), total cohesive ties and lexicalisation.

Thirdly, some discourse measures indicated a differential effect of age, depending on the task used. In personal narratives, ageing resulted in an increase in the oldest group in left-branching clauses and dysfluency rates whilst the incidence of "and" and referential ties decreased. Conjunctions and connectives in the personal narratives tended to increase with age to the seventies group before decreasing. In the same task, age had no effect on the total percentage of clarity disruptors, its three types and attempted cohesive ties. In picture-sequences, an increase with age was found in the total clarity disruptors and its three types and attempted cohesive ties. A decrease in referential ties was observed but no effect on the incidence of left-branching clauses and dysfluency rates. Although conjunctions remained unaffected by age in the picture-sequences, the incidence of "and" and the connectives varied considerably with the topic used. In procedures, older subjects produced fewer left-branching clauses, a higher incidence of total clarity disruptors and its three types as well as higher rates of dysfluency, connectives and "and". However, referential cohesion, conjunctions and attempted cohesive errors remain unchanged.

14.2.2 The effect of socio-economic status (Summary in Table 8.10)

The thirty-two subjects were divided into four socio-economic status groups. The trends reported here reflect the direction from SES1 to SES4. SES had a greater effect on the discourse measures than age. As was observed for ageing, variation in performance with respect to SES can be divided into three categories. Firstly, SES had little effect on the incidence of reference, substitution and ellipsis.

Secondly, SES4 compared to SES1 demonstrated a decrease in relevance and discourse-grammar ratings, in the three syntactic complexity measures, the number of total cohesive ties and the dysfluency rate. There was an increase in total clarity disruptors, non-specific elements and content and fluency elements (although considerable variation was observed in the picture-sequences and procedures). The incidence of main clauses in the three tasks demonstrated an increase from SES1 to SES4 whilst the right- and left-branching clauses decreased.

Thirdly, the effect of SES as assessed on particular measures varied according to the discourse task used. In personal narratives, the incidence of lexicalization, conjunctions and attempted cohesive ties remained unchanged with SES group whereas the incidence of "and" and connectives as well as sample length decreased. In picture-sequence samples, lexicalization declined from SES1 to SES4 whilst attempted cohesion increased. The incidence of conjunctions, connectives, "and" and sample length remained unaffected within the groups. In procedures, the use of lexicalization, conjunctions and connectives and the length of the samples declined from SES1 to SES4 whereas the incidence of "and" and attempted cohesive ties remained unchanged.

14.2.3 Selection of discourse sampling tasks for the RBD group

Based on the investigation of the effects of age and SES, a set of tasks was selected for administration to the RBD group. These eight tasks, representing both narrative and procedural genres, were demonstrated to be the least affected by age and SES and thus provide a tested set of tasks for the discourse assessment of any subject group (see below).

14.2.4 The effect of discourse sampling (Summary in Table 8.14)

The discourse samples elicited from the subjects comprised three tasks:- personal self-generated narratives, picture-sequence elicited narratives and procedures. The effect of task on each discourse measure was examined for the total subject groups (irrespective of age or SES).

The personal narrative task elicited the longest samples which were rated as the least appropriate on the discourse-grammar scale, contained the least embedding, the most main and left-branching clauses, the fewest right clauses, most non-specific elements but least total clarity disruptors, fewer references, least conjunctions, lexicalization, cohesive errors and total cohesion and more dysfluencies.

Picture-sequences were considered the most relevant, shortest and contained the most clausal-embedding, least main and left-branching clauses, most right-branching clauses, fewer non-specific elements, most total, referential and lexical cohesion and most cohesive errors. Subjects were also the most fluent on this task.

Procedures were found to elicit samples that were rated as least relevant but most appropriate on the discourse-grammar scale, contained most content and fluency elements and total clarity disruptors, less referential cohesion, more conjunctions and more dysfluencies.

This systematic analysis of the effect of different discourse sampling methods on a large number of measures has clearly demonstrated the significance of taking such effects into account when selecting discourse tasks and interpreting the results of research. It must be borne in mind that the task findings do not necessarily reflect the subjects' performance on each individual topic emphasising the salience of assessing a number of topics within each discourse type/genre. By examining a large number of topics representing different genres and tasks, the overriding trend in performance can be obtained. Otherwise the results of an individual topic would be considered (possibly erroneously) as the final outcome. Without assessing subjects on a variety of genres, tasks and topics it is not possible to obtain a clear picture of the strengths and weaknesses of their discourse abilities.

14.2.5 The effect of right brain damage

a) Group results (see Table 11.4)

The group of seven RBD subjects *was* compared to an age and SES matched control group (twelve subjects) on a set of discourse tasks carefully selected from those of NBD group on the basis of the lack of effect of age and SES. The RBD group demonstrated decreased relevance and shorter T-units, less clausal-embedding and fewer right-branching clauses. They also used an increased incidence of total clarity disruptors, non-specific and content and fluency elements, attempted ties and a higher dysfluency rate. Both groups showed similar referential cohesion use.

On some specific measures, the comparative performance of the two groups varied according to the discourse task used. On the personal narrative task, the RBD group produced samples that were more appropriate with regard to discourse-grammar. The samples were also longer, contained more total cohesive, substitutive and elliptical ties but shorter clause-lengths and a decreased use of conjunctions, "and"s and connectives. No differences between the two groups in the number of main and left-branching clauses and lexical ties were observed.

In picture-sequences, the RBD subjects produced samples which had shorter clauses and fewer lexical and elliptical cohesive ties. Their samples also contained more main and left-branching clauses, substitutive ties, "and"s and connectives. The two groups performed similarly in the incidence of conjunctions, sample length and on ratings of discourse-grammar appropriateness. In procedures, the RBD subjects produced shorter samples which were rated as having less appropriate discourse-grammar and a decreased incidence of total cohesion and substitution. They also demonstrated an increased clause-length, more main and left-branching clauses and an increased incidence of ellipsis and "and". The two groups did not differ with respect to lexicalization, conjunctions or connectives.

b) Case studies

Following an investigation of each RBD subject individually, three possible sub-groups were delineated (with two subjects not able to be categorised).

The first group comprised subjects whose discourse was characterised by mostly adequate relevance and discourse-grammar (although reduced on the picture-sequences), adequate cohesion in all tasks and a limited incidence of dysfluencies. They produced samples which were shorter, less syntactically complex, containing fewer conjunctions and more clarity disruptors (particularly content and fluency disruptors).

The second group's discourse was characterised by mostly appropriately relevant and structured discourse and an adequate use of all cohesive ties and few cohesive errors. However their output was lengthy with an increase in dysfluency rates and the use of content and fluency disruptors. Their syntactic complexity was either adequate on all tasks or reduced in narratives and increased in procedures.

The discourse performance of the third group was considered to fall within the normal range. As previously noted (Chapter 6), only approximately fifty percent of RBD subjects have been reported to suffer from communication difficulties.

c) Task effects (see Table 11.6)

The relative performance by the two groups on the various discourse tasks as measured by the discourse profiles varied. The performance of each group demonstrates similar ratios of incidence between the three tasks on some measures e.g. for both groups, the most relevant discourse was elicited by the picture-sequences and the least on the personal narratives. A similar configuration occurred on sample length, non-specific elements, left-branching clauses, total cohesive ties, reference, conjunctions and attempted ties. On other measures, the relative incidence differed between the two groups e.g. the most appropriate discourse-grammar was produced in the RBD subjects' personal narratives but in the control group's procedures. Relatively different performances on tasks by the two groups were also observed on other measures e.g. content and fluency elements, T-unit-lengths, clausal-embedding, lexical cohesion, "and"s, connectives. On particular measures (clause-length, dysfluency rates, main and right-branching clauses), the RBD subject showed no task differences whilst this happened rarely with the control group. Although this may appear to indicate a lack of sensitivity to task by the RBD group on these measures, an examination of the results of each topic revealed a variation in their performance which was not reflected in the task mean.

14.2.6 Correlations

a) Correlations with attention measures (see Table 8. 21)

NBD subjects

Age had a significant effect on all three attention tests whilst SES had a significant effect on two. A trend to decreased performance was observed on all attention measures in older and in less skilled SES groups.

For the NBD group, there were clear correlations between the attention tests and certain discourse measures on all tasks (e.g. lexicalisation, attempted cohesion). However, correlations occurred most frequently between specific attention tests (particularly the FAS word fluency) and the discourse measures on particular tasks. Thus additional investigations are needed to determine whether a relationship does exist or whether they merely co-occur.

RBD and M Groups (Table 11.8)

The RBD group performed less well on all three attention tests than the M group and in most cases the former group demonstrated greater standard deviations indicating that their performance was more variable.

For the RBD group, the limited clustering of correlations indicated a relationship between higher scores on some attention tests and more appropriate discourse-grammar, left-branching clauses and fewer cohesive errors. For the M Group, correlations suggested that higher scores on some attention tests were related to samples which were more relevant and contained fewer clarity disruptors, more clausal-embedding and fewer cohesive ties.

b) Correlations between discourse measures

NBD Group (see Table 8.22)

For this group, increased relevance ratings were associated with more appropriate structure, increased syntactic complexity, increased cohesiveness. More appropriate discourse structure was related to greater sample length and decreased clarity disruptors. Increased clausal-embedding was associated with increased cohesion and fewer cohesive errors. Other correlations which occurred were related to specific tasks. Although these correlations must be regarded cautiously, they can provide the basis for further research.

RBD Group (see Table 11.9)

Few correlations and limited clustering were observed between the discourse measures, due to the variability in their performance. Discourse samples with more appropriate structure were associated with higher relevance ratings and greater length. Furthermore increased clausal-embedding was associated with decreased clarity disruptors.

14.3 CLINICAL IMPLICATIONS

During the assessment and treatment of communicatively-impaired patients, the effect of age and SES must be considered. Age is of particular importance in neurological impairments as many of these are associated with ageing e.g. strokes, dementia. Furthermore, those adults now being assessed may have had limited formal education due to the schooling system which was in place when they were young. A number of measures used in this study demonstrated a decline with age and, more particularly, with SES. However, this statement glosses over the wide variation which is observed depending on which discourse measure was used and which discourse task was elicited. Thus the analysis of only one or a few discourse samples on a small number of discourse measures is not an adequate basis on which to differentiate neurological deficits from normal variation. As an example, it can be observed that certain procedural topics elicited a decrease in left-branching clauses with age, whilst others were not affected or elicited an increase. Therefore the selection of procedural topic could provide substantially different results for this measure. When a patient is assessed and treated, the effects of age and SES as demonstrated in this study can provide informed guidance as to where and to what extent changes occur (discussed below).

In a similar vein, assumptions cannot easily be made about the simplicity or complexity of tasks without an in-depth assessment of them. For example, procedures have been reported to be simpler and easier to produce than the narrative genre (see Chapter 2). However, this may have been largely due to the type of procedures employed. If ecologically valid and adult appropriate procedures are used, the true status of procedures will become apparent. Similarly, the level of difficulty and cognitive demands incorporated into different methods of elicitation and different topics cannot be transparently observed.

14.3.1 Assessment

There is no shortcut to a valid assessment of any communicatively normal or impaired individual. At present, the movement is towards shorter assessments being carried out by clinicians. This is considered to be an *efficient* use of their time due to pressure from managers which in turn is based on economic limitations. A recent report (Katz et al 2000) on aphasia assessment in four countries found that assessments varied from one to two hours. More importantly, communication impairments are anticipated in aphasic patients but what would be the case in other neurologically-impaired groups (e.g. RBD, dementia etc)? A shorter assessment may involve the examination of only one discourse sample providing an outcome which may appear appropriate if no other samples are assessed. However this can be misleading and waste a considerable amount of time if the patient's discourse performance is not sufficiently carefully examined. Thus a brief assessment may be false economy in the long run as an in-depth and more time-consuming assessment may focus treatment more accurately. Friedland and Miller (1998), who used conversational analysis with a closed-head injury patient, concluded that.

> *"Time spent on CA was more than compensated for in the shorter period required for therapy once the determinants of conversational breakdown had been accurately described." (p 11)*

For a more precise assessment, there is an obvious need to elicit a variety of discourse genres, using a number of methods of elicitation and various topics to provide a representative picture of the status of the patient's discourse skills. This fact has been accepted and reiterated in recent discourse studies

> *"We feel that connected speech elicited with several (four or five) different types of stimuli is more likely to accurately represent an individual's speech competence than speech samples elicited with several stimuli of the same type, such as single pictures" (Brookshire and Nicholas 1994, p 407)*

However, "a reasonable upper limit, which would cover a variety of analyses, is yet to be determined"(Armstrong 2000). In addition, test-retest reliability for scores was reportedly higher for those based on sets of stimuli rather than for those based on one single stimulus (Brookshire and Nicholas 1994).

From the in-depth investigation of a variety of genres, method of elicitation and topics used in this study, a set of tasks can be proposed which are relatively impervious to the effects of age and SES as reflected in the measures used. This set of eight discourse tasks (Table 14.1) provides a clear and tested framework for discourse assessment for both researchers and clinicians.

NARRATIVES
Two personal narratives:-
"Tell me about a frightening experience that you have had at any time in your life
"Tell me about a funny experience that you have had at any time in your life
Two sequence picture narratives:-
"Tell me the story about the father and son that you see in the pictures"*:-
"Wasp
"Throwing stones"
PROCEDURES
"Tell me how you would change the flat tyre on a car"
"Tell me how you would replace a broken pane of glass in a house window"
"Tell me how you would buy a new jacket or coat"
"Tell me how you would teach someone to ride a bike (push bike)".

* Plauen (1952) (see Appendix A2)

Table 14.1: Set of tasks for discourse assessment

These were selected on the basis of the twenty-three discourse measures and the subject groups used in this study. This set could provide the foundation for the development of a battery of discourse tasks and measures that are relatively unaffected by age and SES which can be used in discourse assessment in a variety of both normal and communicatively-impaired groups. To broaden the application of this set of tasks, it would be necessary and useful to establish whether the tasks and topics are relatively unaffected by age and SES when assessed on other discourse measures (e.g. content analysis, propositional analysis - see Chapter 15). It could then be used with additional sampling techniques (e.g. the parallel forms of story recall developed by Doyle et al 2000).

Rel Most	D.G. Most	Clarity Least	Non-Sp Least	Cont Least	Lngth Least	Cl. emb Least	Main Least	Left Least	Right Least	Tot Coh Least	Ref Least	Conj Least	Lexi Least	Att Least	Dysfl Least
PIC	PRO	PER	PIC	PER	PIC	PER	PIC	PIC	PER	PER	PER PRO	PER	PER	PER	PIC
PER	PIC	PIC	PRO	PIC	PRO	PIC PRO	PRO	PRO	PRO	PRO	PIC	PIC	PRO	PRO	PRO
PRO	PER	PRO	PER	PRO	PER		PER	PER	PIC	PIC		PRO	PIC	PIC	PER

PER=Personal narratives PIC=Picture sequences PRO=Procedures
Rel=Relevance DG=Discourse grammar Clarity=Total Clarity disruptors
N.Sp.=Non-specific Con=Content and fluency Cl.emb.=clausal embedding
Tot.Coh.=total cohesion Ref.=Reference Conj=Conjunction
Lex=Lexicalisation Att=Attempted cohesion Dysfl=Dysfluencies

Table 14.2: Hierarchy of NBD performance on selected discourse measures

For a more accurate assessment, the hierarchy of performance as assessed in this study (Table 14.2) can be used to pinpoint the deficit more carefully. For each measure, the hierarchy of the results of the tasks is given according to the incidence of the measures (as indicated). As can be observed, no single discourse type consistently elicited samples with the most or least of all discourse measures. If a specific aspect of discourse is thought to be impaired, a task can be selected which should demonstrate this impairment more clearly. For example, if cohesion is of particular concern or interest, a sequenced picture narrative can be used as this has been shown to elicit the greatest incidence of cohesion. In addition, the extent of impairment on a particular aspect of discourse can be determined by selecting those tasks which have demonstrated an increased or decreased incidence of this measure. For example, the patient may be able to produce sufficient clausal-embedding on a personal narrative task (which has been found to contain the least embedding). To delineate the area of deficit more carefully, tasks which are known to elicit more clausal-embedding can be used, e.g. a procedural task and then a picture-sequence task. This would pinpoint the level of difficulty more accurately. Using a similar hierarchy of the topics (see Appendix A17), even more accurate assessment techniques may be selected.

14.3.2 Treatment

The treatment of communicatively-impaired groups can also be focused more precisely by using similar hierarchies of performance on tasks. From the examination of the discourse of the RBD subjects in this study, the selection of treatment tasks can be determined (Table 14.3). If a patient has difficulty on a specific aspect of discourse, the task which elicited the most adequate incidence of this aspect can be used as a starting-point for treatment. Once the patient has achieved success on the impaired aspect in this task, a task from a more demanding level can be used. For example, if the patient had difficulty providing sufficient conjunctions, the first tasks used in treatment could be a procedure in which an adequate incidence of conjunctions was elicited. As treatment progressed, tasks which demonstrated increasingly inadequate conjunction usage (i.e. personal narratives and then picture-sequences) could be administered.

Rel Most	D.G. Most	Clarity Least	Non-Sp Least	Cont Least	Lth Least	Cl. emb Least	Main Least	Left Least	Right Least	Tot Coh Least	Ref Least	Conj Least	Lex Least	Att Least	Dysfl Least
PIC	PER	PIC PRO	PER	PIC	PER	PRO	PER PIC PRO	PRO	PER PIC PRO	PIC	PIC	PRO	PRO	PIC	PER PIC PRO
PRO	PRO	PER	PRO	PRO	PIC PRO	PER PIC		PER PIC		PRO	PRO	PER	PER PIC	PRO	
PER	PIC		PIC	PER						PER	PER	PIC		PER	

PER=Personal narratives PIC=Picture sequences PRO=Procedures
Rel=Relevance DG=Discourse grammar Clarity=Total Clarity disruptors
N.Sp.=Non-specific Cont=Content and fluency Lth=Length
Cl.emb=clausal embedding Tot.Coh.=total cohesion Ref.=Reference
Conj=Conjunction Lex=Lexicalisation Att=Attempted cohesion
Dysfl=Dysfluencies

<u>Table 14.3: Hierarchy of RBD discourse performance on selected measures</u>

Treatment can be further tailored to the individual patient (and thereby streamlined) if the hierarchy of RBD performance on individual topics is utilised (Appendix 34).

By investigating a patient's discourse production using a multi-layered discourse approach, information regarding the level at which difficulties emerge can be obtained. Thus, for example, it is hypothesised from this study that RBD subjects have a deficit at the level of selecting and prioritising information which is then manifested in lower level discourse skills (e.g. syntactic complexity). Based on this, treatment could be aimed at the level of impairment, thereby influencing lower-level discourse impairments, so that minimal treatment would need to be focused directly on these areas. This demonstrates further how an in-depth assessment may facilitate the treatment process. Furthermore, the relationships which appear to exist between particular measures may be used to guide treatment. For example, from this research, correlations (controlling for age and SES) suggested that, on the picture-sequence task, greater referential and lexical cohesion was associated with fewer cohesive errors and decreased non-specific elements. Therefore, on this task, treatment could be focused on increasing referential and lexical cohesion which may lead to a reduction in cohesive errors and non-specific elements. More specifically, the comprehensive analysis of specific aspects of discourse applied here can also be used to target treatment. The qualitative analysis of cohesion, rather than an overall measure or a cohesive error rate, permits treatment to be focused on the type of cohesion which is incorrectly or under-used. For example, on picture-sequences, the RBD group did not employ the necessary increase in lexical and referential ties which were essential to provide adequate cohesion on this task. Thus treatment could be targeted at increasing these two particular cohesive ties.

Although the assessment of discourse using such an approach may initially appear to be time-consuming, it may expedite treatment by providing clear guidance for priorities for the patient, including a more effective order of treatment tasks. As stated above, a lengthy assessment may result in briefer, more focused treatment. Clinicians and researchers are often constrained by the burden of ensuring research is clinically applicable. Therefore, discourse investigations have often relied upon discourse tasks such as picture descriptions (from aphasia tests), which are readily available to most therapists. However if research at this stage can investigate the basic aspects of discourse, appropriate assessment and treatment can be derived. As has been stated, "Fundamental research on the nature of disability and handicap will help point the way of instrument development" (Tompkins and Lehman 1998, p 291). This study indicates that, whilst a balance needs to be kept between the most naturalistic discourse sampling possible and clinical restrictions, basic methodical research into discourse per se can provide clear guidance for assessment and treatment.

14.4 Summary

This chapter has summarised the key findings of the study relating to the effects of age, SES, discourse task and RBD. It has also discussed the clinical implications arising from the findings.

CHAPTER 15
CONCLUSIONS

This chapter discusses the limitations of this research study and also provides an agenda for future research based on its findings and limitations.

15.1 Limitations of this research

One of the ongoing criticisms of research into the discourse of communicatively-impaired groups has been the small subject groups examined. Such a criticism could also be leveled at this study. The relatively low number of NBD subjects in each age and SES group reflects the limiting effect of the complexity of analysis required in any multi-layered discourse analysis. For example, Stemmer and Joanette (1998) examined only three subjects[89] in their analysis of narrative discourse (paragraph-by-paragraph recall, summary and questions) using a multilevel discourse model framework. A higher number of subjects in the RBD group would have been desirable to provide a valid comparison to the NBD group. Moreover, this may have permitted a more appropriate differentiation into sub-groups. However, the difficulties in obtaining appropriate clinical subjects arise from three areas:- firstly, as RBD subjects are not often referred to speech-language therapists, it is not easy to establish contact with post-acute stage subjects; secondly, the lack of sophisticated classification methods in stroke data banks means that critical details are often not indicated; thirdly, the introduction of the Data Protection Act in Britain has made patient contact problematic.

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[89] (with results from two other subjects pending).

In conducting research incorporating many variables, a major hurdle lies in the selection of appropriate research methods and analysis to interpret the results. Complexity is inherent in multi-layered discourse analysis by its very nature and therefore, a realistic investigation requires an elaborate method of analysis. However, discourse theories and models to be used in such research are still being developed and tested, thereby making attempts at multi-layered discourse analysis fraught with difficulties and limitations. This study is no exception. It might be argued that many of the results reported here are spurious due to the large number of comparisons made and the wide variation in performances which occurred. However, methods have been used to overcome these problems statistically (e.g. use of specific statistical methods) and methodologically (e.g. a reduction in the number of topic comparisons made, clustering correlations according to broader discourse aspects). It is well known and understood that the use of particular statistical methods to determine relationships between variables (viz. correlations) are problematic. Such relationships may only be reflecting co-existing difficulties and no strong claims can be made. Nevertheless, as Fine (1999) concluded, these relationships can provide a starting-point for further research. At this early stage of this type of analysis, the findings of this study can, at the very least, provide such a starting-point.

15.2 Directions for future research

As discussed above, the issue of limited subject numbers needs to be addressed. There are a number of reasons why a larger group of subjects should be investigated using a similar multi-layered analysis. Firstly, larger subject groups would permit a more sophisticated statistical analysis of results and use of a more advanced experimental design leading to more reliable and more carefully detailed information regarding the subjects' performance on the large number of discourse tasks and measures used. Secondly, if a greater number of NBD subjects were examined, sufficiently large sub-groups delineated by both age and SES could be investigated. This would provide the opportunity to determine the interaction between age and SES. Thirdly, the inclusion of additional age and SES groups (or the division of larger categories into more narrowly defined groups) would provide the opportunity to determine more accurately at what age or in which SES group a change in performance on a particular measure took place. Fourthly, the analysis of the discourse performance of a greater number of RBD subjects would provide increased information regarding their strengths and weaknesses. It would also permit a more relevant differentiation into sub-groups reflecting the heterogeneity of communication difficulties in this group. Furthermore, although the RBD sub-groupings in this study did not relate to site of lesion, the inclusion of more RBD subjects in future studies may permit a comparison of sub-groups based both on discourse performance measures and pathology.

Certain aspects of discourse were not examined in detail e.g. relevance, discourse-grammar, dysfluency. A more robust examination of these areas may indicate all-important features regarding the precise nature of the RBD discourse deficit. For discourse-grammar, it may be possible using propositional analysis to determine the number of propositions occurring within each aspect (e.g. setting, complicating action, evaluation, etc.) to determine which aspects are under- or over-specified. For example, the evaluation aspect of Labov's discourse-grammar is considered to be of pivotal importance and of even more relevance to RBD subjects, who often demonstrate emotional-processing disturbances. A propositional analysis of this component would indicate its adequacy and supply clear guidelines for treatment. This would also be pertinent to other communicatively-impaired groups who may have associated emotional processing difficulties (e.g. those suffering from autism, schizophrenia). A propositional analysis may also provide an explanation of the lack of syntactic complexity demonstrated by RBD subjects[90].

Such a propositional analysis could also reveal more precisely the relevance/irrelevance of the sample by rating each proposition on the Relevance Profile and determining the nature of its irrelevance. This would provide a more detailed and less global indication of the nature of irrelevance exhibited by RBD (and other neurologically-impaired subjects e.g. closed head injury, dementia, schizophrenia). By more carefully ascertaining the nature of the irrelevance exhibited by the RBD subjects, possible sub-groups could be differentiated which could be used as a basis for further examination using other discourse measures.

Although this research has focused on three variables which affect the individual speaker (age, SES and right brain damage) there are variations of these, as well as many other factors, which may have influence discourse performance and need to be examined both in isolation and in tandem with other variables. For example, rather than chronological age, a more appropriate differentiating factor may be health status (as used by Ramig 1983 and Leeper and Culatta 1995). In addition, further investigations of the effect that varying the discourse genre, method of elicitation and topic have on discourse performance are required to enlarge the existing discourse knowledge base. As well as broader aspects of discourse (e.g. genre), the influence of different topics cannot be overlooked as their effects are sometimes greater than the genre itself. Until the effects of discourse task are better known, every opportunity must be taken to determine the effects that these variables have on the discourse performance of NBD or neurologically-impaired patients.

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[90] Evaluation devices often show syntactic complexity whilst narrative clauses show syntactic simplicity (Cortazzi 1993).

It is evident from this research that basing assessment on the multi-layered model-based approach to discourse analysis used in this study can provide information regarding the level at which discourse difficulties emerge for the clinical group. If more subjects could be investigated using this same model, a focus for more careful assessment and treatment could be determined.

> *"Finally, and most important, future discourse studies in neurolinguistics will definitely have to be explicitly inspired by available theoretical models." (Chantraine et al 1998b p 274).*

Specific aspects of discourse which demonstrate an impairment in RBD subjects have been reported in other groups e.g. those suffering from fluent aphasia, closed head injury, early stages of dementia, high-functioning autism, attention deficit disorder, etc. Thus this systematic approach may prove to be a valuable method for assessing the discourse performance of these other groups. Basing analysis on an appropriate discourse model may also permit explanations of both inter- and intra-subject variation.

Inherent in a multi-layered discourse model approach is the examination of the interaction of a large number of variables in the same group of subjects. Although this approach is problematic (as discussed above), an examination of many aspects of discourse within one group of subjects can provide a clearer picture of how the different elements interact to achieve appropriate discourse. Furthermore, these associations provide additional information regarding the components of concepts that are often difficult to define and measure. For example, from this research, correlations (controlling for age and SES) suggested that discourse samples rated as more relevant were more cohesive, had fewer non-specific elements, fewer main clauses and more right-branching clauses. Additional investigations of such relationships could pinpoint the basis for future investigations and this, whether supportive or not, will further discourse knowledge.

The role of attention in the discourse performance of both NBD and RBD subjects was not clear from this study. The attention assessments used may not have adequately examined those aspects of attention which are implicated in discourse, due to the complexity of attention and its assessment. Attempts to determine the deficits underlying discourse impairment are needed and thus the continued examination of the nature of associated cognitive deficits is necessary. Chantraine et al (1998b) consider that discourse research

> *"will have to systematically incorporate an appreciation of all cognitive abilities that are necessary in order to achieve normal interpersonal communication (e.g. working and semantic memory, attention, inferential abilities, visual skills)." (p. 274).*

Information about associated cognitive performance "would almost certainly facilitate comparisons across studies, and generalization of results obtained" (Lehman and Tompkins 2000, p 496). Recent progress has been made in investigating cognitive abilities per se (including attention - Connor et al 2000) and this should benefit discourse research. The role of cognitive systems in language use is regarded as one of the worthwhile yet challenging tasks to be pursued in the new millennium (Stemmer 2000).

15.3 Conclusions

The need continues to exist for the systematic investigation of normative discourse behaviour both for its intrinsic value and for differentiating between normal and pathological discourse. The discourse performance of normal subjects may overlap to a greater or lesser extent with pathological populations according to the different dimensions measured. Although the task of assessing normative behaviour may appear overpowering, a methodical approach can begin to separate the factors involved. Without this knowledge, the assessment of communicatively-impaired patients may be incorrectly targeted and treatment may be inappropriately provided or not given where it is needed.

The effect of neurological impairment on discourse cannot be ascertained until the effects of intrinsic, non-pathological factors such as age, SES and cognitive skills have been determined. Many previous studies into the discourse of normal or communicatively-impaired individuals have not taken these factors into account. The effect on discourse demonstrated by age and SES in this study call the results of these studies into question. Age has been more frequently considered as a variable in discourse assessment but SES was found to have more significant effects on performance in this study.

The benefits of using both group and single-case investigations have been demonstrated by this study. By using a group study to examine the discourse of the RBD subjects, overriding findings which were characteristic or typical of all subjects could be easily determined. The single-case study approach pinpointed the precise impairments manifested by each subject that varied or concurred with those indicated by the group study. Thus the parallel use of single-case and group studies together was enlightening. Additional investigations using such a combination of research methods would satisfy the urgent need to discard the existing stereotypical picture associated with particular groups and move towards more carefully delineated and described sub-groups. Furthermore, it is only by using such a combination that a heterogeneous group such as right-brain damage can be appropriately investigated. This point has been reiterated by McDonald (2000) who states that

> *"Group approaches to the investigation of RH language disorders may be doomed to yield heterogeneous and therefore ambiguous results.* ***Qualitatively distinct*** *pragmatic disorders may only be apparent via intensive investigation of single cases." (p 102, author's own emphasis).*

This study has also demonstrated the significance of considering easily controllable variables when assessing discourse e.g. interlocutor variables (same interlocutor), setting variables (same setting), discourse tasks (genre, task, topic) etc. It cannot be assumed that an adequate performance on one discourse task will provide a representative sample of their performance. Not even the performance on a particular discourse genre, method of elicitation or topic can be taken as read. Assumptions cannot be made about the simplicity or complexity of discourse sampling without an in-depth assessment of them. Without data on the effects of discourse sampling, the comparison of results from different studies is fraught with difficulties and probably misleading. Furthermore, the ecological validity of the discourse sampling techniques requires further investigation to determine relevant and appropriate methods for use with adults. The pattern of strengths and weaknesses demonstrated by a communicatively impaired group on particular discourse tasks assessed on particular measures may help in the differential diagnosis of specific groups (e.g. normal ageing effects and dementia).

This study has emphasised the importance of using a systematic discourse-model-based approach in the investigation of a number of different discourse levels in a variety of different discourse types within one group of subjects. This point has been stated by Tompkins (1995): "Multiple narrative discourse samples elicited with multiple methods, will help provide a complete picture of patients' abilities..." (p. 120). This approach has also provided the opportunity to investigate the relationships between these variables in a more comprehensive way. This method is obviously more complex and time- and resource-consuming than assessing a single variable or using a few discourse measures on one subject group. However, to continue to make progress in discourse analysis in any NBD or neurologically-impaired group, researchers need to use a multi-layered approach to discourse investigation. Borod et al (1998) have emphasised this, stating

> *"Our inclusion of numerous methodological features in a single research design (.....) permitted a breadth of analysis that was not previously possible". (p. 456).*

Thus, whilst the difficulties of such an approach need to be taken into account, it would appear that a multi-layered discourse analysis holds considerable merit for future investigations into discourse production and would thereby provide clearer assessment and treatment alternatives.

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ORAL DISCOURSE: RIGHT-BRAIN DAMAGE, DEMOGRAPHIC VARIABLES AND SAMPLING EFFECTS

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Volume 2: Appendices

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Appendix A1
Instructions to Raters

These samples, presented in a random order, have been elicited from both neurologically intact and impaired subjects of various ages and socio-economic groups. Each sample is to be analysed according to seven profiles.

1. RELEVANCE

This analysis should be carried out first (to obtain an overall impression of the sample).

RELEVANCE PROFILE

	Mostly Inappropriate	Inappropriate	Mostly Appropriate	Appropriate
Relevance				

Did you consider the sample as irrelevant because:

	Mostly	Sometimes	Rarely
a) although the information given was new, it was unconnected to previous information?			
b) the information was already present in the context?			
c) the information was inconsistent with the context?			
d) the additional information gave too much detail to be relevant to communication?			
e) for another reason(s) (please describe below)			

____

____

____

The Relevance Profile aims to obtain an overall rating of the relevance or appropriateness of the discourse sample to the request given to the subject.

Please read through the entire sample, bearing in mind the request given to the subject. Afterwards, use the four-part scale to rate the relevance of the sample.

There are also a number of reasons for irrelevance given (a - d). Indicate which of these you consider to be applicable to this sample and to what extent. If you consider some of the sample to be irrelevant for a reason which is not give here, please elaborate.

2. DISCOURSE GRAMMAR

Definitions and examples are provided by Labov (1972), Peterson and McCabe (1983), Kaplan (1987) and the writer.

There are separate profiles for narrative and procedural discourse samples due to their different structure.

a) Profile for evaluating the components of narrative discourse production

This profile consists of six elements which evaluate the structure of the narrative. Two of these elements have additional sub-components which are represented on the profile. You are required to determine the presence/absence and appropriateness/inappropriateness of the component produced by the subjects.

PRESENT	ABSENT
Appropriate (Essential and optional aspects or steps)	Appropriate (Optional aspects of steps
Inappropriate (Essential and optional aspects of steps) i.e. confused, limited or excessive	Inappropriate (essential aspects or steps)

For example, an abstract is an optional component and may thus be appropriately present or absent. However, an essential component such as Orientation cannot be considered as appropriately absent.

Definitions and examples of each component are provided below.

Abstract This summarises the story by providing a statement about the content at the beginning.

e.g. Q: Were you ever in a fight?
A: **A boy once punched me in the face.**
When we were kids....

Q: What happened?
A: **We almost drowned in Cape Town**

An "introducer" is also a stylised way of indicating what is to follow in the narrative and may be rated under Abstract.

e.g.: **I remember one time when.....**
Weii, this is what happened....

The abstract is an <u>optional</u> item and therefore the absence of this component can still be rated as appropriate.

Before rating this, ask yourself the following question:
Did the narrator present an abstract of the narrative before giving the details?

Orientation This is the background information which serves to orientate the listener to the context of the narrative, i.e. clauses that provide information as to time, place, persons and their activity or situation. This element has been further divided into sub-categories. The general types of orientation are presented on the profile.

Participants This may include descriptions of the characters (people, animals or animated objects)

e.g. **David and I...**

My aunt Susan was there.

My dog came with me.

Time This reference to time may be quite specific. It may refer to the time of day and may also include locating events in time.

e.g. **Three weeks age....**

It was my tenth birthday....

It happened in the morning.....

When I arrived at the house, I....

Location This may be the location of the events, objects or people in the narrative.

e.g. **He stood outside the shop.**

We were in Durban.

There was a baseball bat in the corner.

General conditions These may be conditions of weather, temperature, lighting, noise, smell, etc. which occur at the time of the narrated events.

e.g. **it was raining.**

it was an extremely hot night.

NARRATIVE DISCOURSE GRAMMAR				
	PRESENT		ABSENT	
	Appropriate	Inappropriate	Appropriate	Inappropriate
Abstract				
Orientation:				
participants				
time				
location				
general conditions				
ongoing events				
tangential information				
imminent events				
features of environment				
Complicating action				
Evaluation				
onomatopoeia				
stress				
elongating particular words				
repetition				
exclamation				
compulsion words				
similes and metaphors				
gratuitous items				
attention-getters				
words per se				
exaggeration + fantasy				
negatives				
intentions, purposes, hopes				
hypotheses, predictions				
results of high point action				
causal explanations				
objective judgements				
subjective judgements				
facts per se				
internal emotional states				
tangential information				
Result/resolution				
Coda				

Ongoing events Narrators orient the listener to ongoing events or the behavioural situation, and such remarks always occur in the past progressive tense.

e.g. **He was running down the road.**
We were going fifty miles per hour.

Tangential information This evaluative information of the events provided may be pertinent to the narrative.

e.g. She gave me ten dollars for going in there. **Ten dollars is a lot of money when you are little.**

Imminent events These often serve as means of fixing the time of the narrative.

e.g. **When mum was going to have my baby brother....**

Features of the environment This involves information about objects or features of the scene of action.

e.g. **We had a ball with us.**
There was a rip in his pants.
There was a pole in front of him.

Before rating, ask yourself the following questions:-

i) Did the initial orientation give you enough information to understand what had happened?
ii) Did you understand who was involved, where and when the event took place?
iii) Did you know enough about the people and places to understand the point of a narrative?

Complicating action This is the sequence of events, presented chronologically, which lead to the high point of the narrative, i.e. the series of clauses which describe the series of events, the "what happened" of the narrative.

e.g. **When I was swimming, it started to rain and....**
We went to a picnic spot and unpacked all of the food on to the wooden table. Soon the table was covered with ants.

Before rating, ask yourself the following questions:

i) Was there at least one event or action?
ii) Was there more than one action or event?
If so,
iii) Were the events related sequentially?
iv) Did each event lead to the next, either by enabling it to happen or directly causing its occurrence?
v) Was there a variety of different events (rather than one type repeated)?
vi) Was there some change in the environment that served as a complicating event, a crisis or a problem of some sort?

Evaluation These are the means or devices for communicating information regarding the narrator's feelings about the characters and events. These clauses makes the narrative worth telling, and wards off the question "so what?". The following types of evaluative comments may be found.

Onomatopoeia

e.g. He heard the gun go **Pow**!

Stress The importance of certain things may be conveyed by a marked emphasis in the narrator's voice. This may be applied to one word or several words and are indicated on the written sample.

Elongating Particular words may be drawn out i.e. a prolonged word for effect.

e.g. In the garden was a **huuuuge** dog.

Repetition This is repetition purely for the sake of emphasis, not for the sake of adding any new information or for clarification of pronunciation.

e.g. The sky looked so **big, big, big**.

Exclamations

e.g. **Oh gosh**

Compulsion words Words used to evaluate what went on.

e.g. We **had** to come in then.

Similes and metaphors

e.g. His eyes got **as big as tomatoes**
Mary felt that he had told her **a white lie**.

Gratuitous terms These terms are common means of stressing or intensifying what they modify. They provide no information and therefore are only evaluative in nature.

e.g. **very, just, really**
He is a **very** big child
I'm trying **really** hard.

Attention-getters These refer to commands that attempt to focus the listener's attention on important information.

e.g. **Listen**
You know what.

Words per se Many words are in themselves evaluative. There are a number of adjectives, some adverbs, some nouns and a few verbs. (This category does not include "good" or "bad").

e.g. (adjectives) **fun, ugly, funny, excited, lazy, scared, happy**

(adverbs) **finally, accidentally**

(nouns) **all. - All** I got was a bleeding nose.

(verbs) **squished** - Then I **squished** the spider.

Exaggeration and fantasy Fantasy is an account of a purely fictional event

e.g. **I held the bear by the paws while dad shot it**.

Exaggeration is an expansion of events that did occur.

e.g. **I ran faster than my friend on his bicycle**.

Negatives (and modified negatives) The events that did not happen are extremely evaluative. Often they inform the listener of either personal or general expectations that were held, but not met, in the situation.

e.g. He **didn't** hit me.

No one was home after all.

We **almost** stopped the car.

Intentions, purposes and desires or hopes These are also evaluative.

e.g. **I was going to sit down.**

We were there to see Dr. Grady.

I wanted to do better in my exam.

I hoped I'd get a car for my birthday.

Hypotheses, guesses, inferences and predictions

e.g. I thought that he would get caught

We didn't think that it would rain.

Results of high point action or climatic action These actions are not identical to or simultaneous with the specific high point action, although they are related to it. Examples include the second comments in the following sequences (the first comments are the high point actions).

e.g. The blue car crashed into our car/ It bent the bumper.
The ball hit by arm/ My wrist was bent back.
I cut myself with a knife/ Blood came running out.

Causal explanations These include all clauses introduced by "because" except where it is used with no possible causal meaning. This category also includes clauses introduced by "so" where it is used in relation to the sequence it connects.

e.g. **He got caught/because he didn't have a good alibi.**
He hit me on the head with a rock/ So I threw one at him.

Objective judgments These are the means by which the narrator uses people (specific or general) to evaluate the narrated event. These must be specified rather than inferred.

e.g. **My brother liked my snowman much better than he liked my sister's.**

Subjective judgments These are the narrator's own opinions about matters which are disputable (such as good-bad, what is best, etc).

e.g. **That was good.**
That was the worst day we had.
I liked the house.
That is my favourite.
That was easy.

A fact per se Some facts are evaluative because of commonly held cultural assumptions.

e.g. **I caught the biggest fish.**
My brother told a lie.

Internal emotional states These may be states of either the narrator or some other participants in the event.

e.g. I felt embarrassed.
He was mad at me.
She didn't care about me.
Mary was feeling depressed.

Tangential information As discussed under orientation. This has the effect of suspending the action and calls attention to that particular part of the narrative as being important.

Before rating, ask yourself the following questions:

i) Do you know how the narrator felt about the complicating event?
ii) Did the narrator provide suspense during the narration by stopping the sequence of action at the high point and dwelling upon it?
iii) Did the narrator use a variety of techniques to evaluate?
iv) Did the narrator seem to be involved in the presentation?

Result or resolution This is a statement which reflects the final events or ends the experience. This is the portion of the narrative sequence which follows the evaluation (or events) and refers to "what finally happened". This is an essential component of the narrative.

e.g. Then the bird flew down and picked up the small mouse in its' beak.
The exhausted mouse had given up its fight to live.

Before rating, ask yourself the following question:

Did the narrator let you know that the narrative was over (through his lexical usage)?

Coda This indicates the formalised ending or moral of the narrative, i.e. a clause that signals that the narrative is finished. This element is optional.

e.g. ... and **that was that**

... and **there were no more problems after that**.

... and that's how he died. **He got involved in other people's business.**

A coda can also return the narrative to the present moment.

e.g. ... the little girl was playing with the scissors that were meant for cutting the paper dolls with. **Now she has short hair.**

Before rating, ask yourself the following question:

Did the narrator inform you of any long range consequences or give a moral to the narration?

b) Profile for evaluating the components of procedural discourse production

The rating procedure for this profile is the same as that for the narrative discourse production described above. Some components of procedures which are similar to the narratives (viz. Introduction/orientation, coda) have already been described in Section 2(a) above.

Essential steps These are steps which must be understood by the listener in order to determine the basic actions to do the task.

Optional steps These are the steps which clarify, add or provide further detail beyond the essential steps. Within these steps the narrator may convey his feelings about the procedure, i.e. provide an evaluation.

Target step This step shows that the procedure is complete.

The essential and target steps for each procedure are provided below.

<u>Changing a car tyre</u>

- Take out spare wheel/tools
- Loosen bolts/take off hubcap
- Jack up car
- Take off bolts and flat wheel
- Put on spare wheel
- Tighten bolts/put on hubcap
- Jack down car and drive off.

<u>Replacing a pane of glass in a window</u>

- Get new glass cut/get tools
- Break out broken glass
- Prepare window frame/place layer of putty in
- Insert new glass
- Secure with putty/nails
- Clean up

<u>Buying a jacket</u>

- Go to shop
- Select jacket/discuss with sales person measurements, colour, etc.
- Fit jacket (try on)
- Pay for jacket
- Take jacket/leave shop

Bike

- Get person on bike/give instructions
- Hold the bike
- Get them pedaling
- Run with them, holding the bike
- Let go

Supermarket

- Prepare list
- Go to supermarket
- Collect basket/trolley
- Select goods
- Go to till
- Pass goods through/Pack up goods
- Pay
- Pack into car/leave

Book

- Go to library
- Discuss with librarian/look up in catalogue/Select book
- Take to counter
- Give in library card
- Books are checked out
- Take books and leave.

Before rating, ask yourself the following questions:

i) Are the objects necessary for performing the ask clearly mentioned?

ii) Are the actions for carrying out the task mentioned and described so that you understand what is being done?

iii) Was the amount of information given of sufficient detail to perform the task completely?

iv) Was the information provided too detailed or personalized, thereby impeding easy comprehension of the task?

PROCEDURAL DISCOURSE GRAMMAR				
	PRESENT		ABSENT	
	Appropriate	Inappropriate	Appropriate	Inappropriate
Introduction/Orientation				
Sequence of steps				
Essential steps				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Optional steps				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Target				
Coda				

3. CLARITY DISRUPTORS

Definitions and examples are provided by Nicholas et al (1985, Kaplan 1987, Sherratt 1988, 1992.

CLARITY DISRUPTORS

	Number	Percentage
Non-specific components		
Empty phrases	______	
Indefinite terms	______	
Deictic terms	______	
Total		______
Word substitutions		
Neologisms	______	
Paraphasias	______	
Circumlocution	______	
Total		______
Content and Fluency Disruptors		
Repeated words or phrases	______	
Repetition of ideas	______	
Semantic perseveration	______	
Comments on the task	______	
Personal value judgments	______	
Intrusive words or phrases	______	
Total		______
TOTAL OF ALL DISRUPTORS		______
Total no. of words		______
PERCENTAGE		=======

This profile consists of twelve elements (divided into three categories) that may contribute to non-informative or empty speech. Definitions and examples of each are given below.

Please read the sample and underline those words which you consider to be disruptors and indicate the type used. If you consider particular words to be disruptors but are not certain what type, please underline the words anyway.

The same word/s may appear in more than one category e.g.

> **This is a mess.**
> "**This**" = deictic term, "**This is a mess**" = comment on task.

In this case, count the larger category i.e. four words in "Comment on task".

Non-specific elements

Empty phrases/pause fillers : Common idioms or idiosyncratic fillers not contributing any content to the discourse.

e.g. **"and so on and so forth", "like", "you know", "I think", "sort of", "something like that"**

or tag questions

e.g. "they do that, **don't they**"

Indefinite terms: highly non-specific nouns

e.g. **"thing", "something", "stuff"**.

Deictic terms: e.g. **"this", "that", "here", "there"**.
Exclude "that" when used as a relative pronoun and as a subordinating conjunction (i.e. do not include "the person that bought..." or "he went to town so that ...."). Also exclude "there" when used non-specifically (e.g. There are often nice cakes in that shop".

Word substitutions

Neologisms: nonwords with no apparent relation to the target.

e.g. "**filakers**" for "scissors, "**sandbyes**" for "castle".

Paraphasias

These may be
-literal - nonwords that are phonologically related to the target. e.g. "**tsair**" for "chair".
-unrelated verbal - real words with no apparent relation to the target e.g. "**candle**" for "gun".

-semantic - real words that are semantically related to the target e.g. "**chair**" for "gun".
-verbal-phonological - real words that are phonologically but not semantically related to the target e.g. "**bed**" for "red".

Circumlocution: a round about way of expression, when a person cannot find a specific word for an object, action, event, etc.

e.g. "**something that you fix your hair with**" - "brush".

<u>Content and fluency elements</u>

Repeated words or phrases: repetition other than for effect.

Semantic perseveration: Persistent repetition of words, phrases, ideas or subjects so that once a subject mentions the particular word, phrase, etc, he returns to it in the process of speaking. The repetitions fall beyond the requirements of the discourse sample.

e.g. One man is pinching and **the other man is waiting in the car.**
The man is taking out the jewelry....
The other man is waiting in the car.

Repetition of ideas: This involves the repetition of ideas/concepts within the discourse sample but are not used for the sake of emphasis or to highlight important facts in the sample. Different wording is used to express these ideas when repeated.

e.g. "His shoelaces were not tied up. **They were loose**."

Comments on the task instead of the actual picture/narrative/procedure

e.g. "**I know the word but I can't say it**".

Personal value judgments about the picture/story/procedure (These comments may bear no relation to the specific task).

e.g. "**This is a lousy mess**".

Intrusive words or phrases: These are words or phrases associated with others in the environment, but not relevant to the discourse.

e.g. It was a good book. It was about the American War of Independence. **The cover is red and white**. The characters.....

From this profile, a frequency count of the number of words present in each element is made and a category total calculated. Each category total divided by the total number of words in the sample provides the percentage of the sample occurring in each category.

4. PRODUCTIVITY AND SYNTACTIC ANALYSIS

PROFILE OF PRODUCTIVITY AND SYNTACTIC MEASURES	
	Number
Total number of words (No. W)	_______
Total number of T-units	_______
Mean number of words per unit (W/T)	_______
Number of clauses	_______
Mean number of words per clause (W/Cl)	_______
Mean number of clauses per T-unit (Cl/T)	_______

Cleanse the data by placing mazes (i.e. false starts, repetitions, revisions) in brackets. The segments in brackets will be analysed further in the dysfluencies profile.

Total no. of words

Count the total number of words in the sample (from the first word following the request until the last word before a pause indicating the end or before a statement indicating the end).

Note:

The following are counted as one word:-

hyphenated words:	sister-in-law
abbreviations	O.K.
partial words	wor...words
possessives	dad's
acronyms	L.R.I.

The following are counted as two words:-

contractions	I'd (= I would or I had), don't (= do not)
elided words	gonna (= going to), wanna (= want to).

The following are counted as three words:-

contractions	dunno (do not know)

Count interjections (e.g. Oh, hmm, uh-huh) but do not count nonword fillers (um, er, uh).

Count each word in numbers (e.g. 45 = 2 words) and in proper names.

Total number of T-units and Total Number of Clauses

A T-unit is a minimal terminal unit (Hunt 1979) and is defined as one main clause and all subordinate clausal and non-clausal elements attached to or embedded in it. It is thus a thought unit. Divide the sample into T-units.

A clause contains a finite verb and may be a main, subordinate or embedded clause. Identify the number of clauses in each T-unit by underlining the finite verbs.

For example

/and I was worried/
(1 T-unit, 1 clause)

/and as I say when I got up and took that cup of tea, she'd died in the night/
(1 T-unit, 4 clauses)

/Then when we were there in the waiting room, I was very scared because I was thinking that he was going to pull all my teeth out/
(1 T-unit, 4 clauses).

Mean number of words per T-unit (or T-unit length)

This is computed by dividing the total number of words by the total number of T-units.

Mean number of words per clause (or clause length)

This is computed by dividing the total number of words by the total number of clauses.

Mean number of clauses per T-unit (or clausal embedding)

This is computed by dividing the total number of clauses by the total number of T-units.

5. CLAUSAL STRUCTURE

Definitions and examples are provided by Kemper et al (1989) and the writer.

PROFILE OF CLAUSAL STRUCTURE

	Frequency
Main clauses	________
Gerunds	
Subject embedded (L)	________
Predicate-embedded (R)	________
Relative clauses	
Subject-embedded (L)	________
Predicate-embedded (R)	________
That clauses	
Subject-embedded (L)	________
Predicate-embedded (R)	________
Infinitives	
Subject-embedded (L)	________
Predicate-embedded (R)	________
WH-clauses	
Subject-embedded (L)	________
Predicate-embedded (R)	________
Subordinates	
Noun Phrase (L)	________
Verb Phrases (R)	________
Co-ordinates	
Noun Phrase	________
Verb Phrase	________
Total clauses	________
% Left branching	________
% Right branching	________
% Main clauses	________

Analyse each T-unit in terms of the type of clauses it contained. Clauses are coded as either main clauses or one of the types of left- (subject-embedded) and right- (predicate-embedded) branching clauses (after Kemper et al 1989). A main clause contains a subject and predicate but no dependent/embedded clauses. The incidence of each clause type and direction of embedding is noted in the relevant place on the Clausal Structure Profile.

Examples of complex syntactic constructions are given below:

Gerunds

Subject-embedded (left)	*Walking in the woods* is his daily treat.
Predicate-embedded(right)	I caught him *running out of the door.*

Relative clauses

Subject-embedded (L)	*The worst experience that I had* was finding my wife dead.
Predicate-embedded (R)	The bolt is the bit *that sticks out.*

That clauses

Subject-embedded (L)	*That he was dressed as a clown* surprised me.
Predicate-embedded (R)	I thought *that it was funny.*

Infinitives

Subject-embedded (L)	*To go out in such weather* would be madness.
Predicate-embedded (R)	The procedure would be *to slide the other one back.*

WH-clauses

Subject-embedded (L)	*What you have to do* is be careful of the glass.
Predicate-embedded (R)	That is *what I would do.*

Subordinates

Noun phrase (L)	*If I go shopping with my wife*, she usually drives.
Verb phrase (R)	Now it's night *because the moon is up.*

Co-ordinates

Noun phrase (L)	*The two boys and the dog* waited there.
Verb phrase (R)	So I go and pay for it at the till.

Then tally the total number of main, left and right branching clauses for each sample. From this, the percentage of clauses of the total number of clauses coded as main, left and right branching clauses can be calculated.

6. COHESION ANALYSIS

Definitions and examples are provided by Halliday and Hasan (1976), Hedberg and Stoel-Gammon (1985) and the writer.

PROFILE OF COHESION

	CODE	NO.	TOTAL
REFERENCE			_____
Pronominals	R1	_____	
Demonstratives and definite article	R2	_____	
Comparatives	R3	_____	
SUBSTITUTION			_____
Nominal substitutes	S1	_____	
Verbal substitutes	S2	_____	
Clausal substitutes	S3	_____	
ELLIPSIS			_____
Nominal ellipsis	E1	_____	
Verbal ellipsis	E2	_____	
Clausal ellipsis	E3	_____	
CONJUNCTION			_____
Additive	C1	_____	
Adversative	C2	_____	
Causal	C3	_____	
Temporal	C4	_____	
Other ("continuative")	C5	_____	
LEXICAL			_____
Same item	L1	_____	
Synonym or near synonym	L2	_____	
Superordinate	L3	_____	
"General" item	L4	_____	
Collocation	L5	_____	
ATTEMPTS		_____	
TOTAL COHESIVE TIES			=====
TOTAL T-UNITS			_____
TOTAL NO. OF TIES PER T-UNIT			_____
ANDS:-			

Each sample is to be analysed using the five types of cohesive relations (described below). Each type of cohesive tie is coded and totals for each type are tallied and recorded on the Cohesion Analysis Profile. The total number of cohesive ties per sample is then tallied and the number of each type of cohesive tie relative to the total number of cohesive ties is calculated.

Only cohesive ties that connect items in separate T-units are coded.

REFERENCE

These are items which make reference to something else so that they can be interpreted.

R1 - Pronominals

Pronouns e.g. *he, me, I, they, theirs.*

R2 - Demonstratives and definite articles

Demonstratives e.g. *this, there, those.*
“There” is not rated as cohesive in cases such as "There are usually public telephones in such places”.

Definite articles e.g. *the*
Comparatives e.g. *same, identical, different.*

SUBSTITUTION

This involves the replacement of one item with another. For example, nouns may be replaced by "one" or verbs by "do".

S1 - Nominal substitutes (in place of a noun)
e.g. This box is small. I must get a larger *one.*

S2 - Verbal substitutes (in place of a verb)
e.g. Does he usually shop there? I think he always *does.*

S3 - Clausal substitutes (in place of a clause).

(*so, not*, or *that* take the place of a clause)

e.g. Is he going to the meeting? I think *so.*

ELLIPSIS

This occurs when something that is structurally necessary is left unsaid.

E1 - Nominal ellipsis

A modifier (e.g. adjective, deictic) functions as the noun.

e.g. Here are my two best dresses.

Where are *yours*?

I'd like *three.*

E2 - Verbal ellipsis

e.g. Is he going to the meeting?

Yes, he *might.*

E3 - Clausal ellipsis

This entails the omission of an entire clause.

e.g. Are you going to London?

Yes, I am.

CONJUNCTION

This is a cohesive relation which occurs between clauses and specifies the way in which what is to follow is systematically connected to what has gone before.

C1 - Additive
Used to connect same or similar topics.
E.g. *and, or, furthermore, alternatively, that is, thus* etc.
For "and" see note below.

C2 - Adversative
These relate similar topics antagonistically.
E.g. *but, however, though, in fact, instead, on the other hand, I mean, in any case.*

C3 - Causal
These reflect result, reason and purpose.
e.g. *so, then, consequently, because, for, otherwise*, etc.

C4 - Temporal
These relate topics according to time.
e.g. *then, next, before that, first...then, at once, soon, next time, finally, up to now,*

C5 - Continuative
These indicate that more information will follow
e.g. *now, of course, well, anyway.*

LEXICALISATION

This is achieved by the selection of vocabulary.

L1 - Repetition of the same item
e.g. Knock out the broken glass.
Pick the pieces of *glass* up.

L2 - Synonyms or near synonyms.
e.g. The man chatted to us.
He was a very friendly *chap.*

L3 - Superordinates
These refer to any item whose meaning includes that of the earlier one.
e.g. The boy asked for some sweets.
This *child* has such a sweet tooth.

L4 - General items
These are words such as *thing, person, make, do* etc.
e.g. Drive that old car carefully.
It's such an old *thing* now.

L5 - Collocation.

These are associated lexical items which regularly co-occur. These include opposites, complementaries, antonyms, ordered series etc.

e.g. *boy...girl, climb...ascent, disease...illness, wet...dry, sky...sunshine...cloud....rain.*

ADDITIONAL MEASURES

a) Attempted cohesive ties.

The number of cohesive ties which are either ambiguous or incorrect (e.g. number, gender, meaning) are tallied and the ratio to the total number of cohesive ties per sample is calculated.

e.g. The girls bought new dresses.
She chose a blue one.

The boy and his dad were throwing stones
He searched for some more.

b) The number of "ands" is counted separately (as it is often difficult to determine when "and" is used cohesively or not).

7. DYSFLUENCY

Definitions and examples are provided by Biddle et al 1996, Brookshire and Nicholas (1995), Clark (1997), Cooper (1990), Dollaghan and Campbell (1992), Glosser et al (1988), Illes (1989), Leeper and Culatta (1995) and the writer.

PROFILE OF DYSFLUENCIES

	No. of words
False starts	____________
Incomplete mazes	____________
Repetition	____________
Nonword fillers	____________
Part-word production	____________
Total dysfluencies	===========
Total words	____________
Percentage dysfluencies of total words	===========

The following dysfluencies are coded on the profile.

1. *False start mazes*- (i.e. a phrase or sentence which is revised to modify, correct or clarify what the speaker has already said and may include an editing expression such as "I mean", etc).

e.g. I went to town *on Thursday* I mean on Friday.

The ball.... the rugby ball went over the .....

My family always... I mean my mother's side of the family always go to.....

2. *Incomplete mazes* (aposiopesis) - (i.e. a phrase or sentence which is begun but abandoned, leaving the thought incomplete)

e.g. *After going home....* well first I went shopping

We set off without .... we hadn't thought about what we were going to do.

..... *and then I.....* She wanted to buy a ......

3. *Repetition of words or phrases*

e.g. Some of the boys *the boys* I teach are rowdy

on.....on the table

when I..... when I went

4. *Nonword fillers* (i.e. the inclusion of extraneous sounds e.g. interjections and filled hesitations such as "uh", "um", "oh").

e.g. I *uh.....* thought that

He went to *um* London, I think.

5. *Part-word production* (i.e. the production or repetition of syllables and sounds within a word)

e.g. He went *ho* home first.

give me the *buh buh* box

Each word or occurrence of dysfluency is counted.

e.g. *buh buh* box = two part-word productions;

We set off without .... we hadn't thought about....= four words in an incomplete maze.

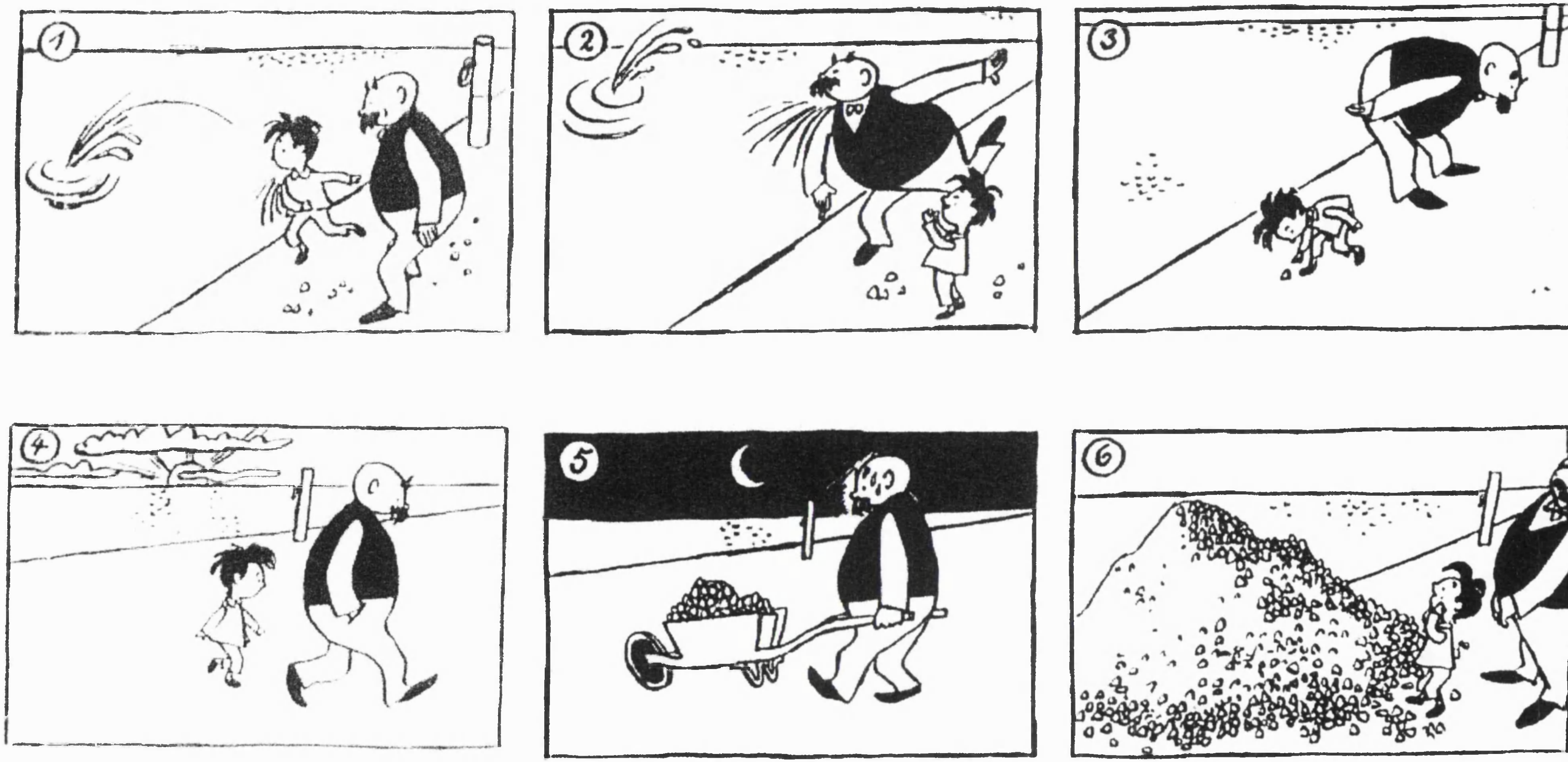
The total of each category of dysfluency and the total incidence of dysfluency is calculated. The total incidence of dysfluency is divided by the total number of words and then multiplied by 100 to provide the percentage of dysfluency which occurs in each sample.

Appendix A2

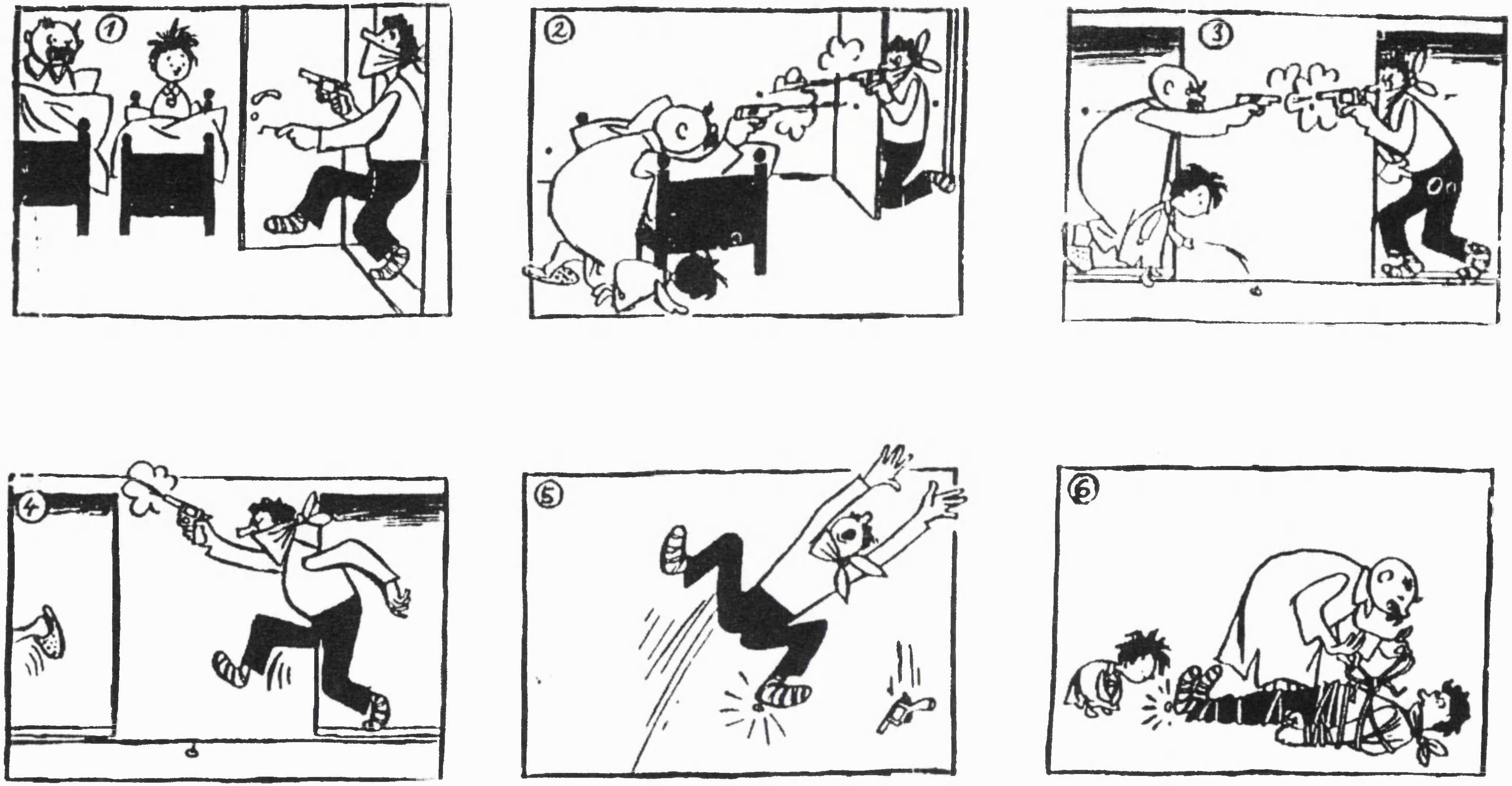
Picture Sequence Stimuli

(Plauen 1952)

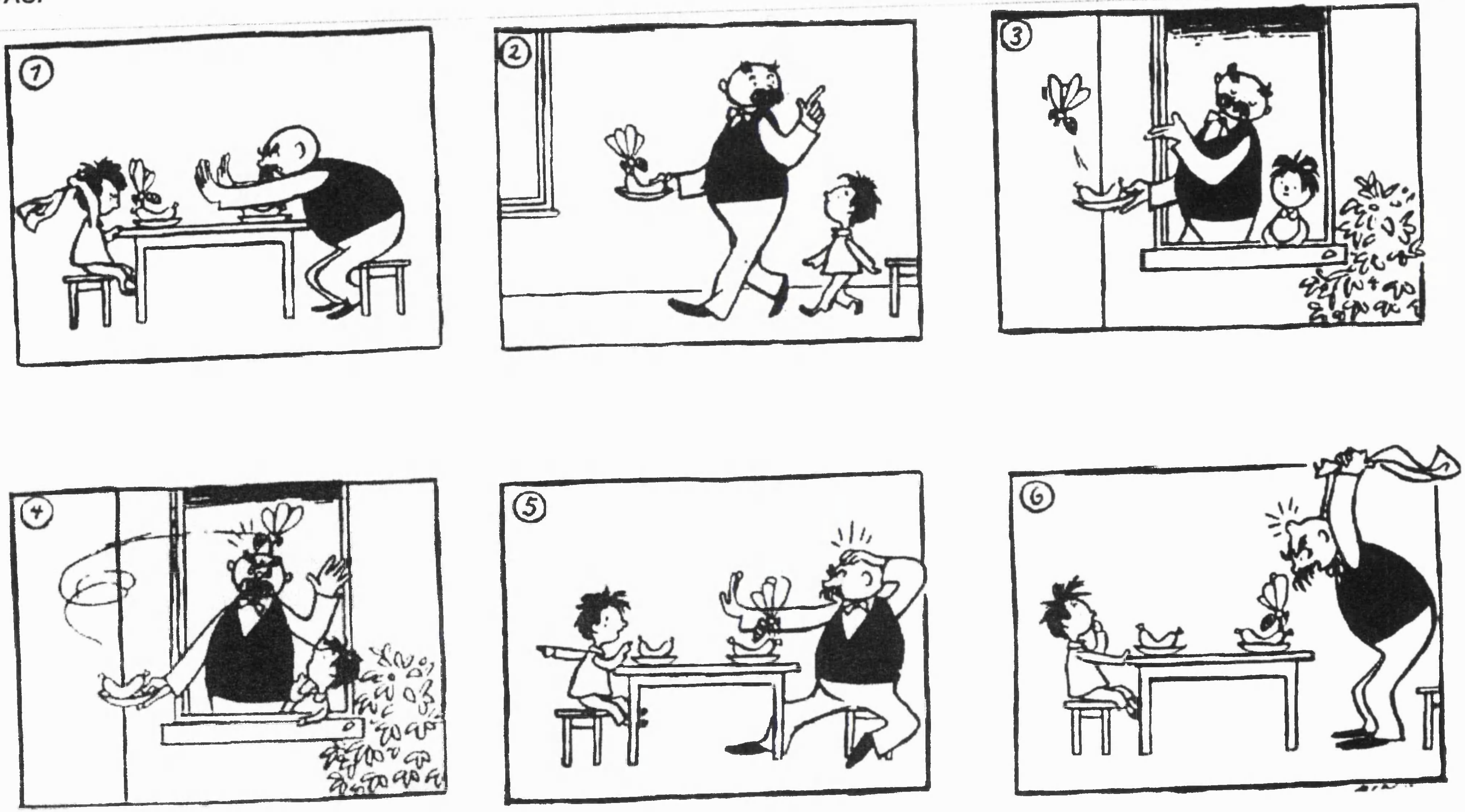
STONES



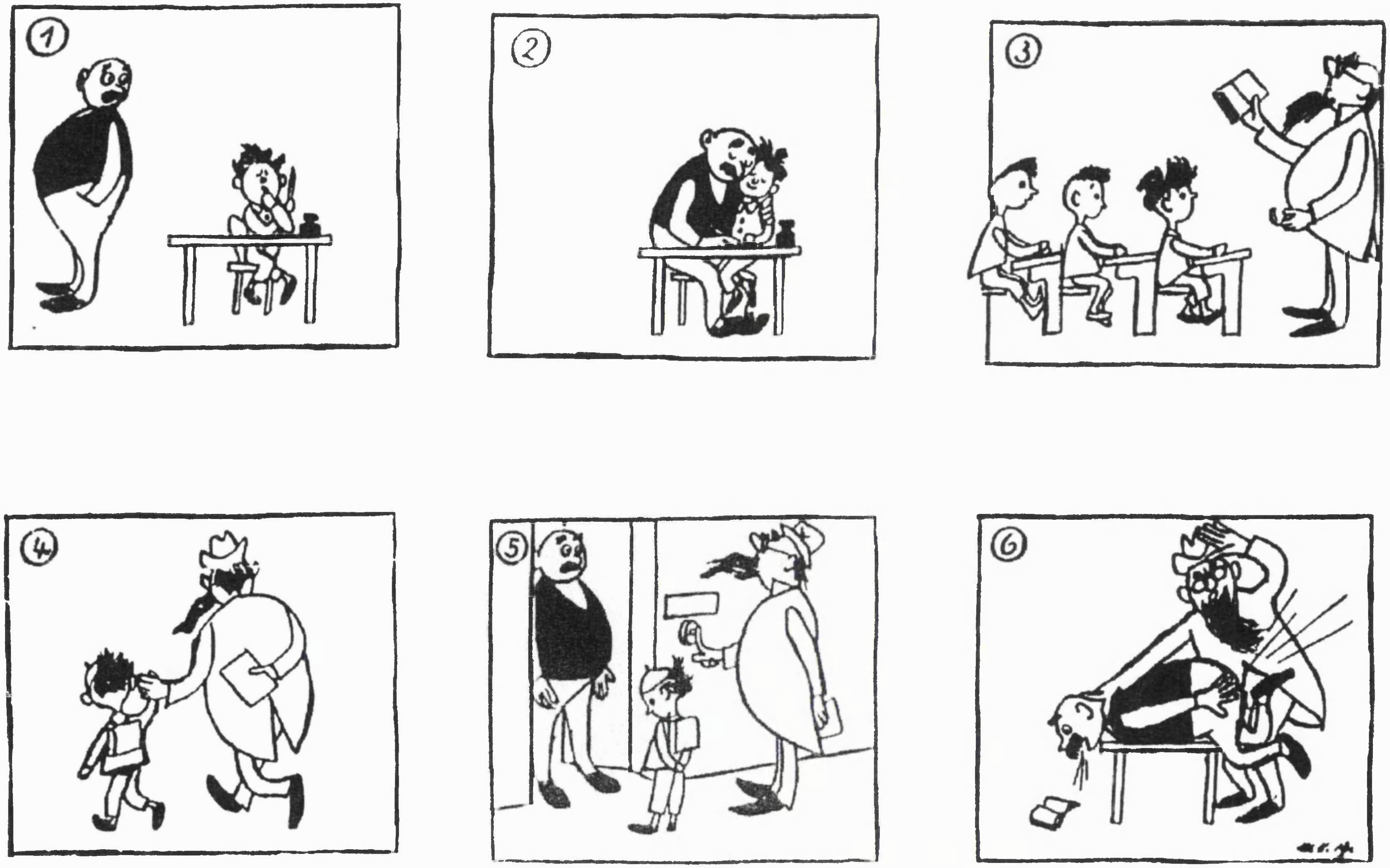
BURGLARY



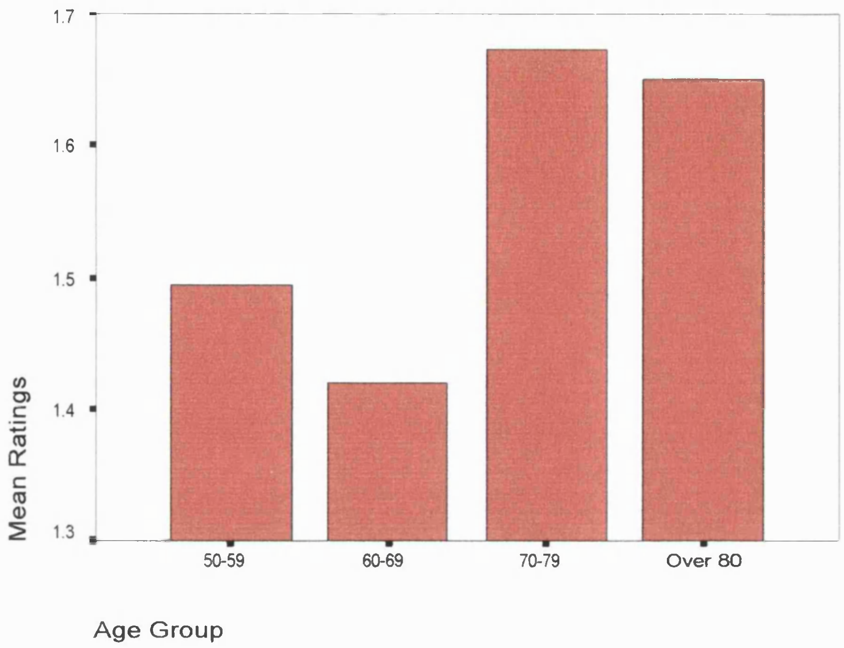
WASP



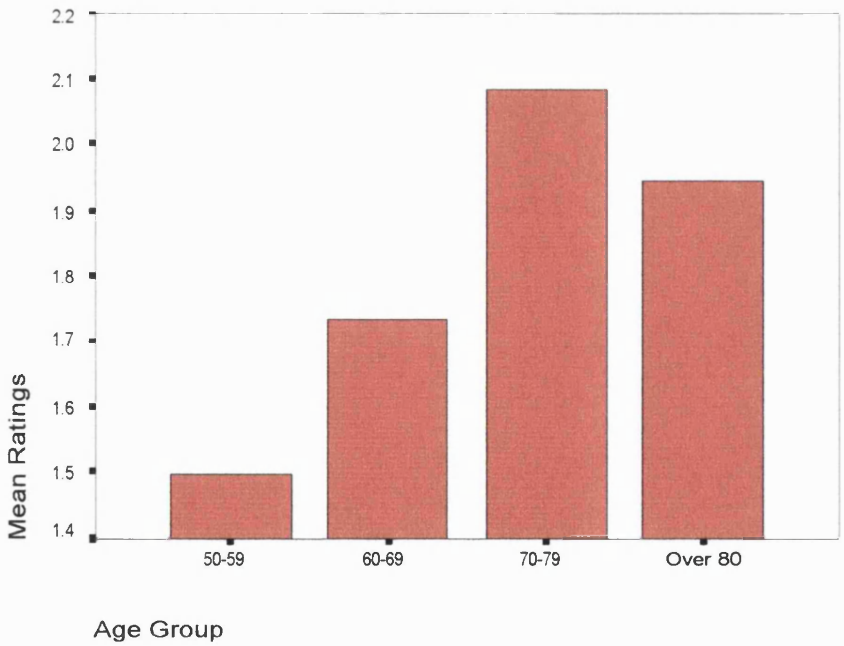
HOMEWORK



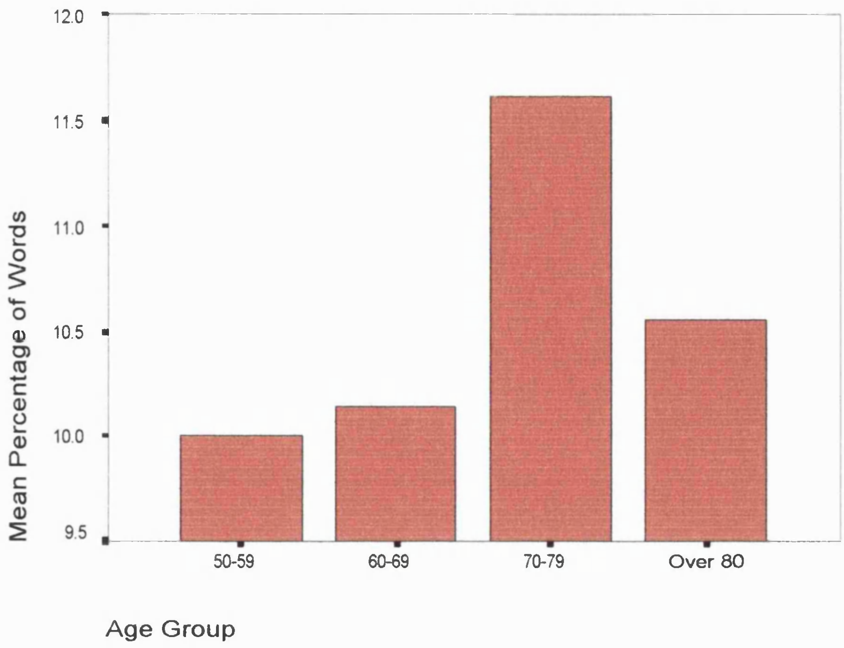
Appendix A3
Age Effects on NBD Samples



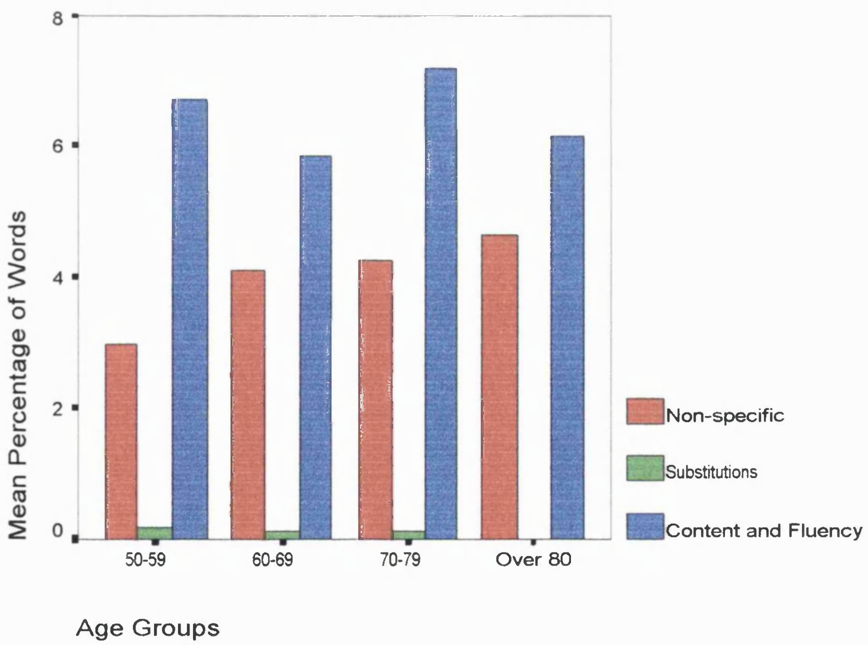
Graph A3.1: Age effect on relevance ratings in combined discourse samples



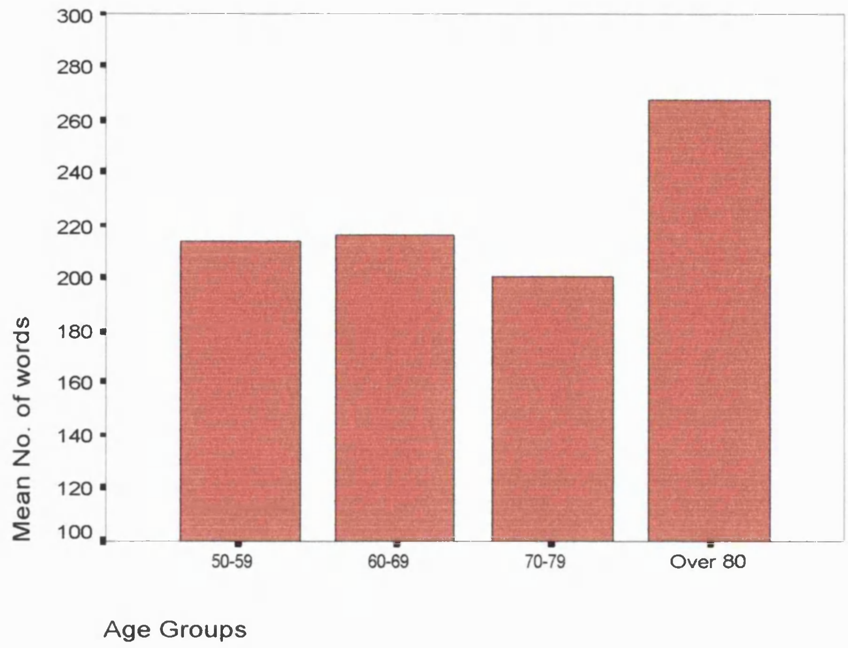
Graph A3.2: Age effect on discourse grammar in combined discourse samples



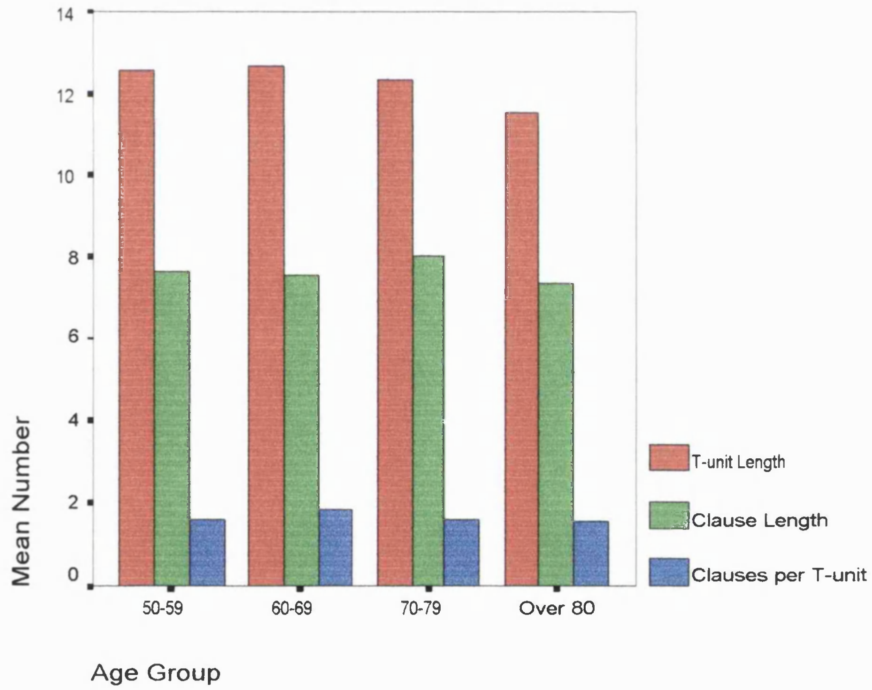
Graph A3.3: Age effect on total clarity disruptors in combined discourse samples



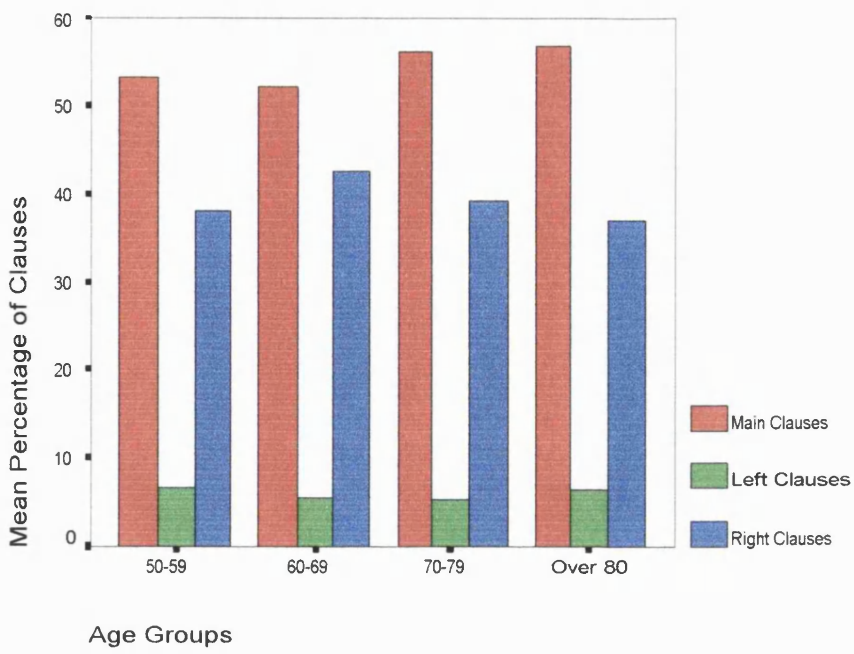
Graph A3.4: Age effect on types of clarity disruptors in combined discourse samples



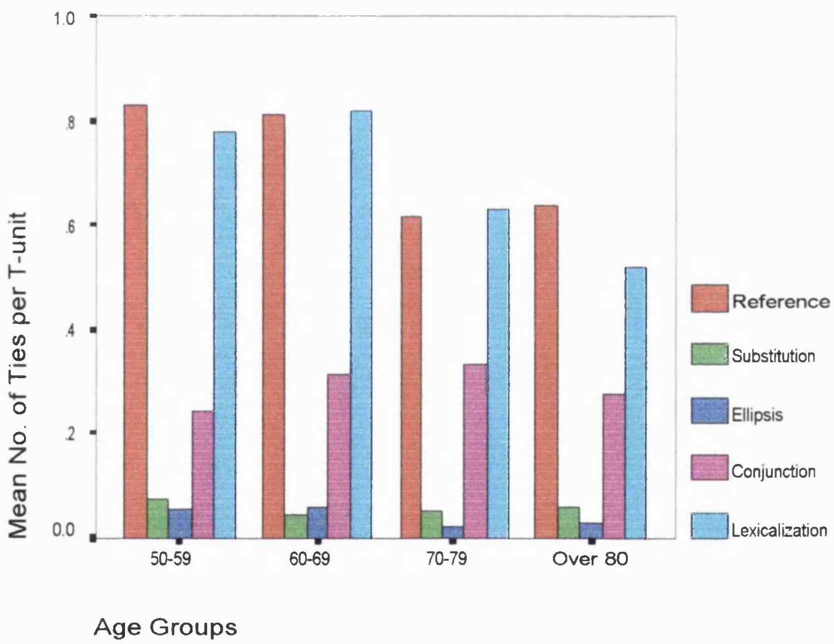
Graph A3.5: Age effect on length of combined discourse samples



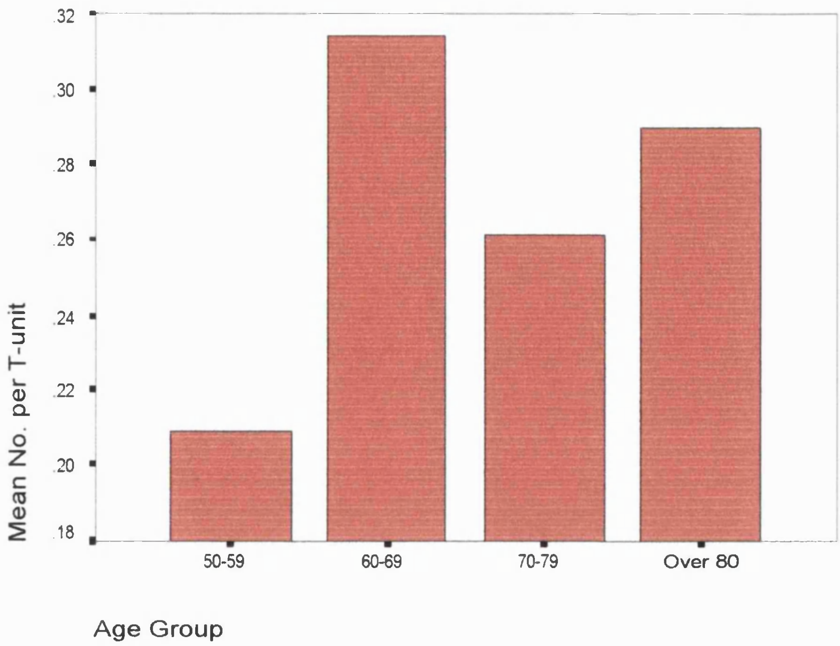
Graph A3.6: Age effect on syntactic complexity in combined discourse samples



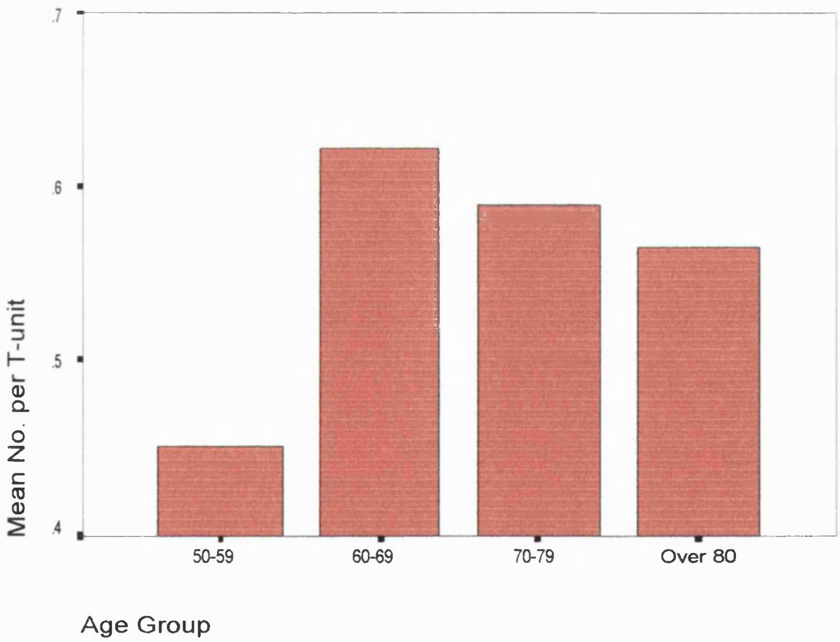
Graph A3.7: Age effect on clausal structure in combined discourse samples



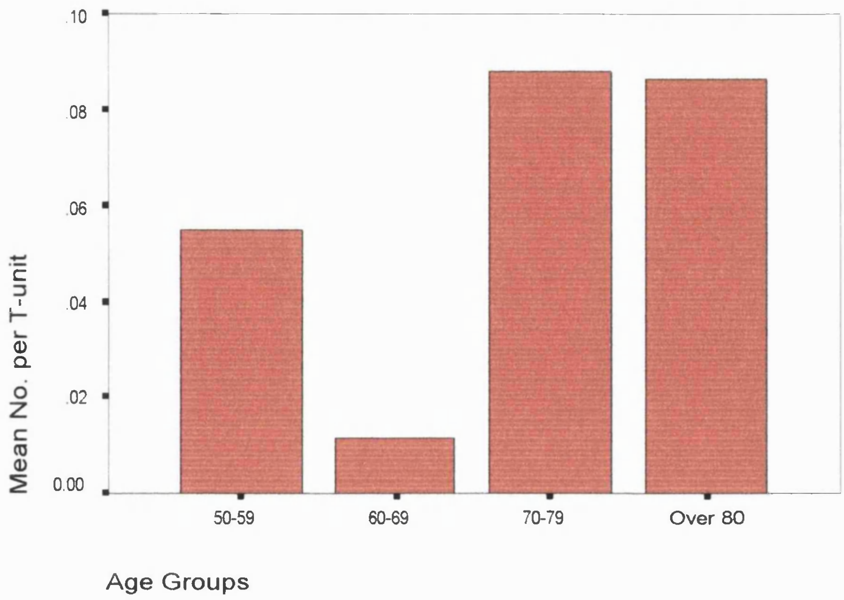
Graph A3.8: Age effect on types of cohesion in combined discourse samples



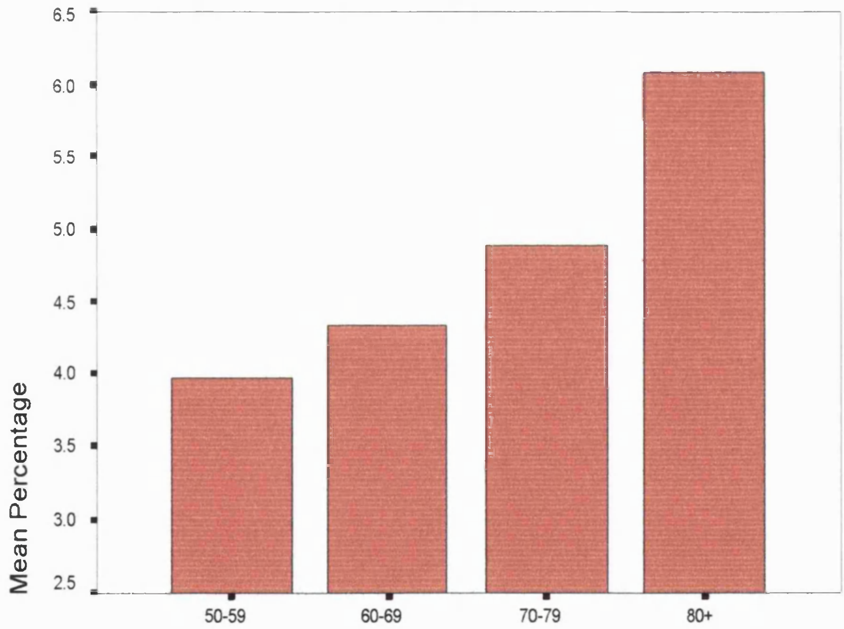
Graph A3.9: Age effect on "and" in combined discourse samples



Graph A3.10: Age effect on connectives in combined discourse samples

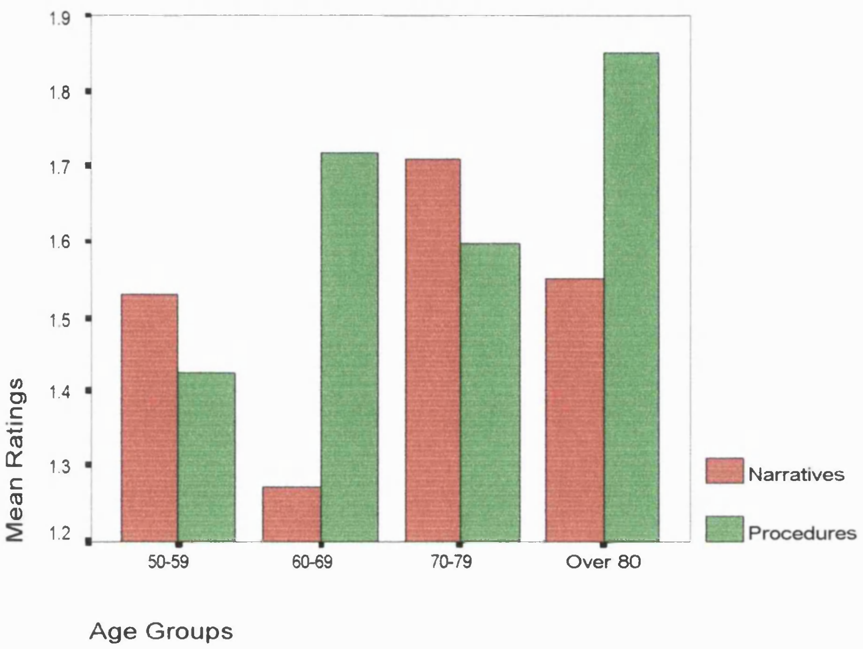


Graph A3.11: Age effect on attempted cohesion in combined discourse samples

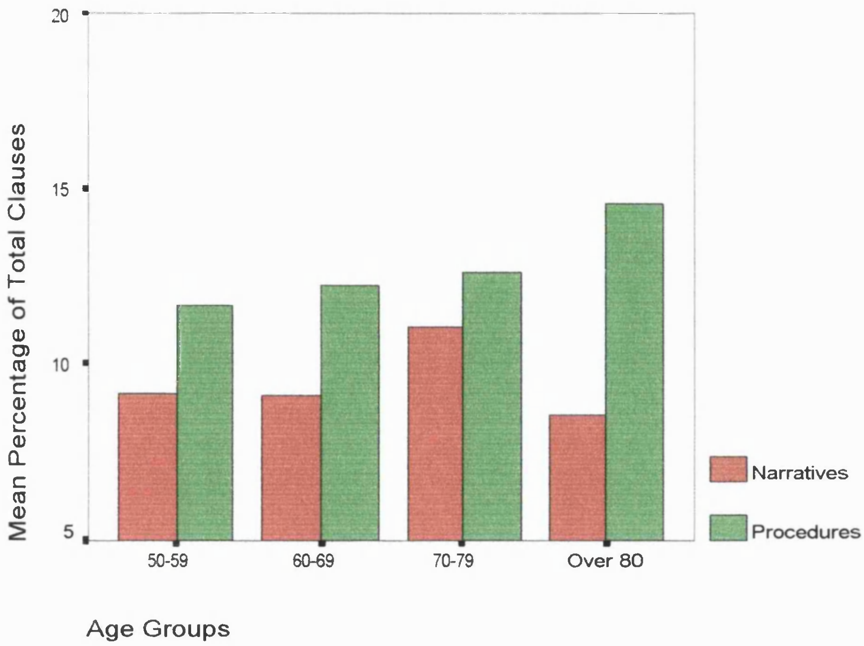


Graph A3.12: Age effect on dysfluencies of combined samples

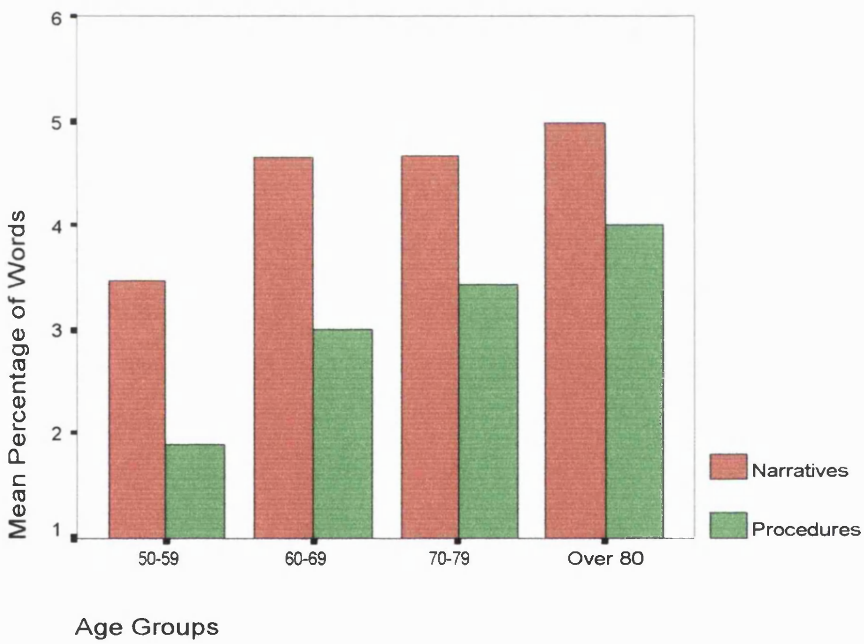
Appendix A4
Age Effects on NBD Discourse Genres



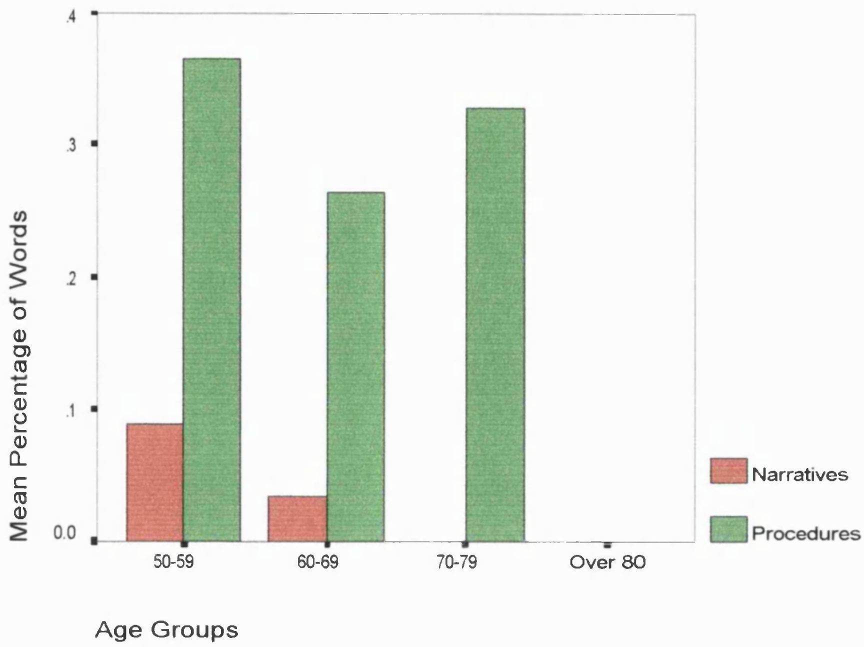
Graph A4.1: Age effect on relevance ratings of genres



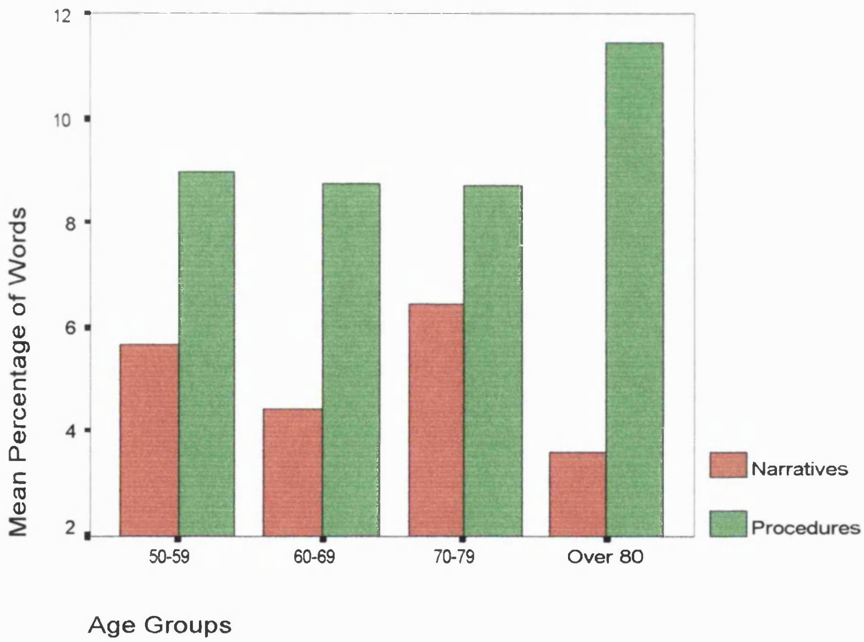
Graph A4.2: Age effect on total clarity disruptors of genres



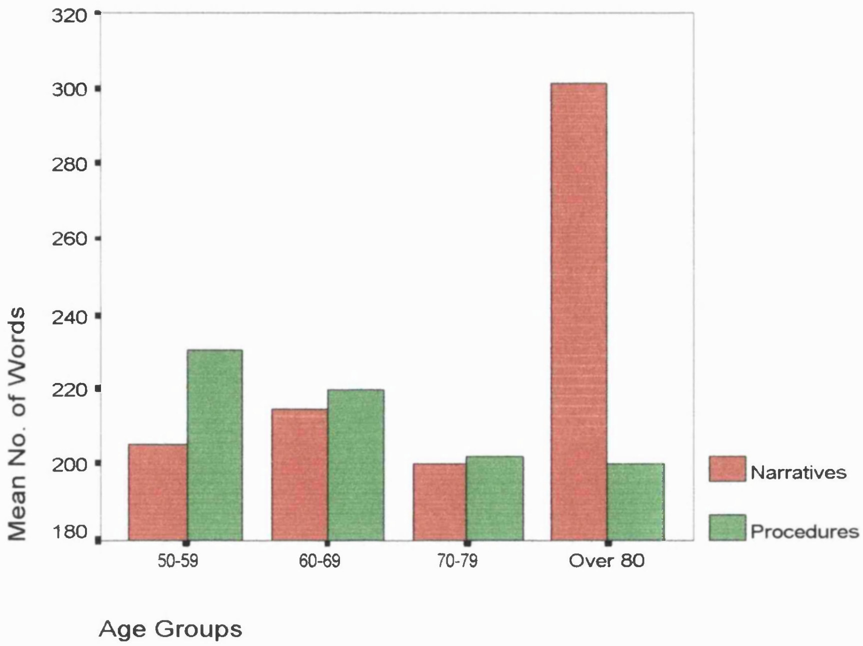
Graph A4.3: Age effect on non-specific elements of genres



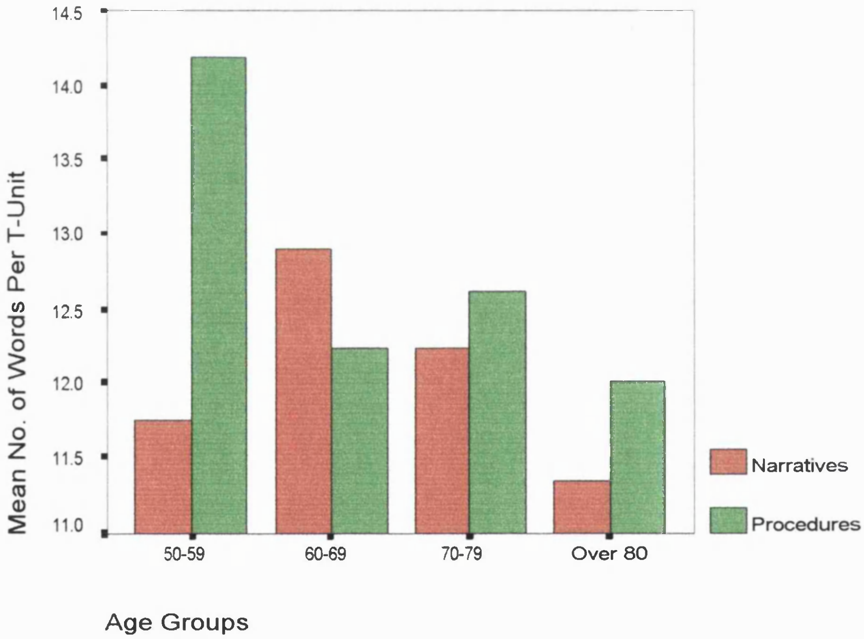
Graph A4.4: Age effect on word substitutions of genres



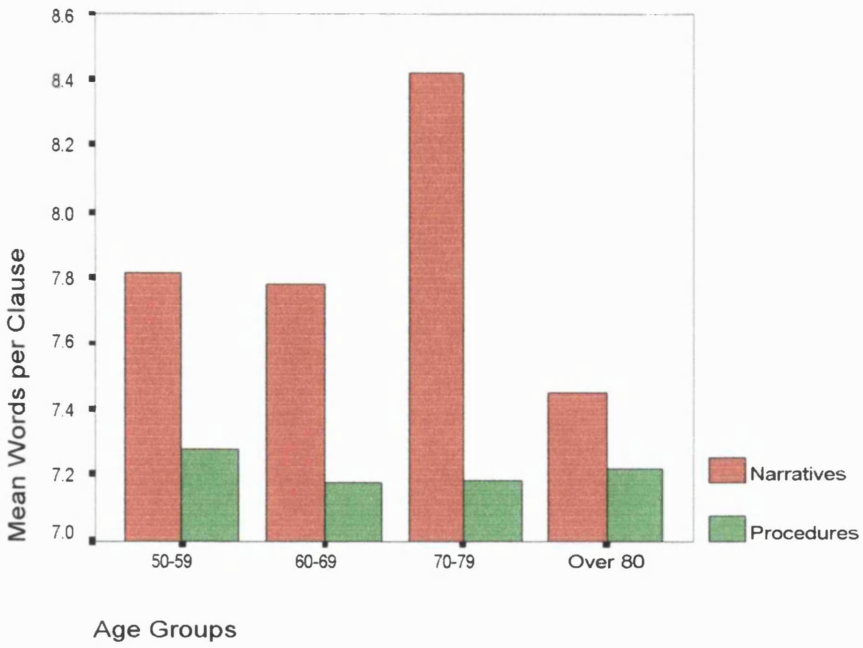
Graph A4.5: Age effect on content and fluency disruptors of genres



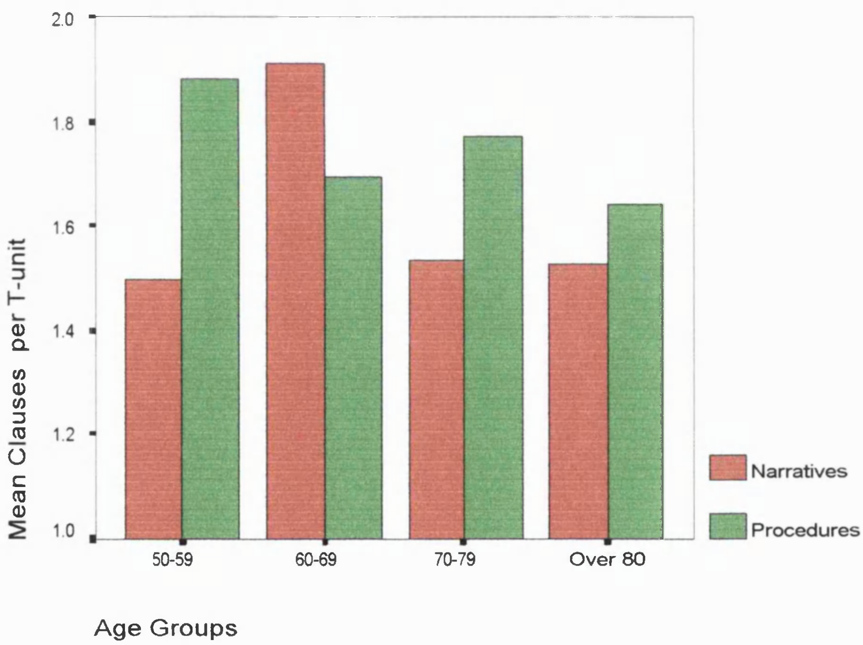
Graph A4.6: Age effect on length of genres



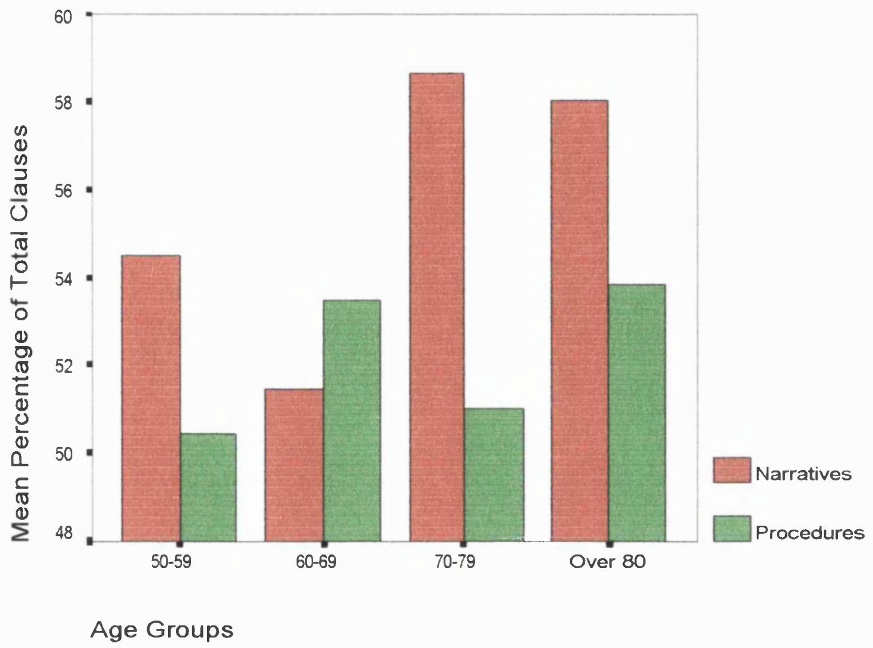
Graph A4.7: Age effect on T-unit length of genres



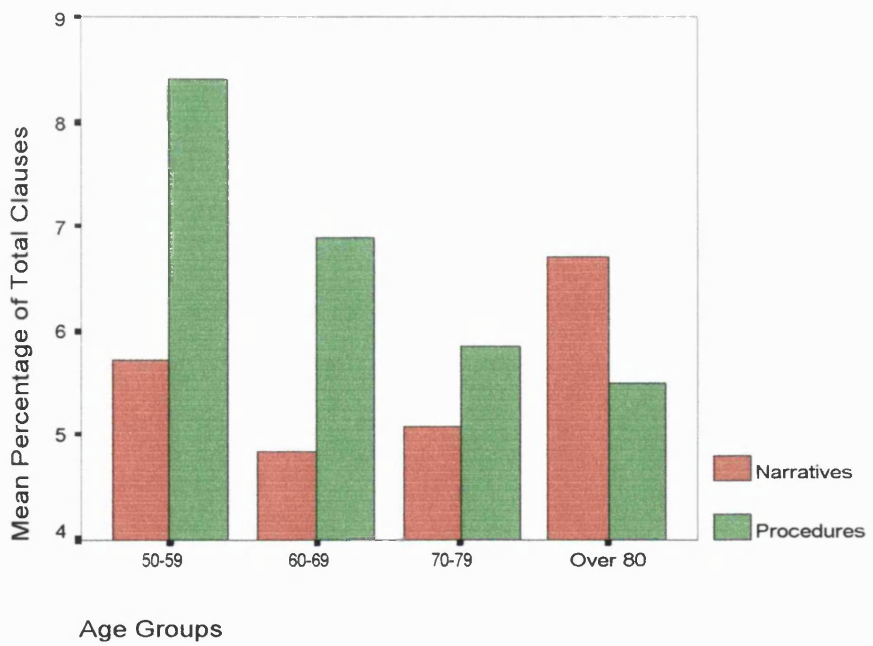
Graph A4.8: Age effect on clause length of genres



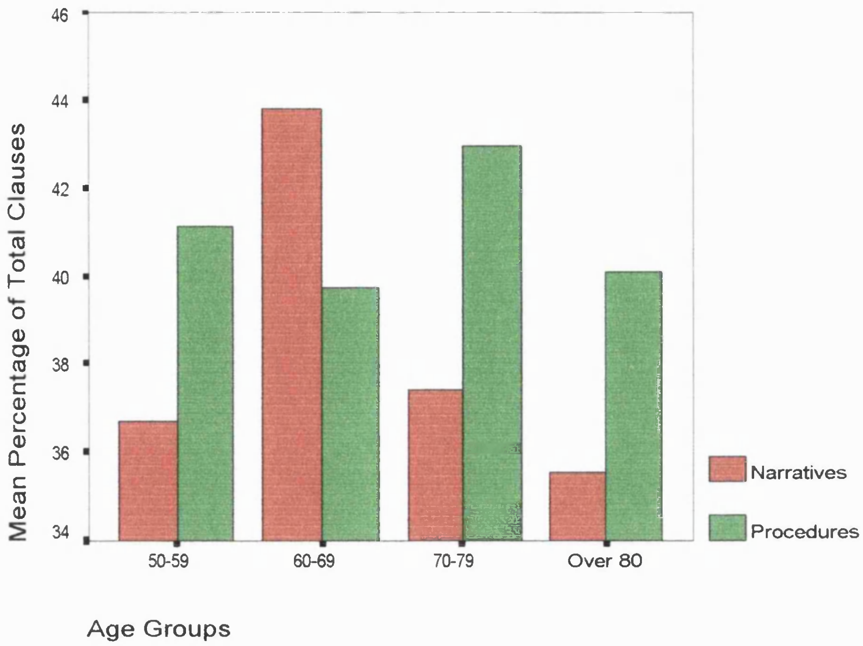
Graph A4.9: Age on clausal embedding of genres



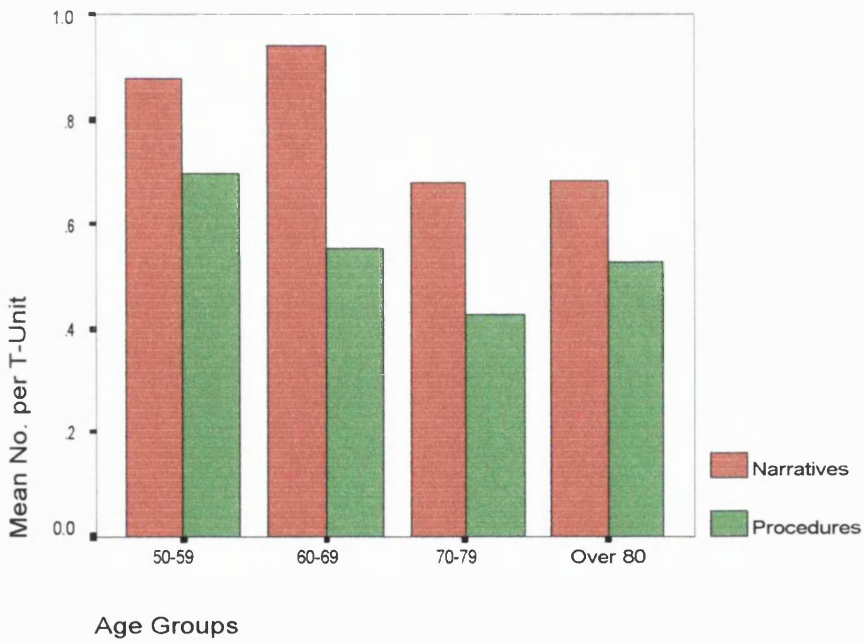
Graph A4.10: Age effect on main clauses of genres



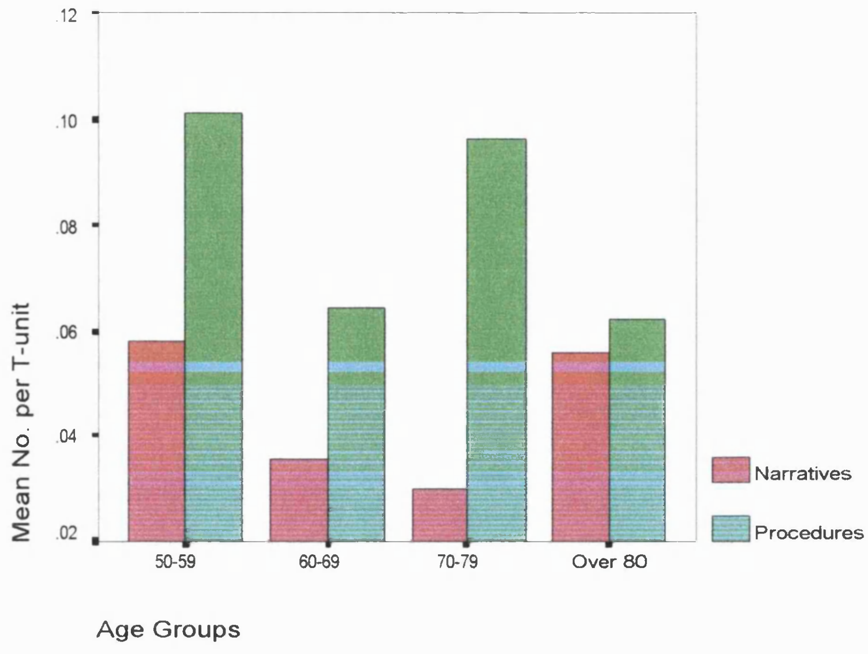
Graph A4.11: Age effect on left-branching clauses of genres



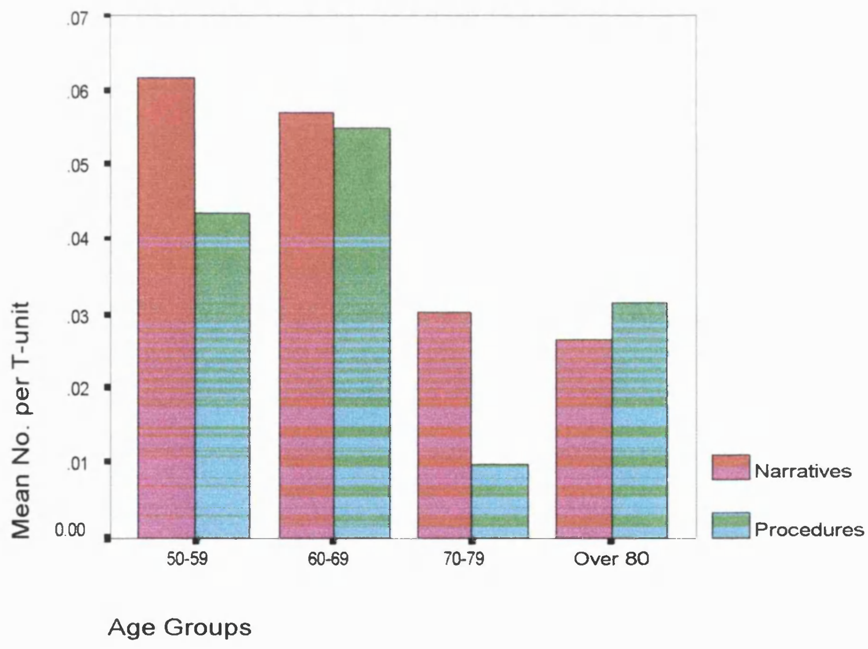
Graph A4.12: Age effect on right-branching clauses of genres



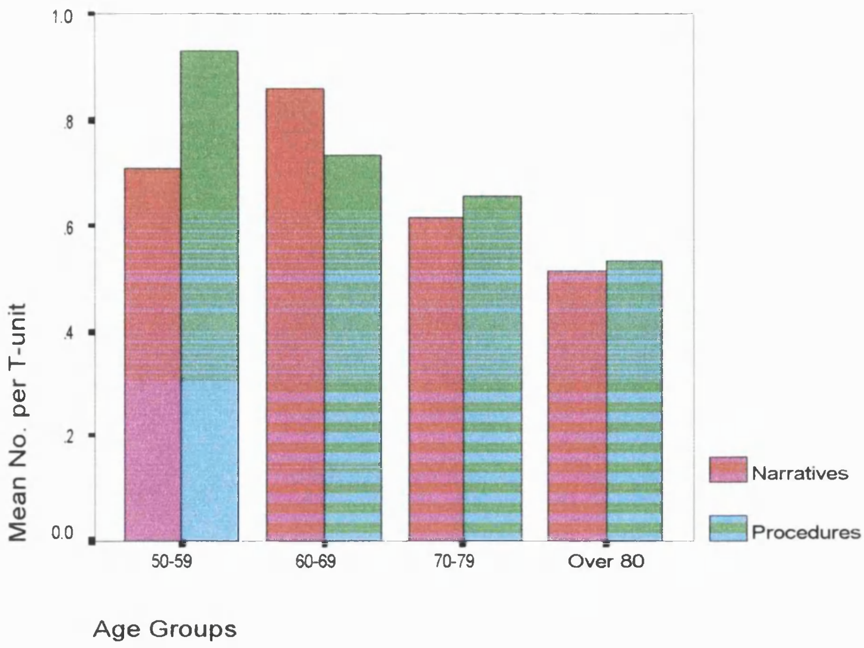
Graph A4.13: Age effect on referential cohesion of genres



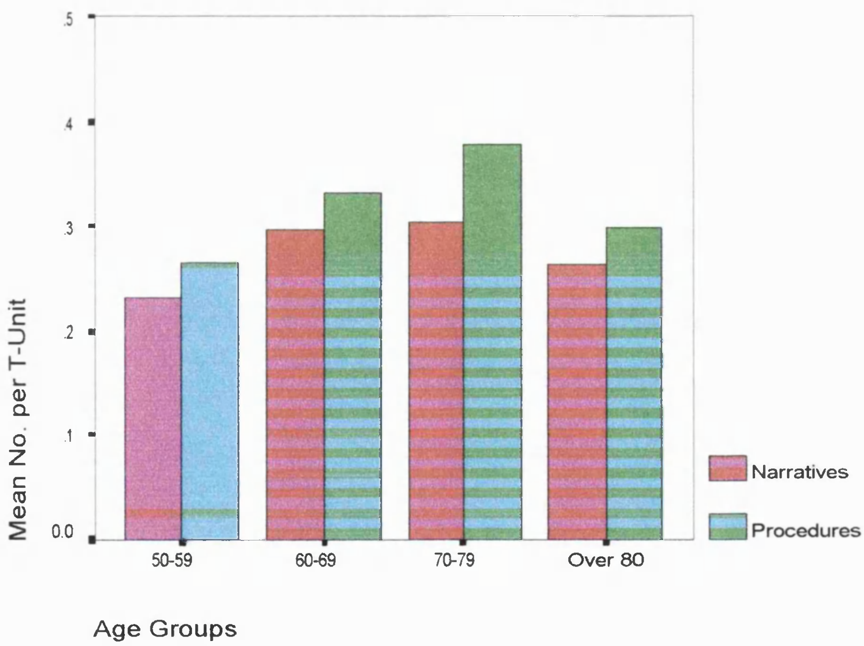
Graph A4.14: Age effect on substitution cohesion of genres



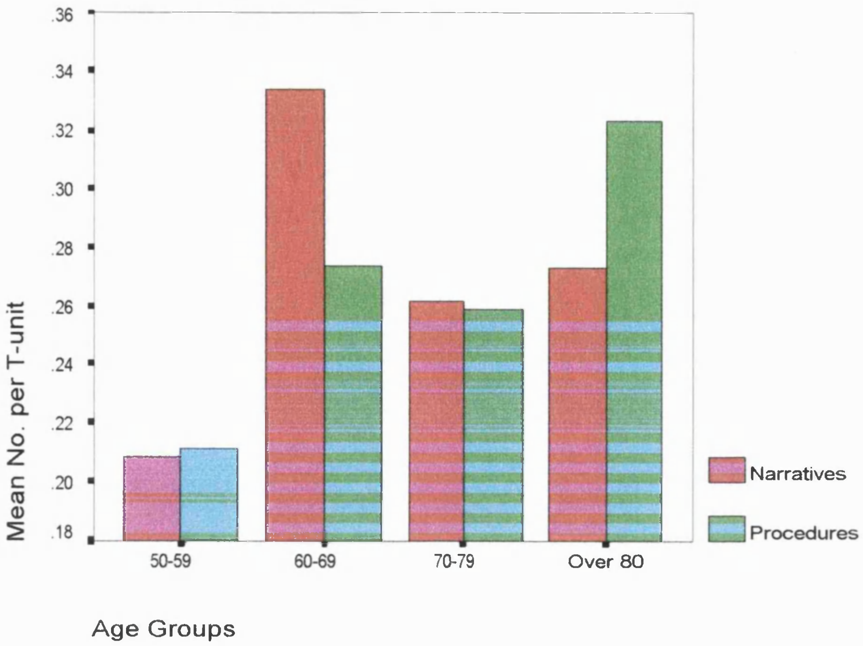
Graph A4.15: Age effect on ellipsis of genres



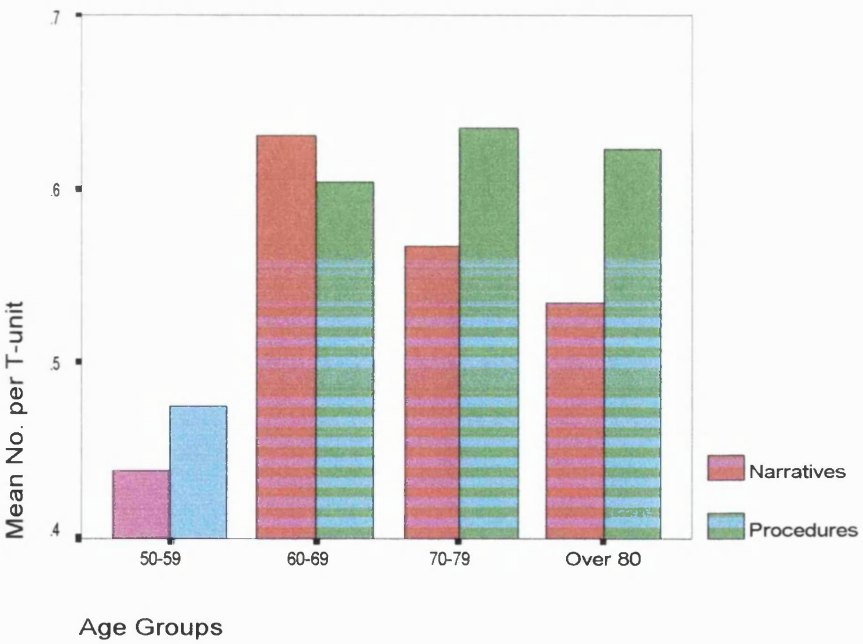
Graph A4.16: Age effect on lexical cohesion of genres



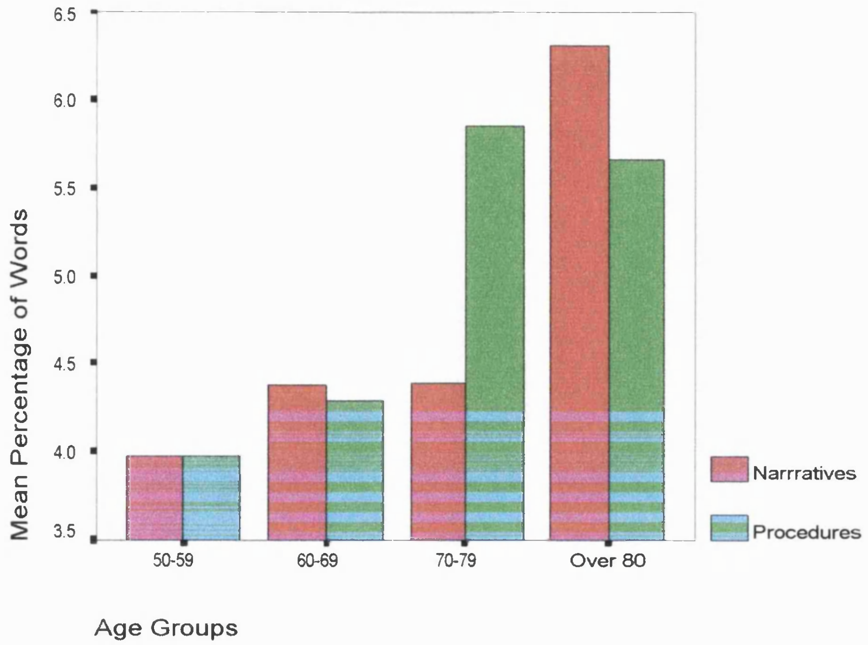
Graph A4.17: Age effect on conjunction cohesion of genres



Graph A4.18: Age effect on "ands" of genres



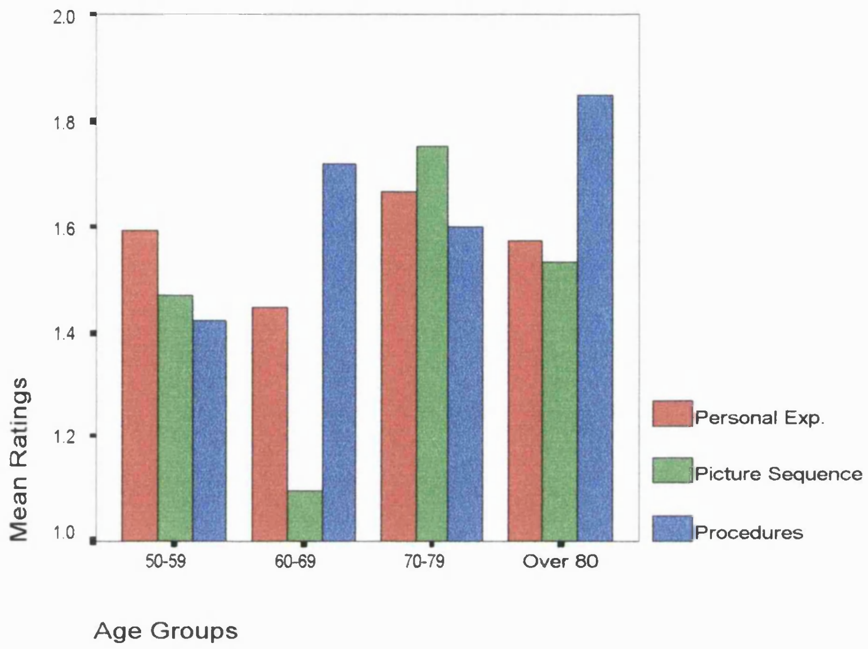
Graph A4.19: Age effect on connectives of genres



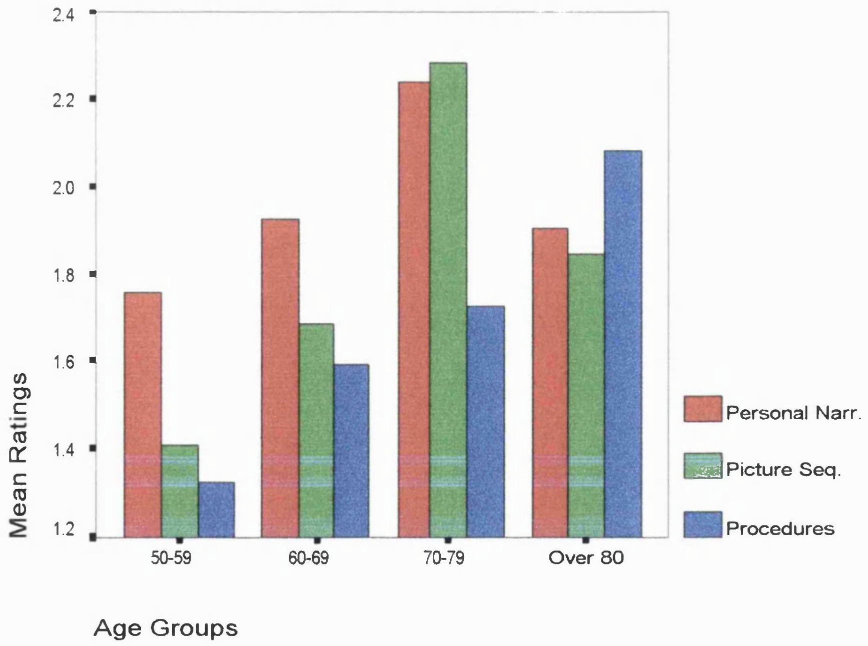
Graph A4.20: Age effects on dysfluencies of two genres

Appendix A5

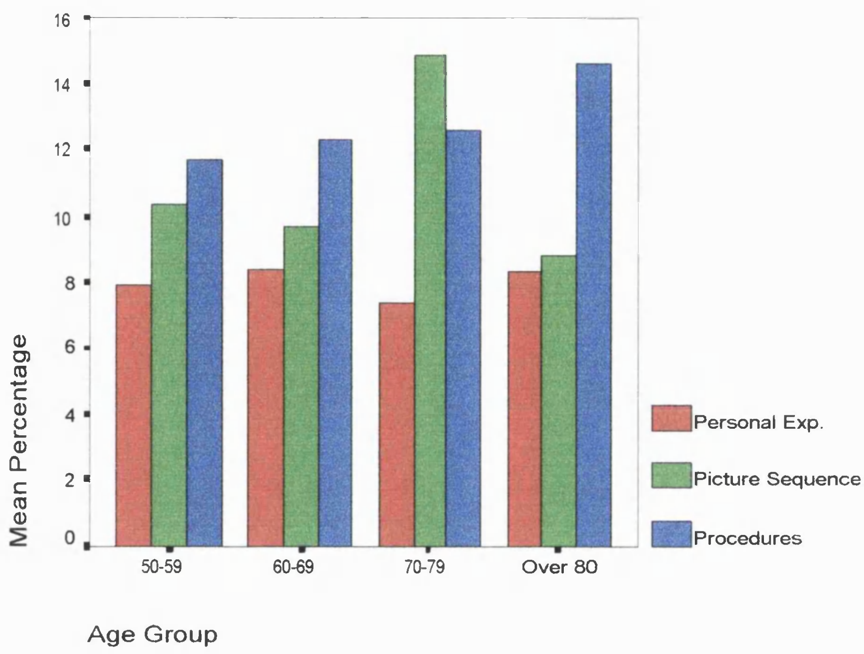
Age Effect on NBD Discourse Tasks



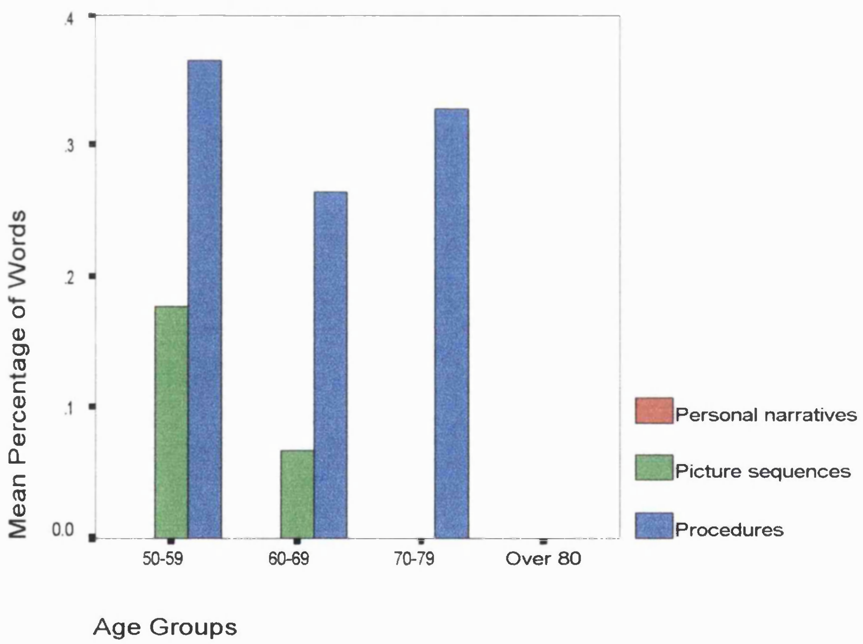
Graph A5.1: Effect of age on relevance ratings of tasks



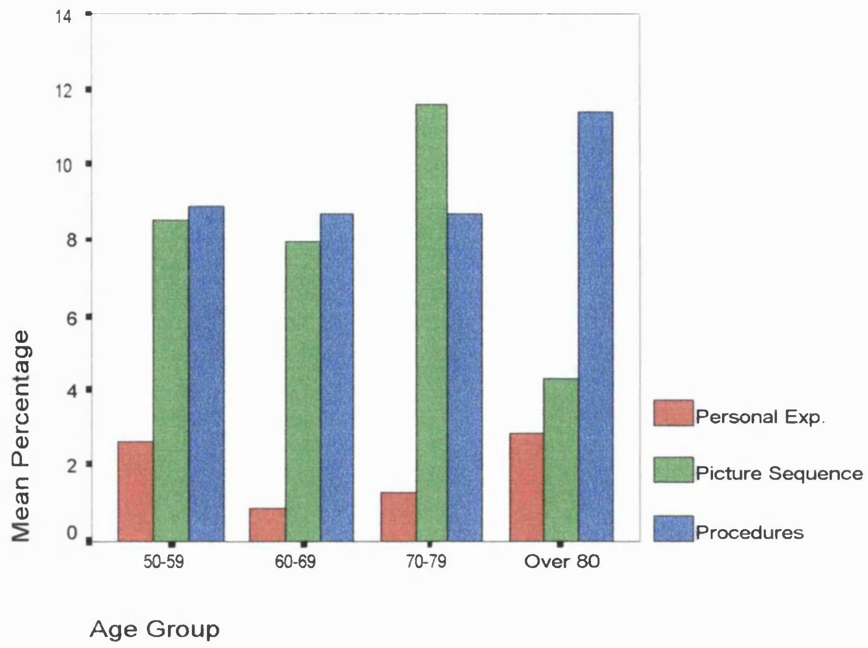
Graph A5.2: Effect of age on discourse grammar of discourse tasks



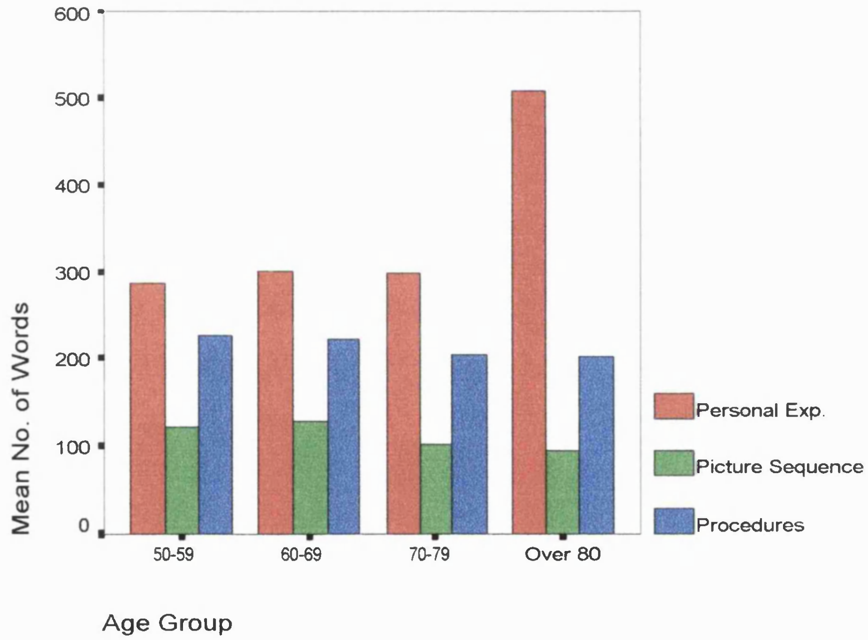
Graph A5.3: Effect of age on total clarity disruptors of tasks



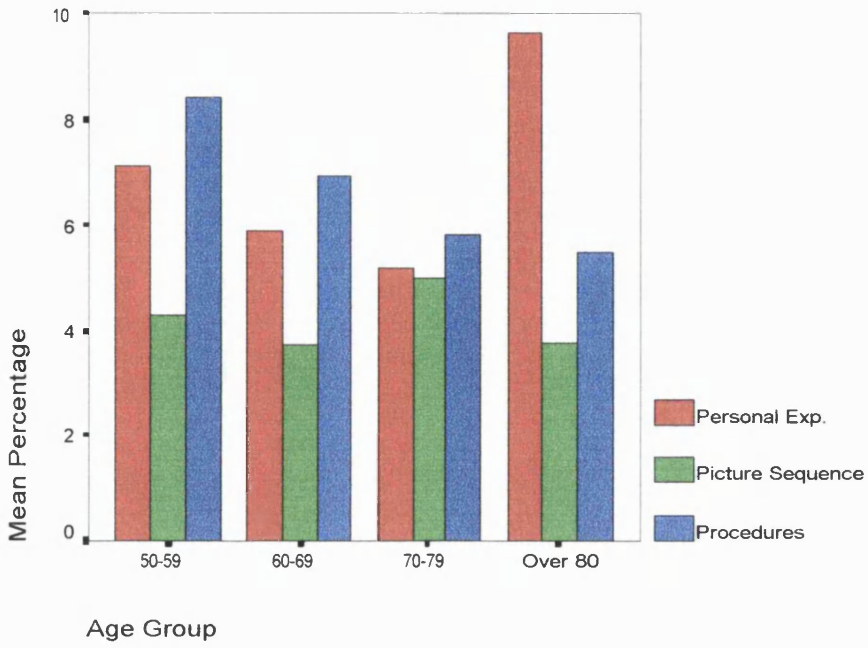
Graph A5.4: Effect of age on word substitutions on three tasks



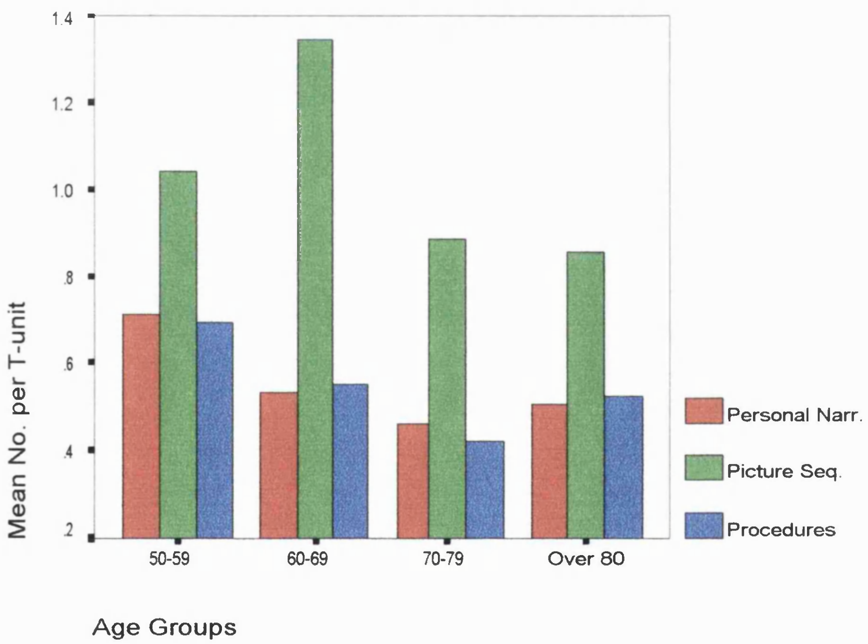
Graph A5.5: Effect of age on content disruptors of tasks



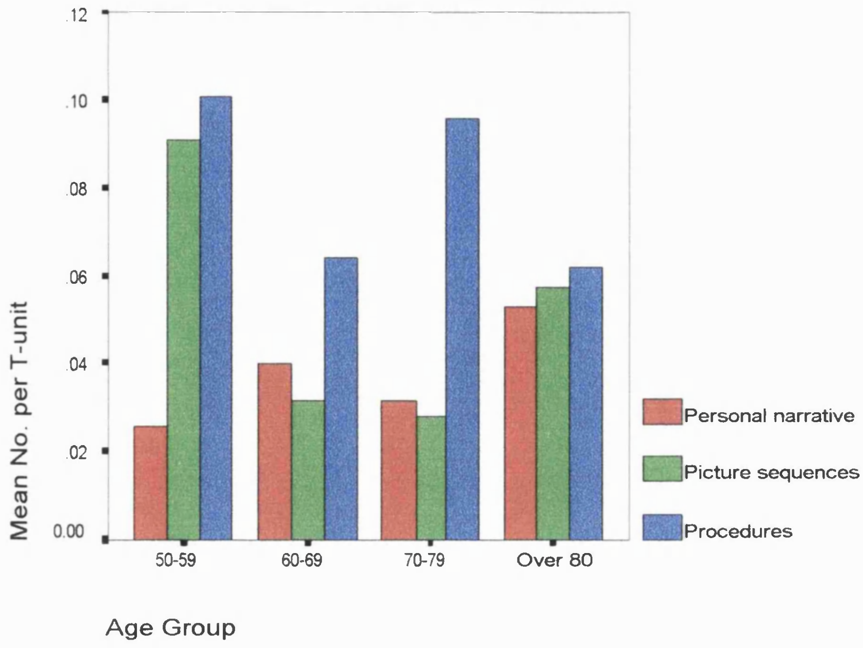
Graph A5.6: Effect of age on sample length of tasks



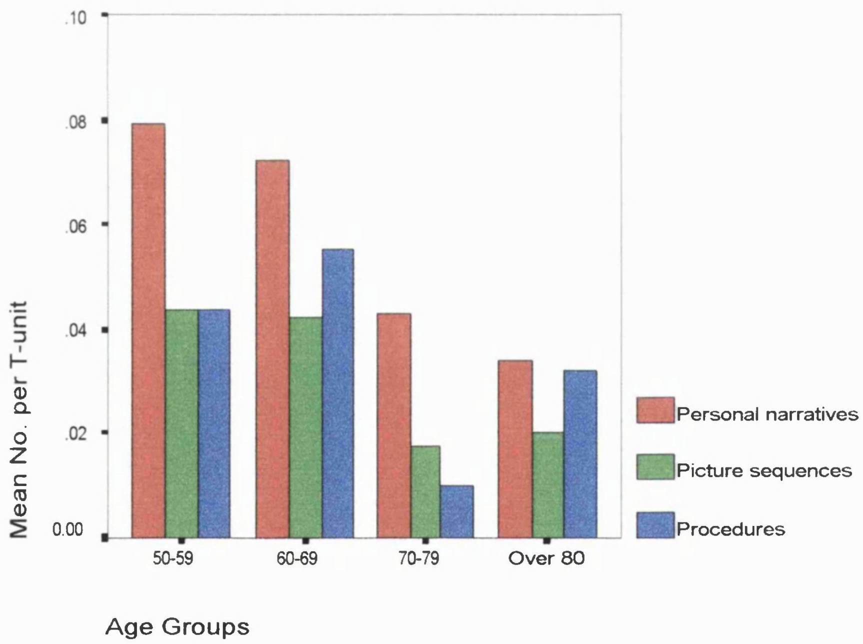
Graph A5.7: Effect of age on left-branching clauses of tasks



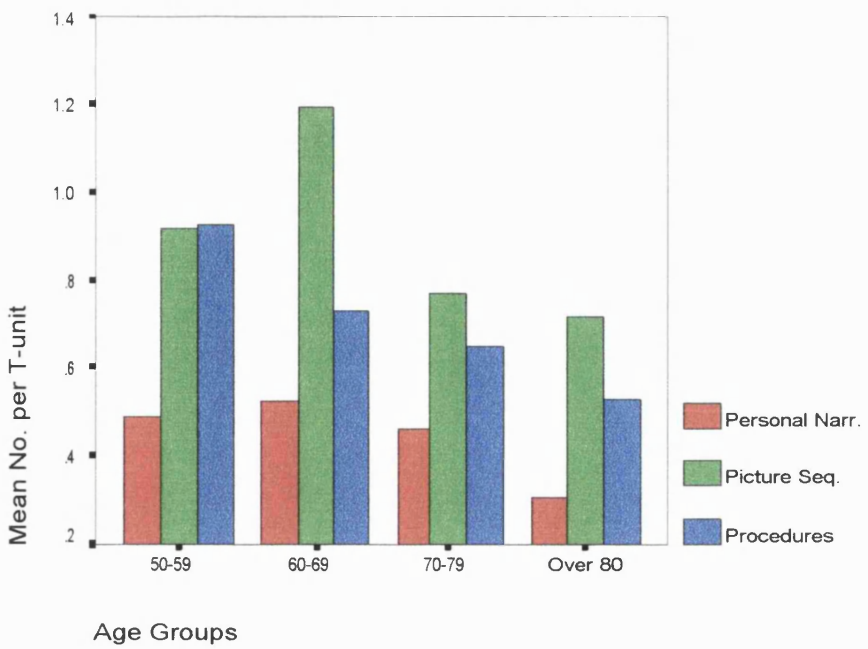
Graph A5.8: Effect of age on reference of discourse tasks



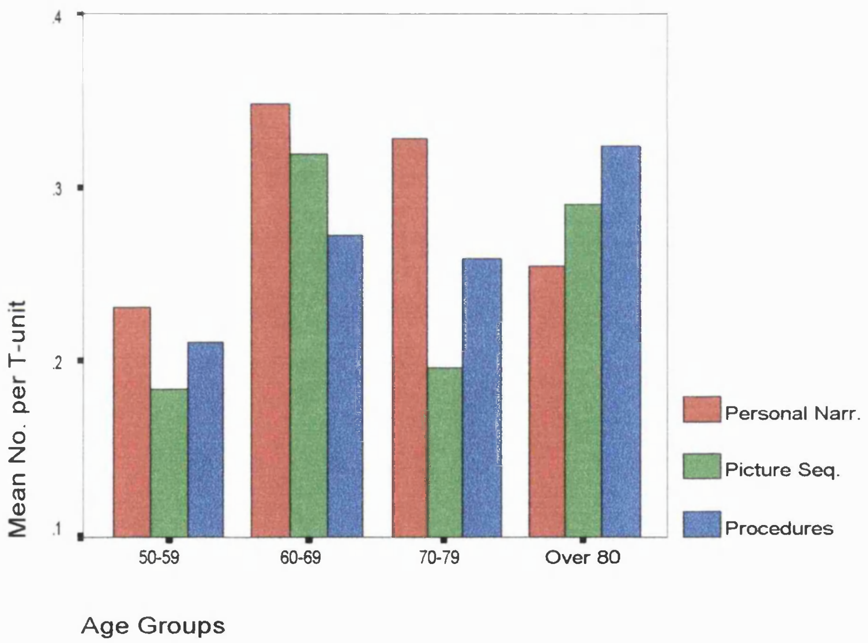
Graph A5.9: Effect of age on substitution cohesion in three tasks



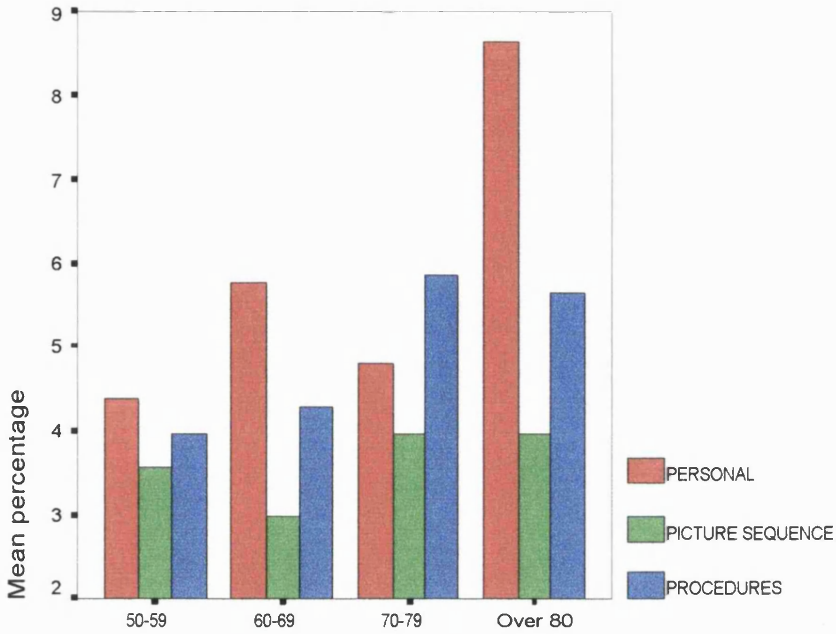
Graph A5.10: Effect of age on ellipsis in three tasks



Graph A5.11: Effect of age on lexicalization of discourse tasks

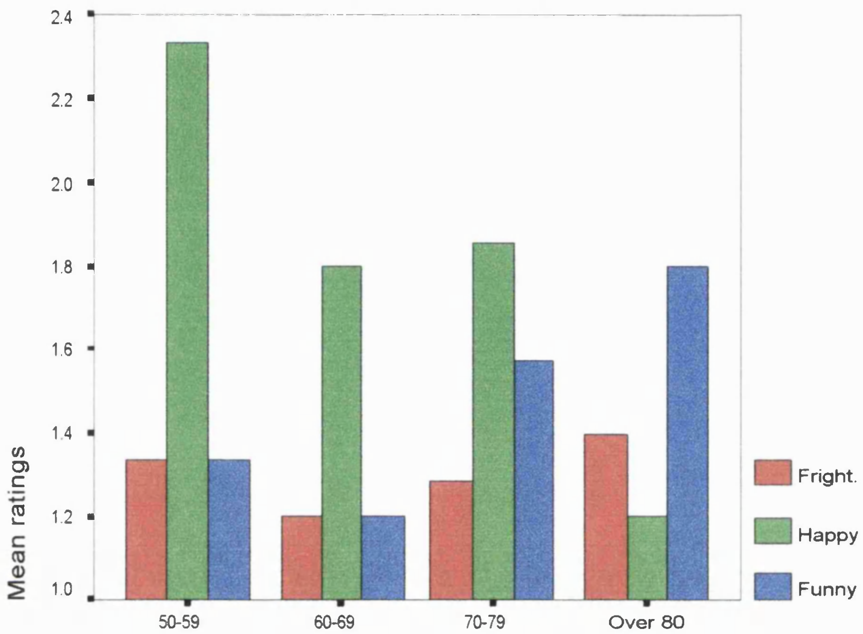


Graph A5.12: Effect of age on "and" of discourse tasks

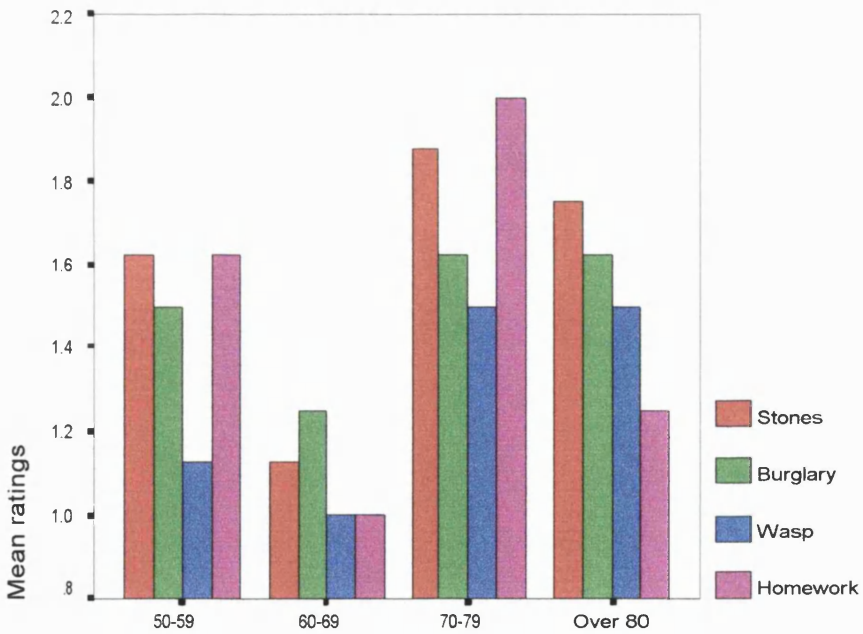


Graph A5.13: Effect of age on dysfluencies of three tasks

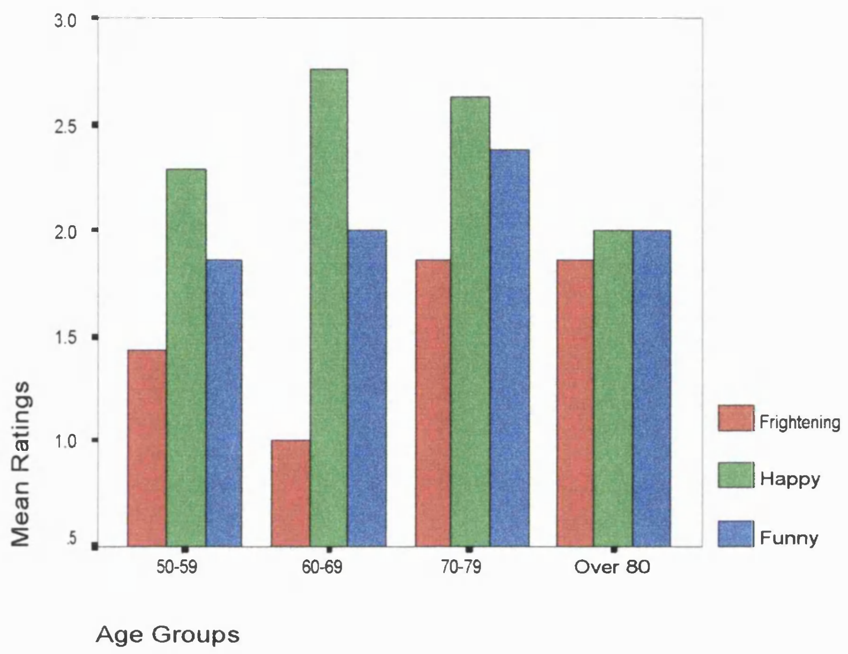
Appendix A6
Age Effect on NBD Discourse Topics



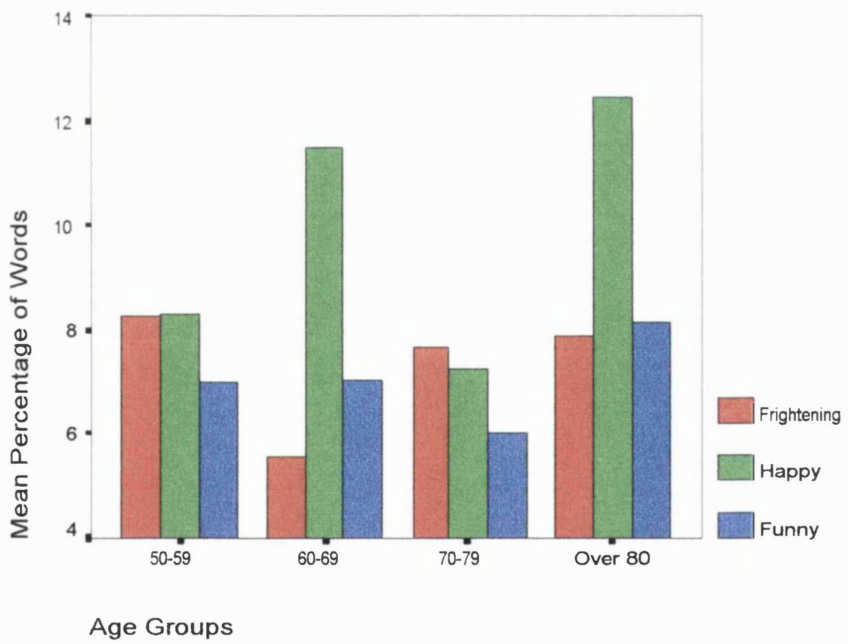
Graph A6.1: Age effect on relevance ratings for personal narrative topics



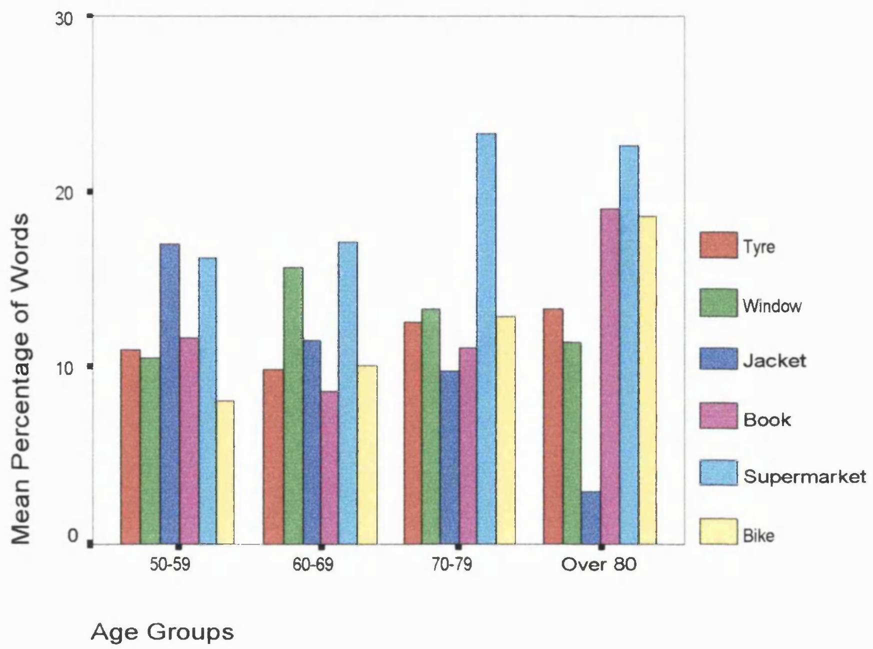
Graph A6.2: Age effect on relevance ratings in picture sequence topics



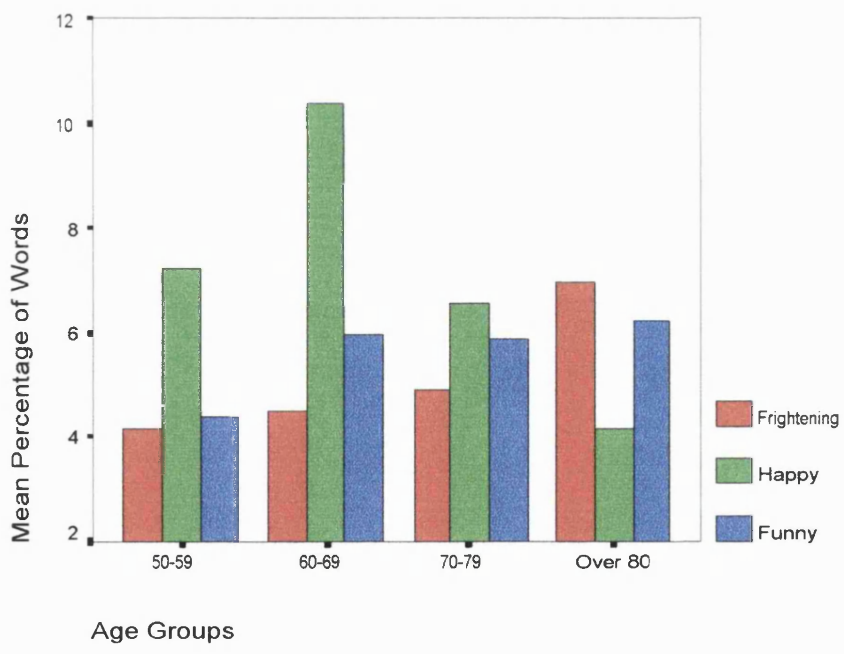
Graph A6.3: Age effect on discourse grammar ratings of personal narratives topics



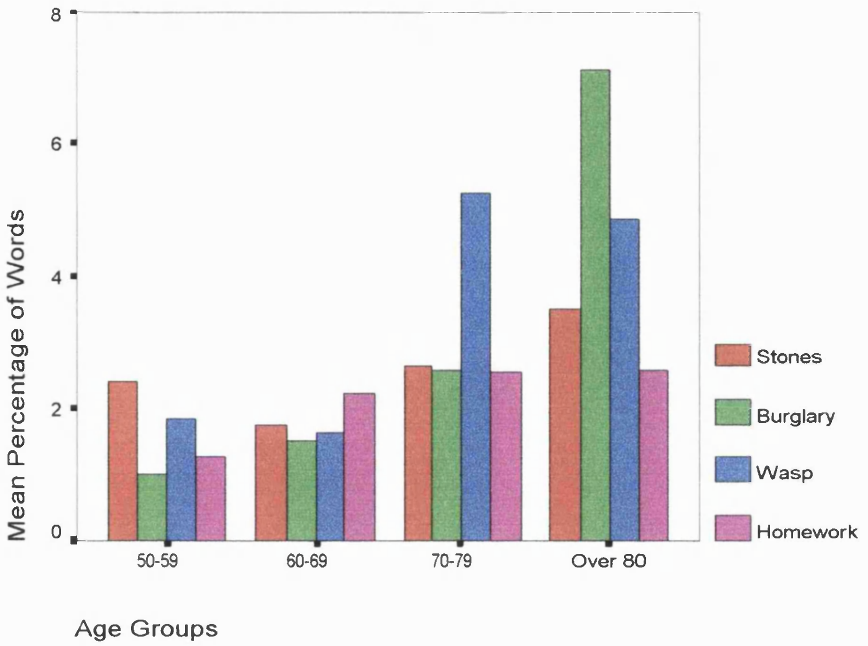
Graph A6.4: Age effect on total clarity disruptors of personal narrative topics



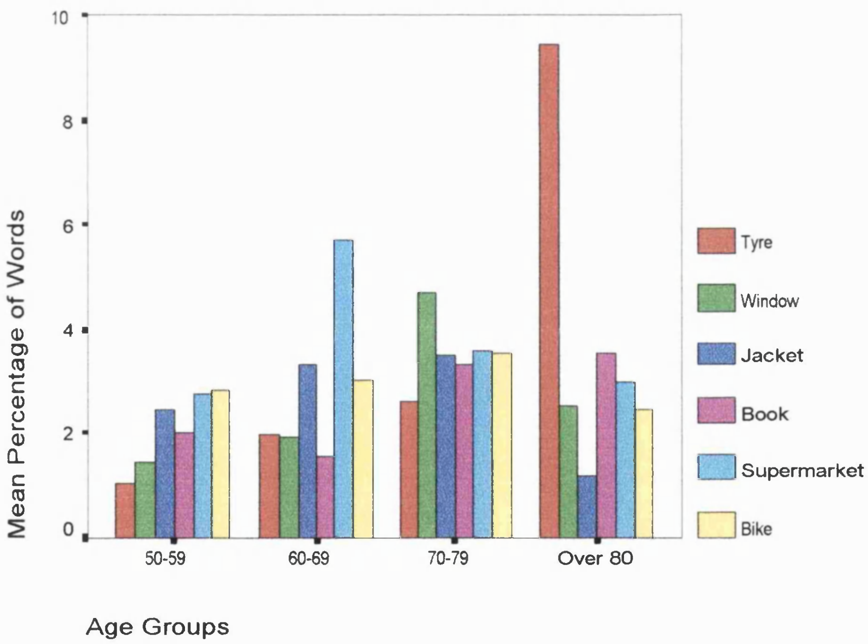
Graph A6.5: Age effect on total clarity disruptors in procedural topics



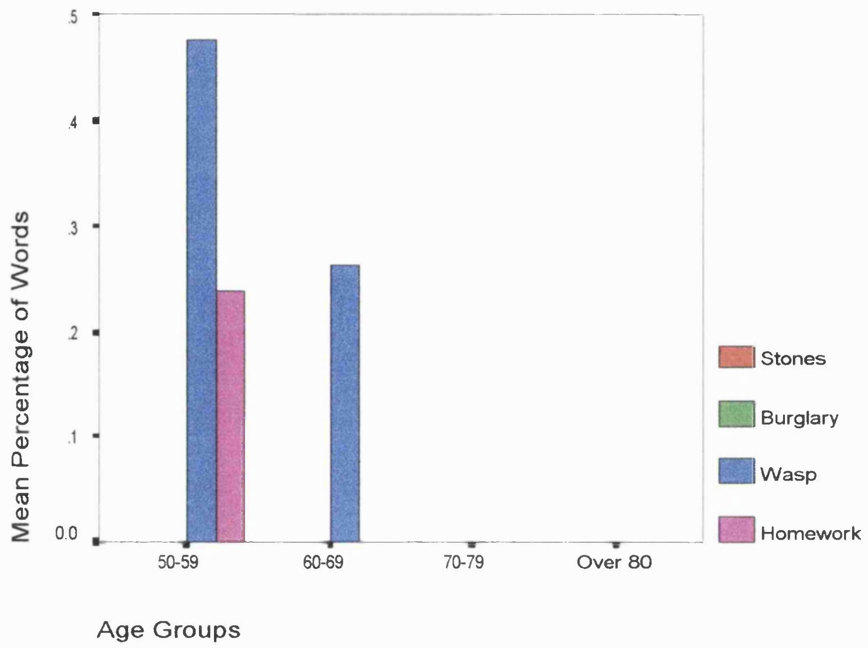
Graph A6.6: Age effect on non-specific elements in personal narrative topics



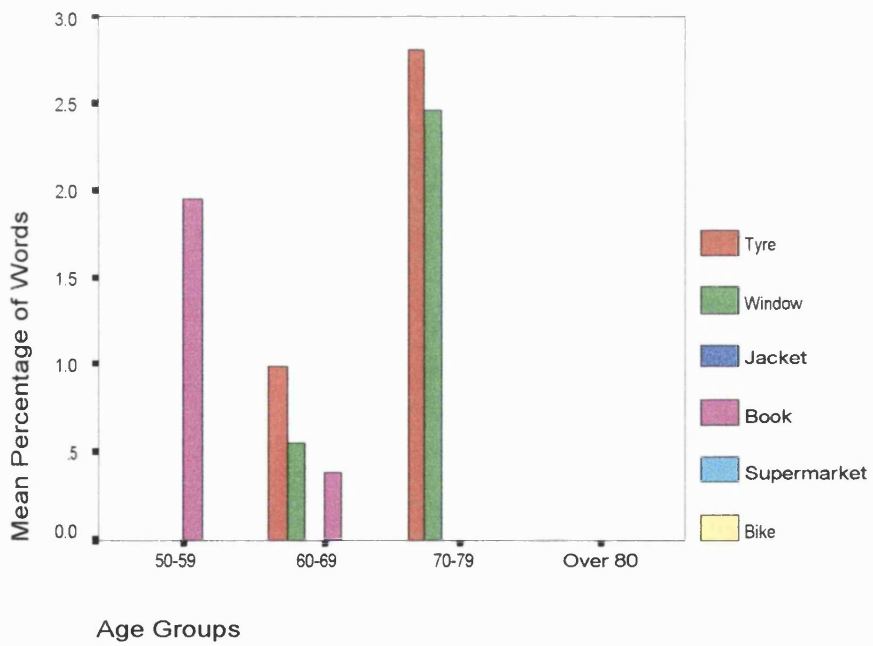
Graph A6.7: Age effect on non-specific elements in picture sequence topics



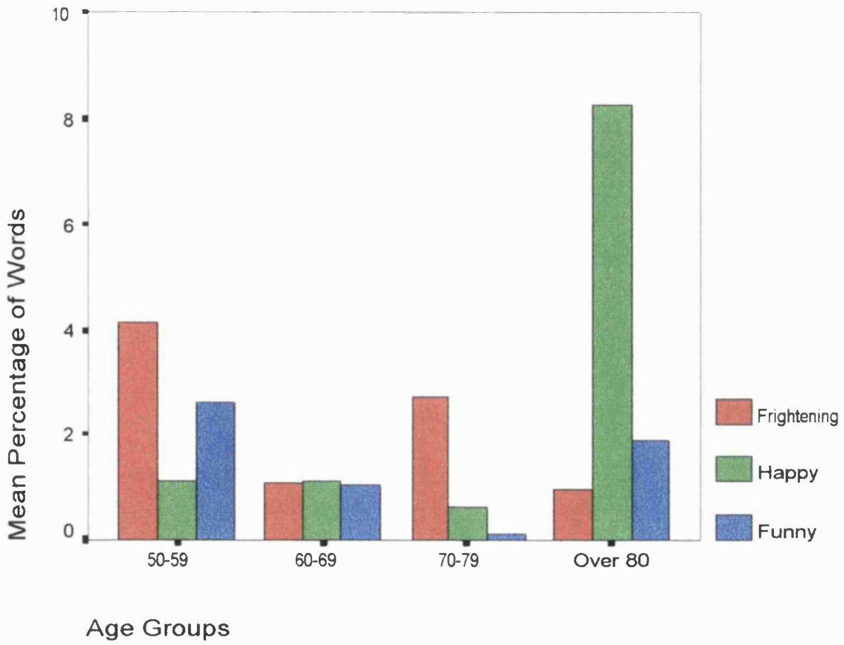
Graph A6.8: Age effect on non-specific elements of procedural topics



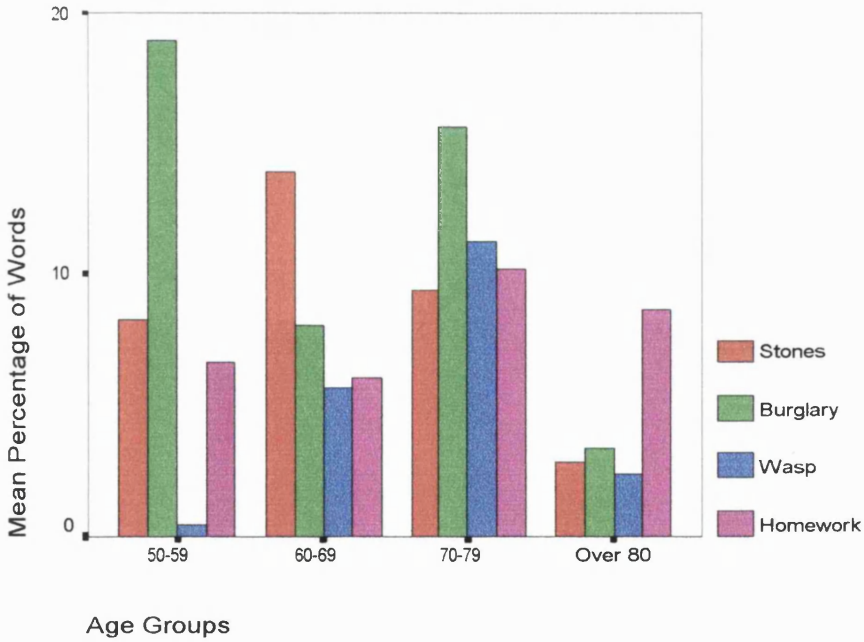
Graph A6.9: Age effect on word substitutions in picture sequence topics



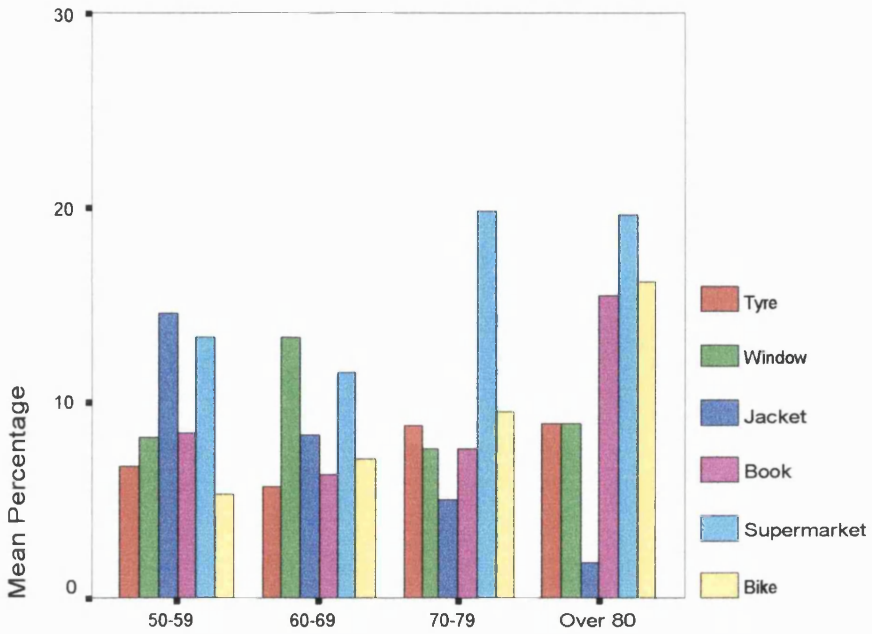
Graph A6.10: Age effect on word substitutions in procedural topics



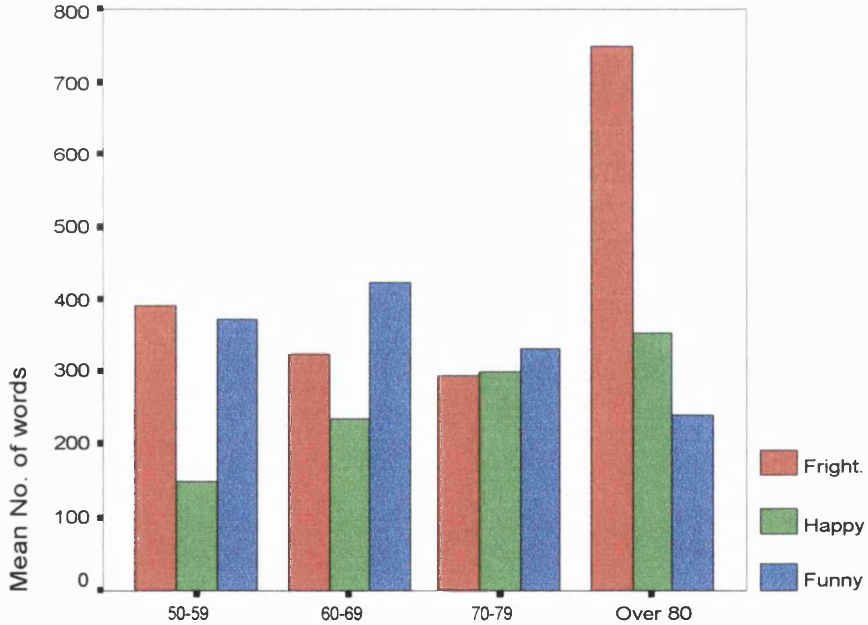
Graph A6.11: Age effect on content and fluency disruptors in personal narrative topics



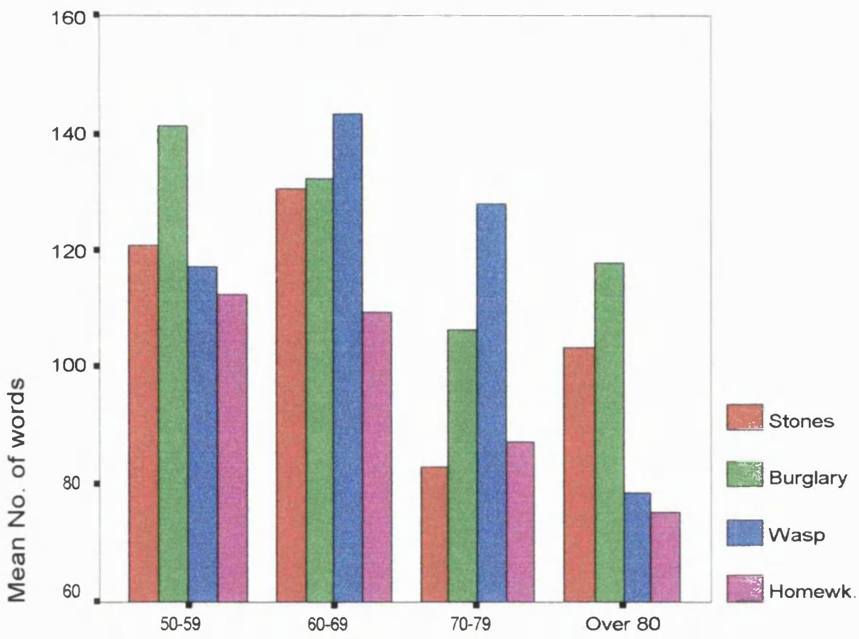
Graph A6.12: Age effect on content and fluency disruptors of picture sequence topics



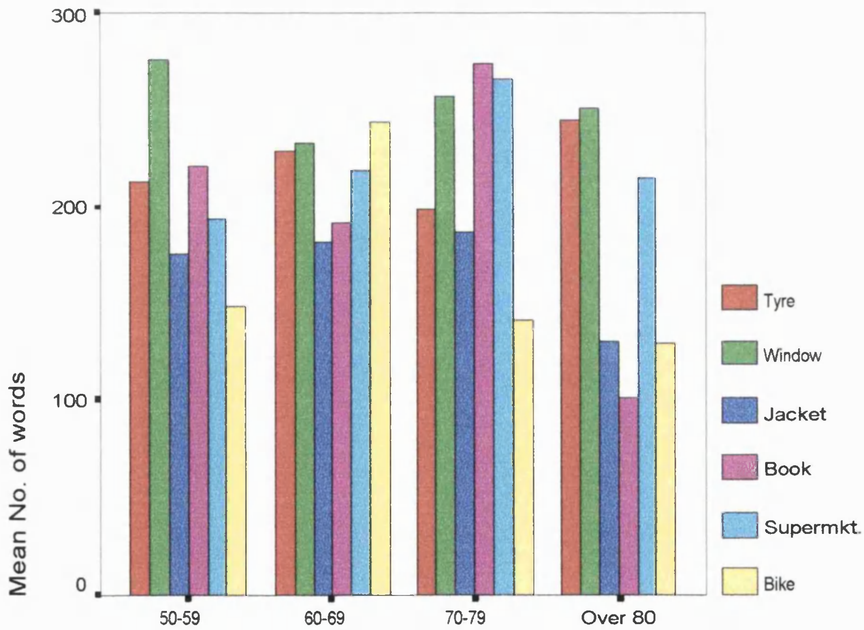
Graph A6.13: Age effect on content and fluency disruptors in procedural topics



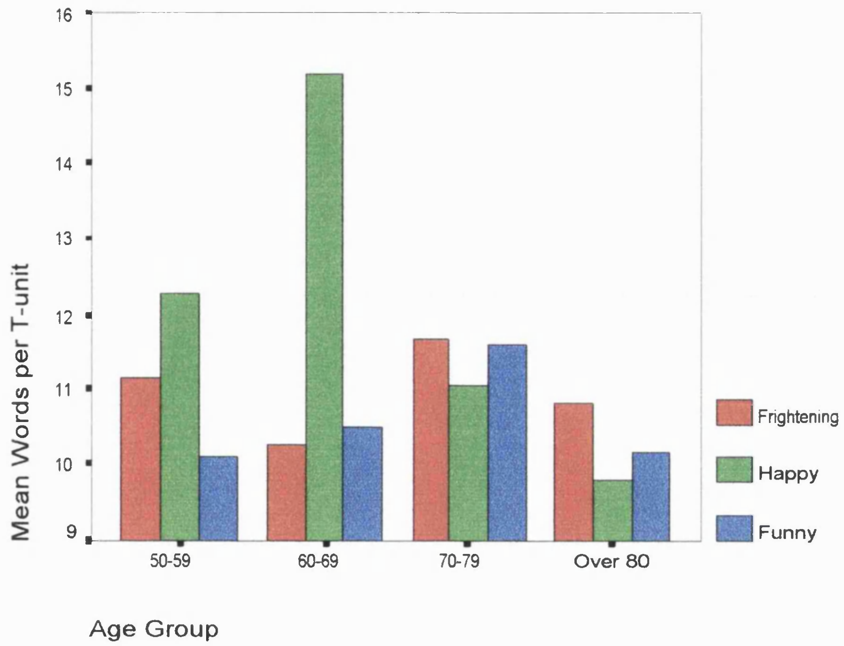
Graph A6.14: Age effect on sample length for personal narrative topics



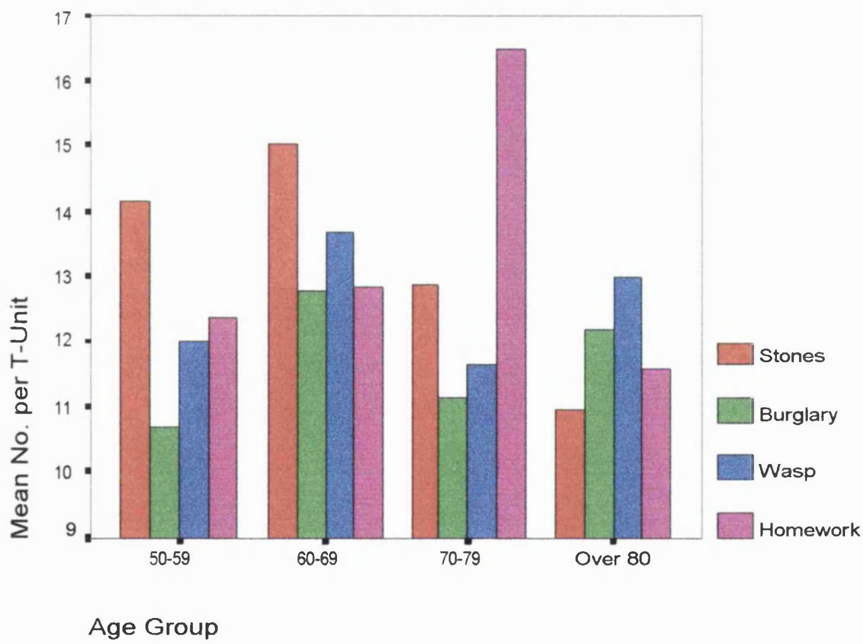
Graph A6.15: Age effect on sample length of picture sequence topics



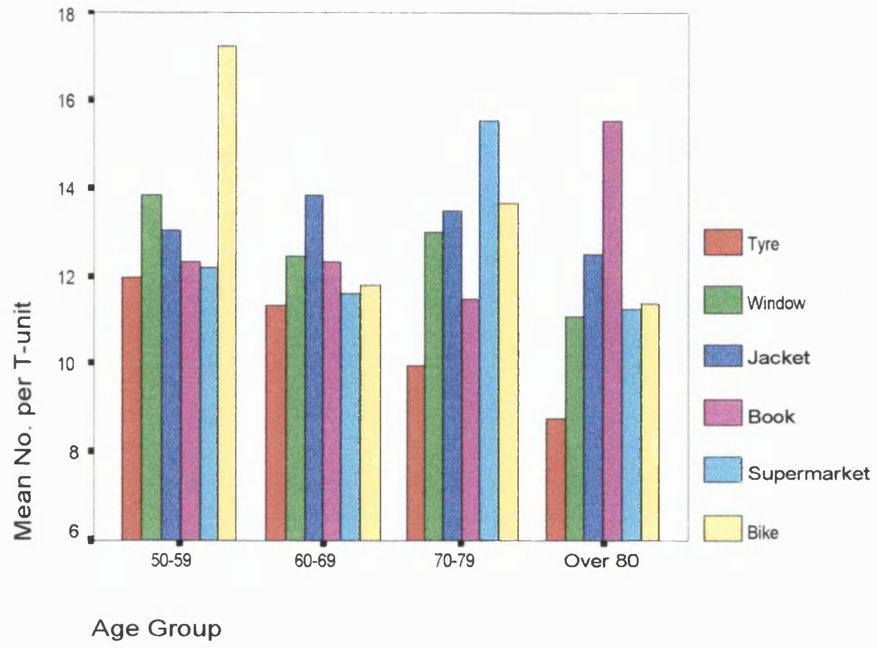
Graph A6.16: Age effect on sample length for procedural topics



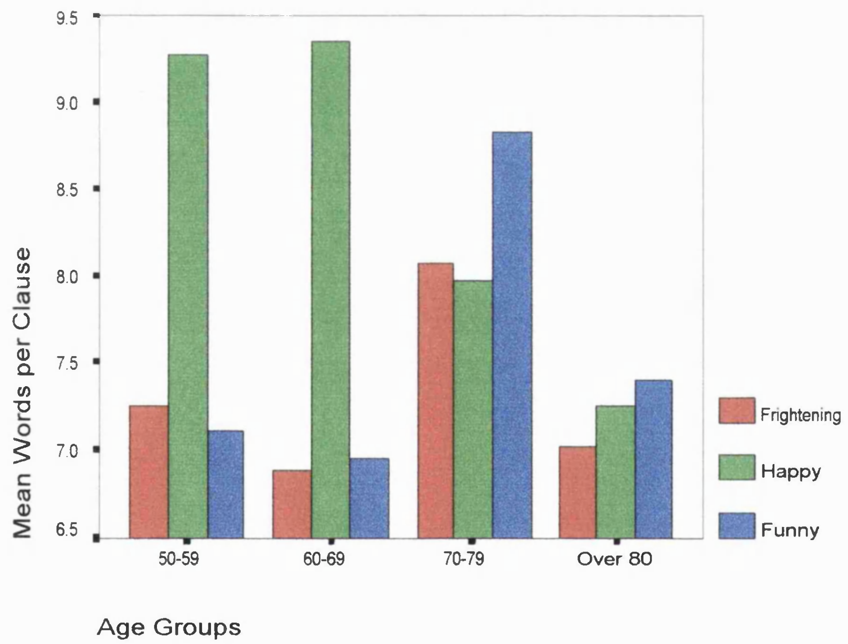
Graph A6.17: Age effect on T-unit length of personal narrative topics



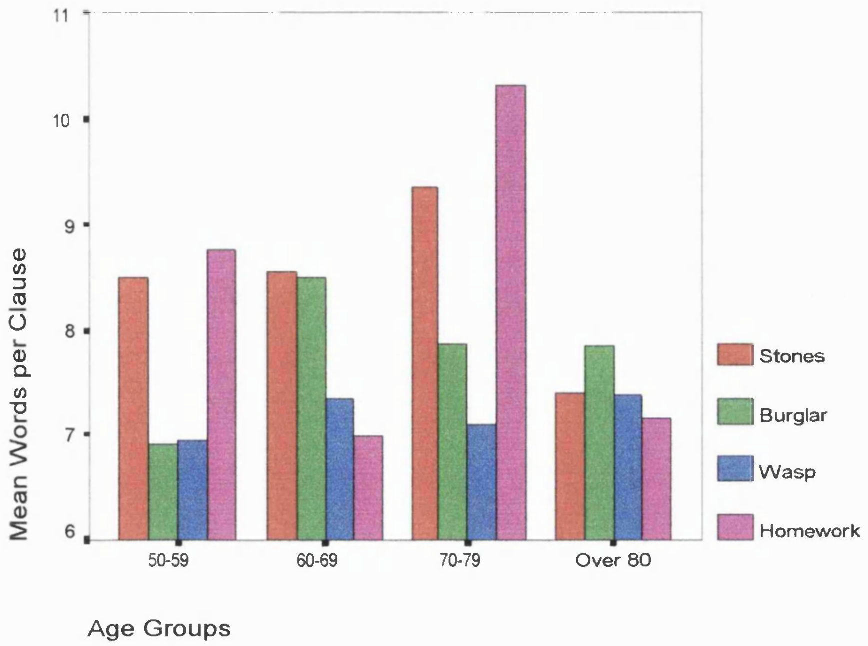
Graph A6.18: Age effect on T-unit length of picture sequence topics



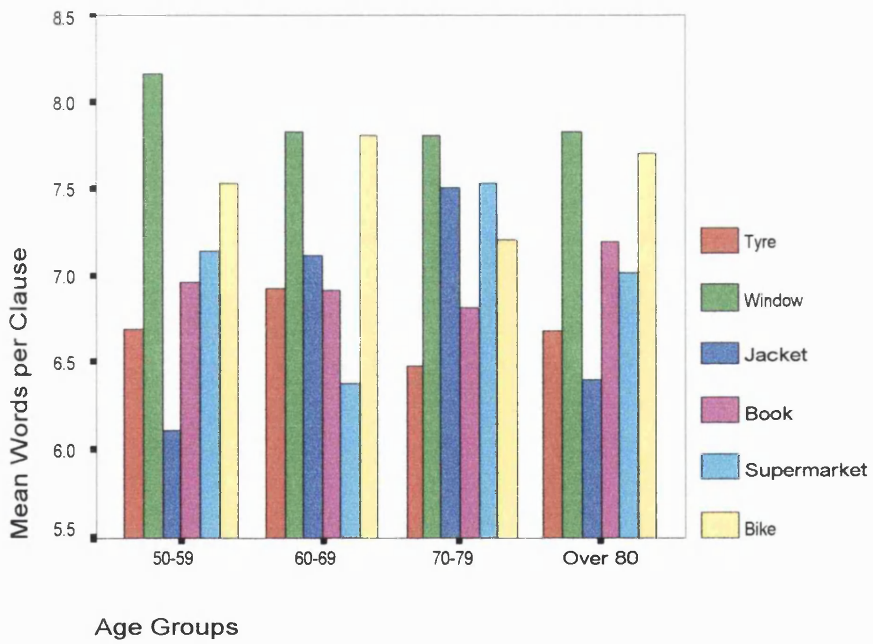
Graph A6.19: Age effect on T-unit length of procedure topics



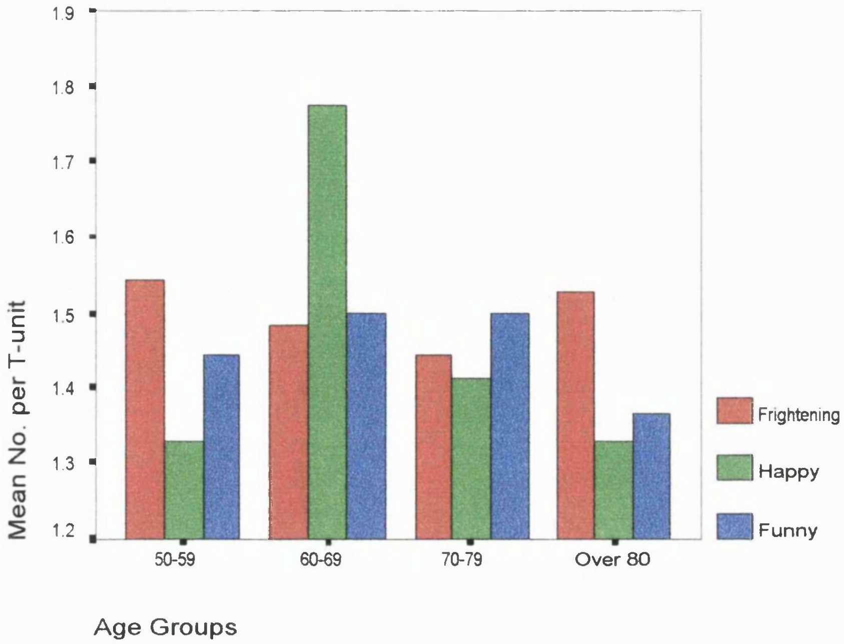
Graph A6.20: Age effect on clause length in personal experience topics



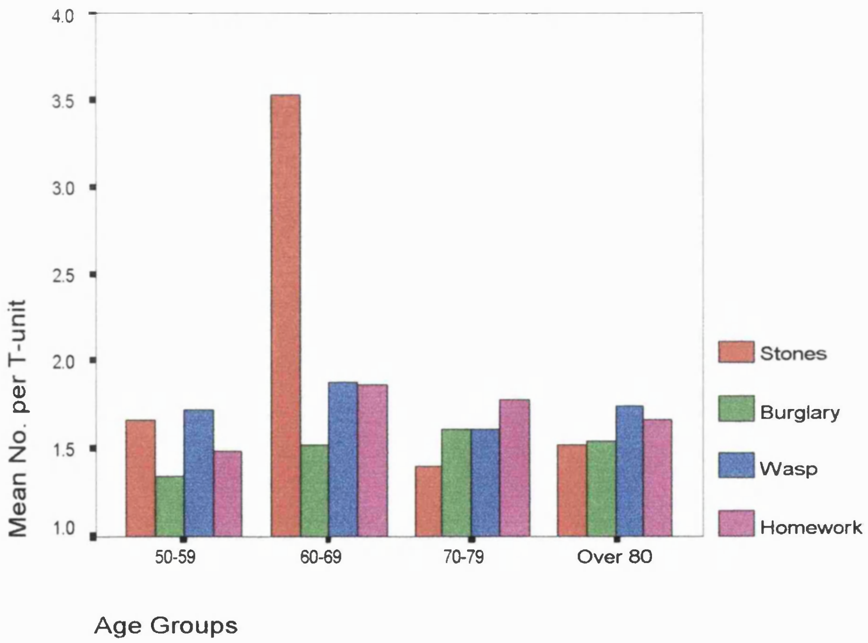
Graph A6.21: Age effect on clause length in picture sequence topics



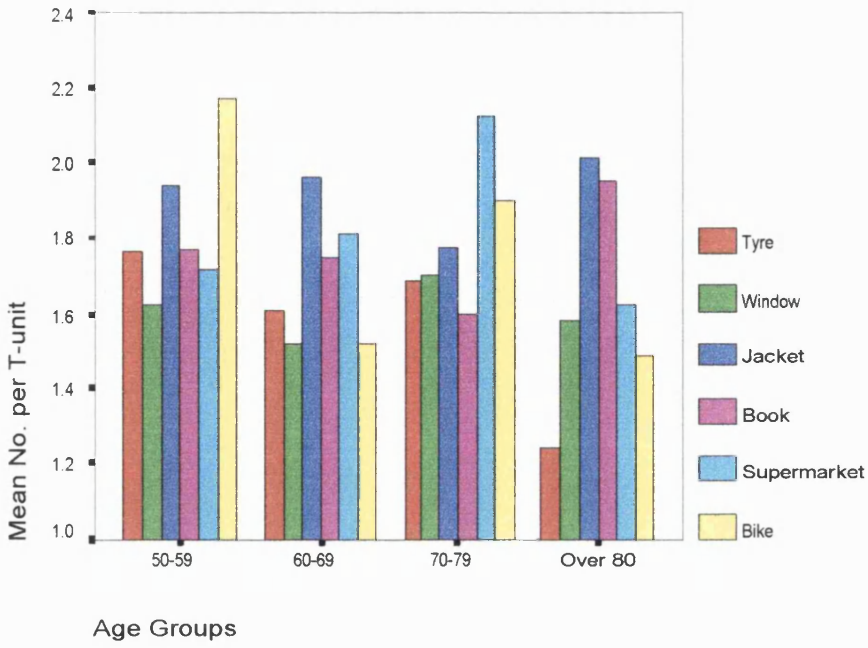
Graph A6.22: Age effect on clause length of procedural topics



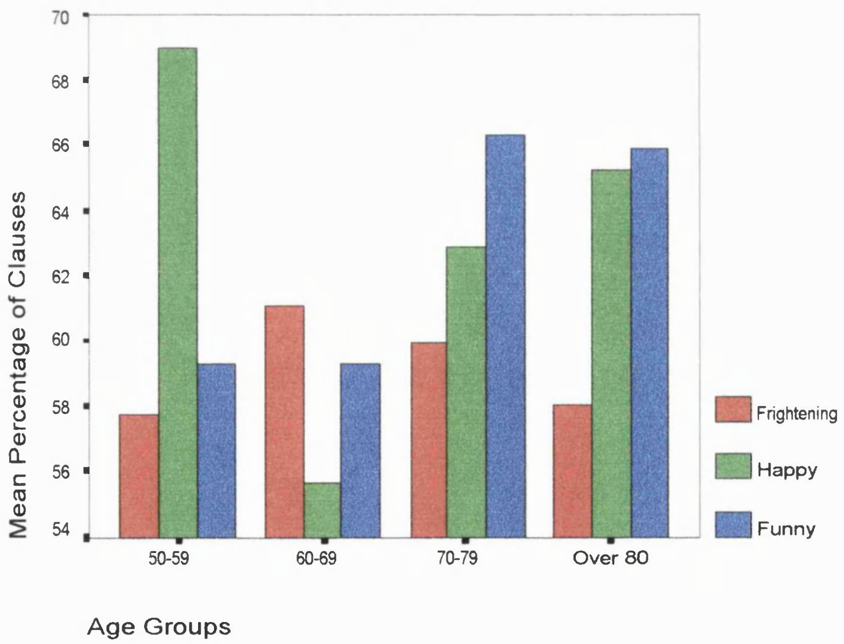
Graph A6.23: Age effect on clausal embedding of personal narrative topics



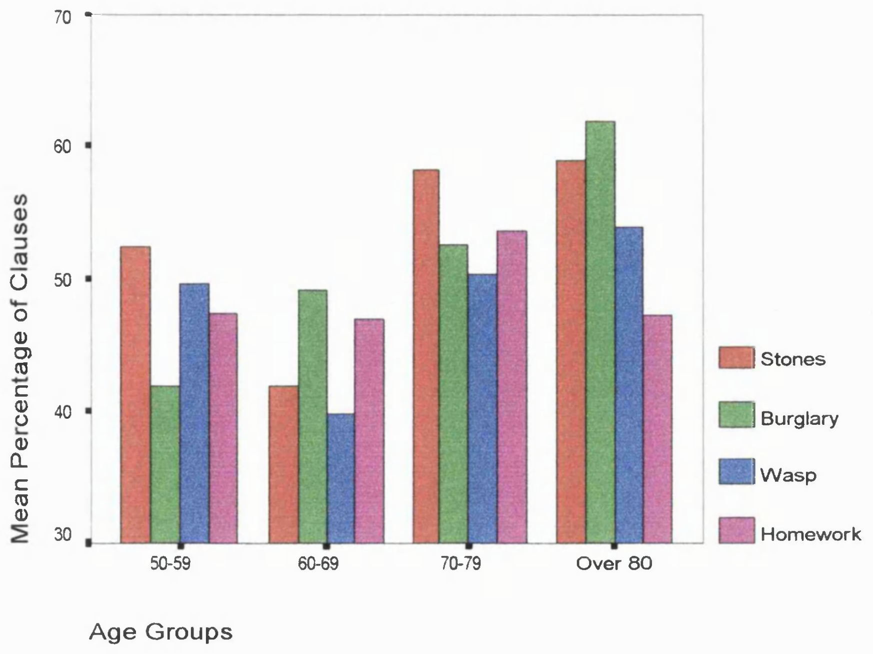
Graph A6.24: Age effect on clausal embedding of picture sequence topics



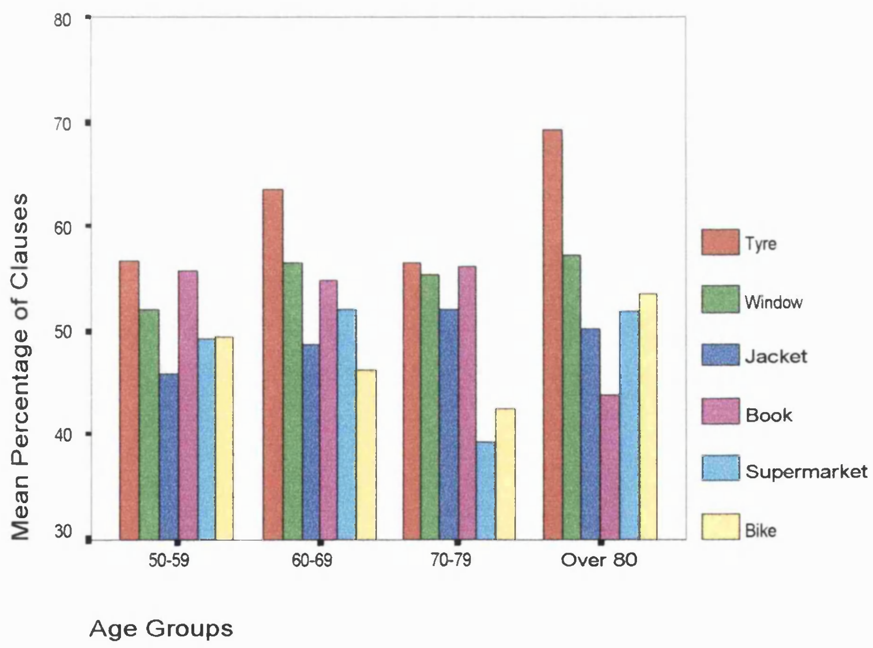
Graph A6.25: Age effect on clausal embedding of procedural topics



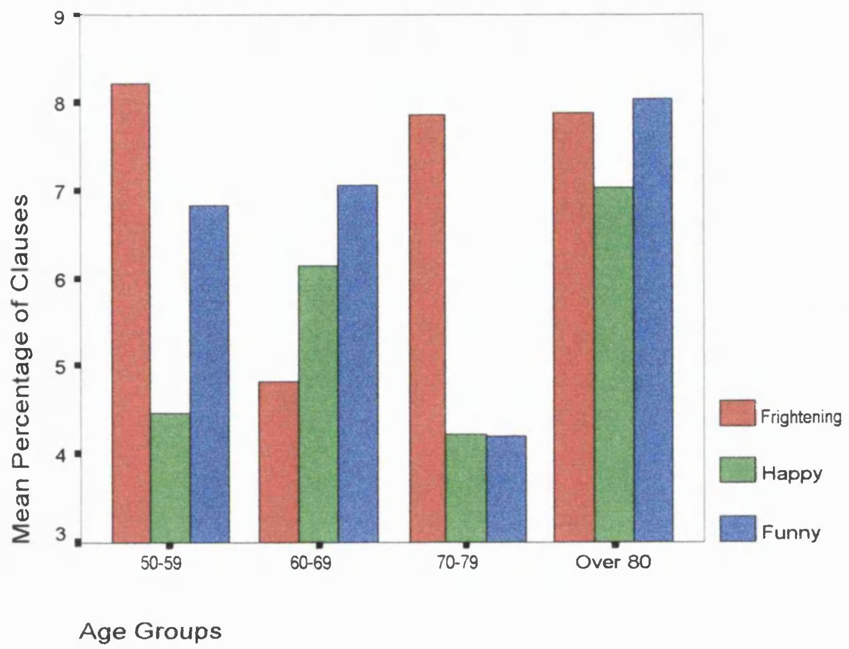
Graph A6.26: Age effect on main clauses of personal narrative topics



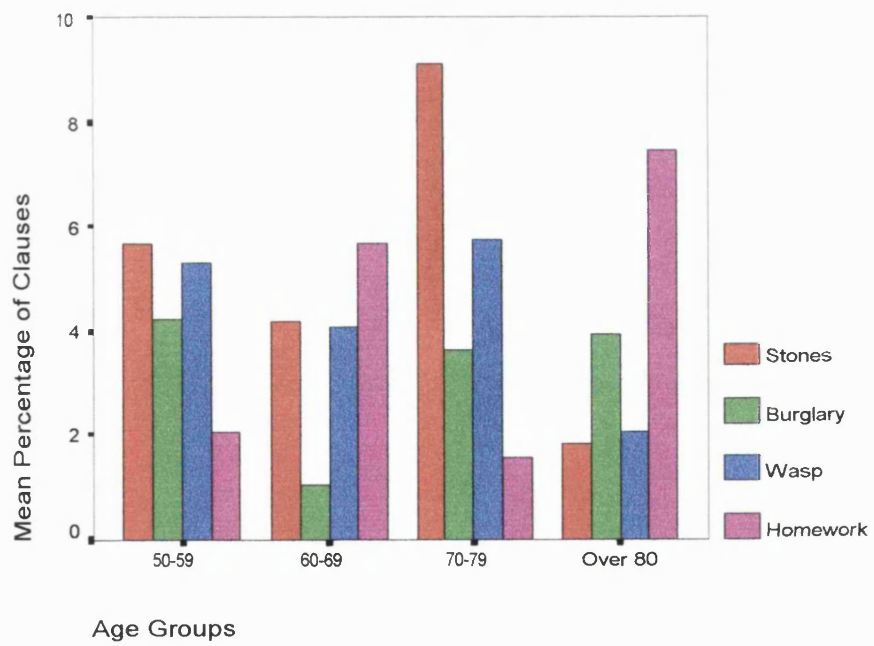
Graph A6.27: Age effect on main clauses of picture sequence topics



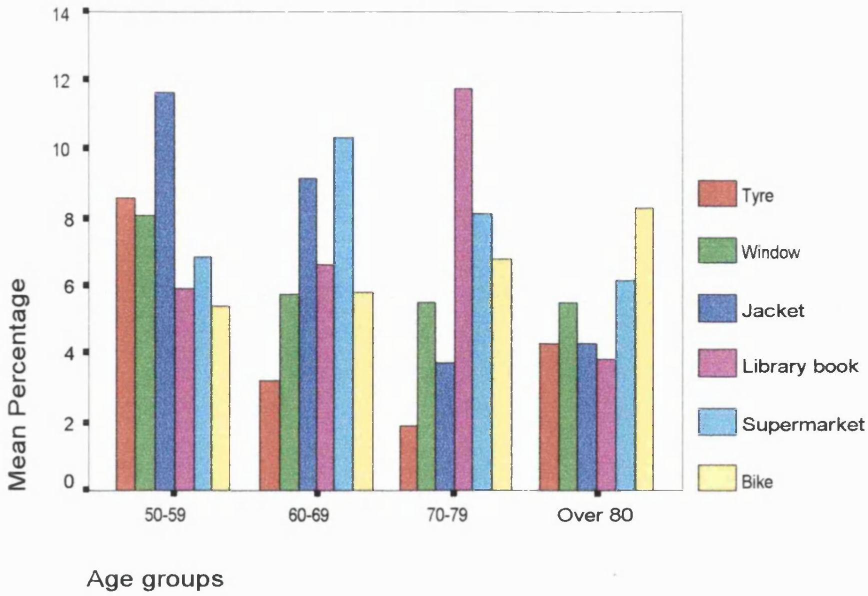
Graph A6.28: Age effect on main clauses of procedural topics



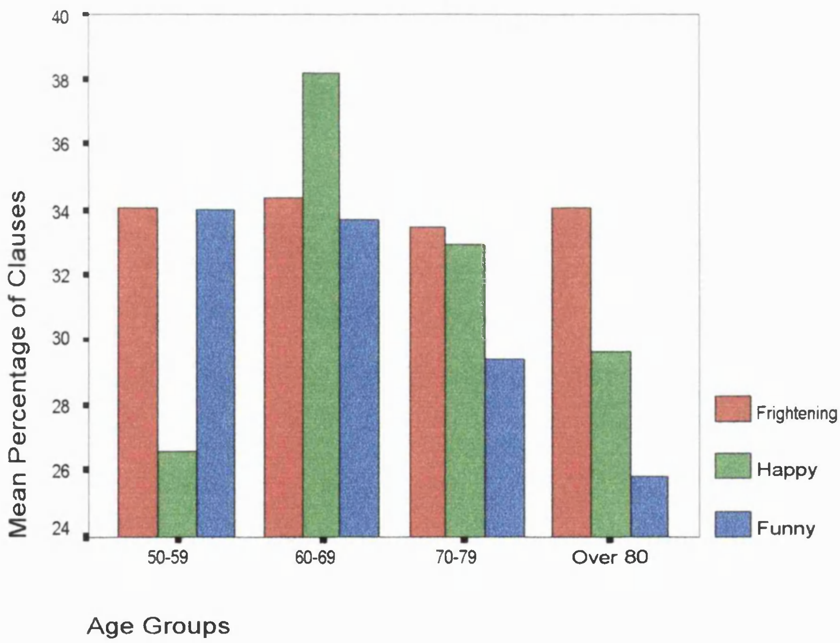
Graph A6.29: Age effect on left-branching clauses in personal narrative topics



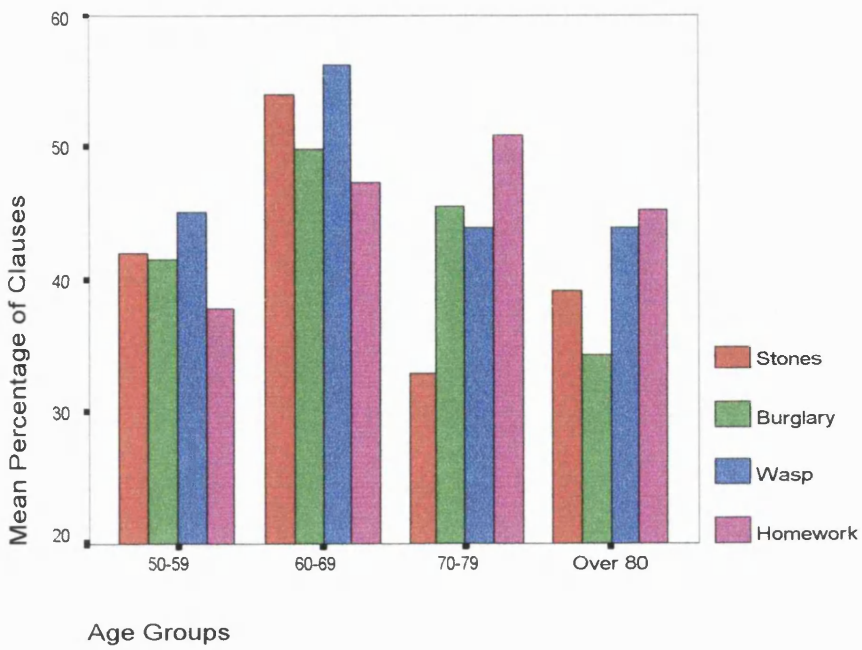
Graph A6.30: Age effect on left-branching clauses in picture sequence topics



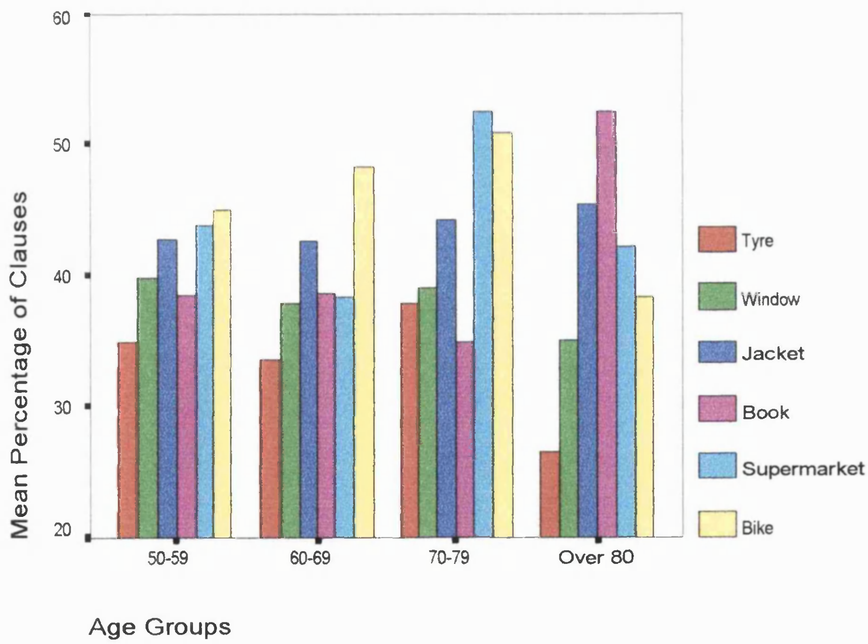
Graph A6.31: Age effect on left-branching clauses in procedural topics



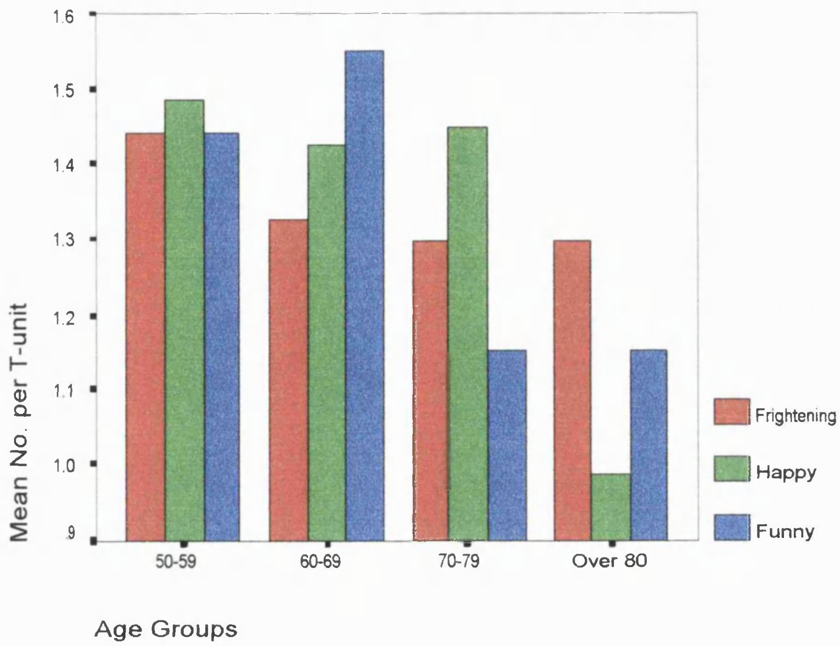
Graph A6.32: Age effect on right-branching clauses in personal narrative topics



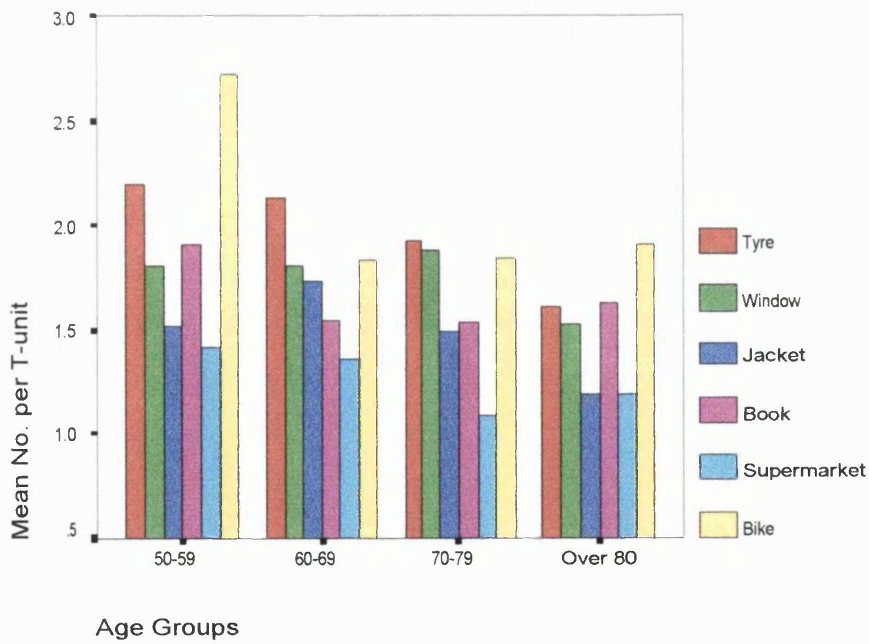
Graph A6.33: Age effect on right-branching clauses of picture sequence topics



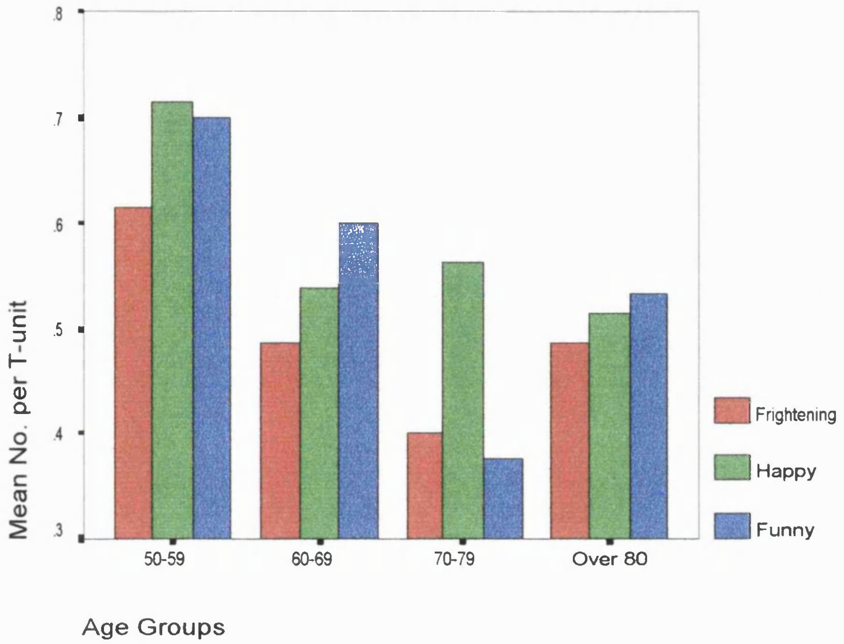
Graph A6.34: Age effect on right-branching clauses of procedural topics



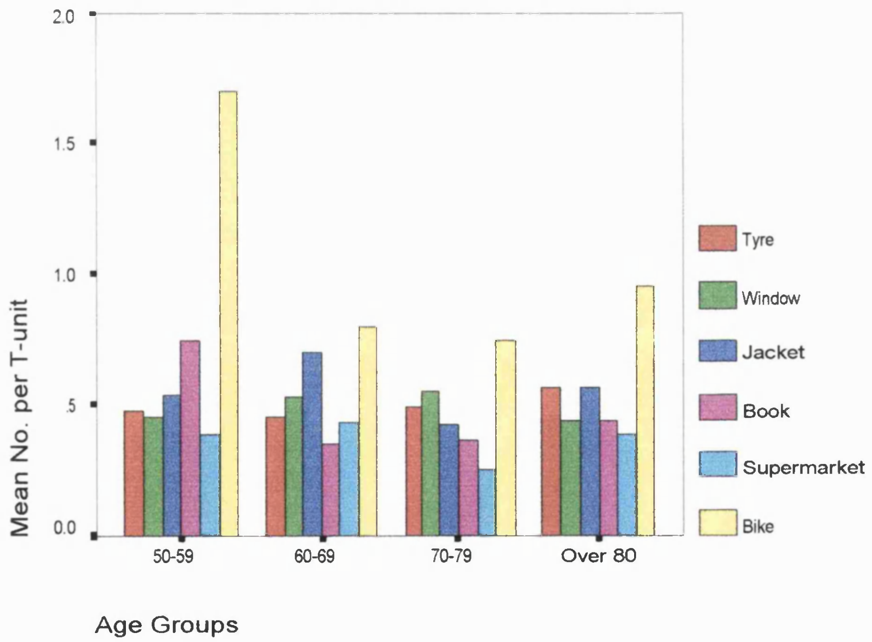
Graph A6.35: Age effect on total cohesion in personal narrative topics



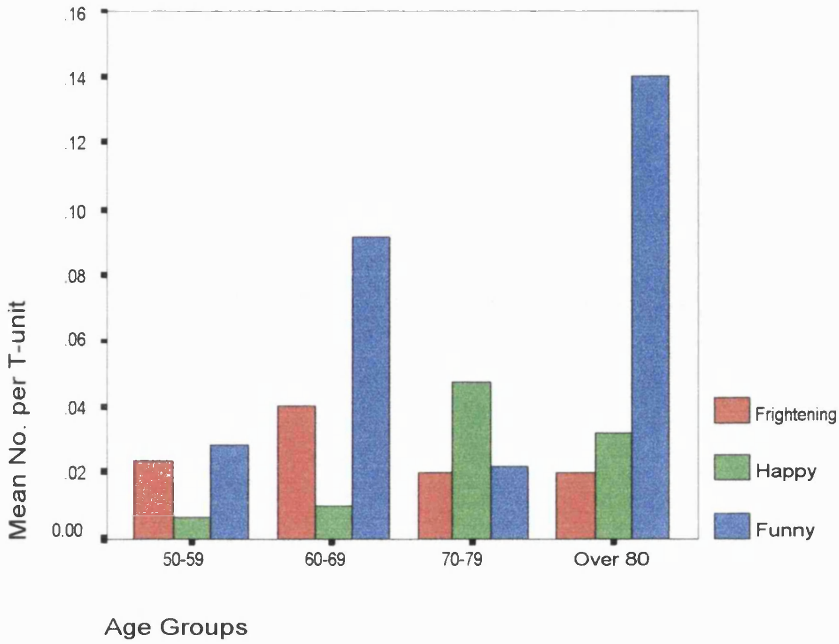
Graph A6.36: Age effect on total cohesive ties in procedural topics



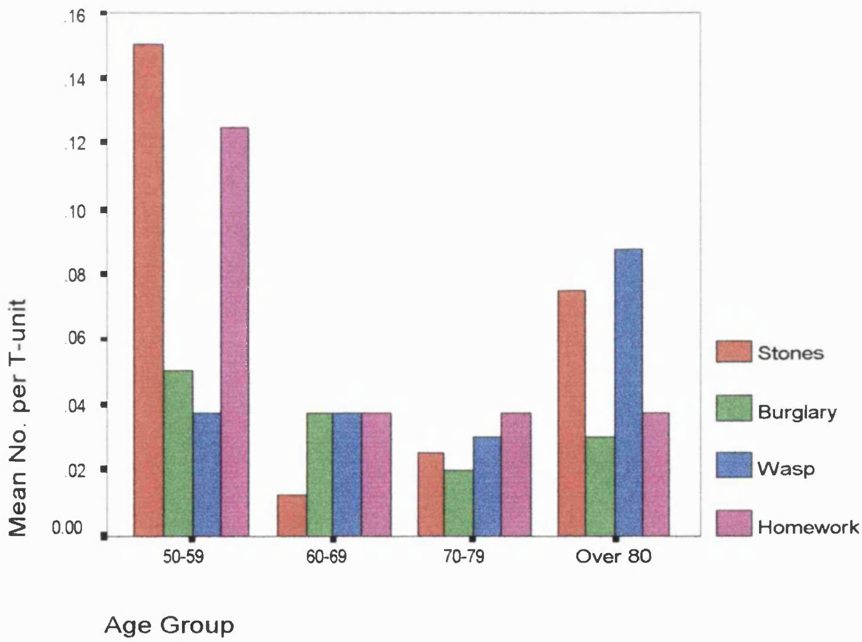
Graph A6.37: Age effect on reference in personal narrative topics



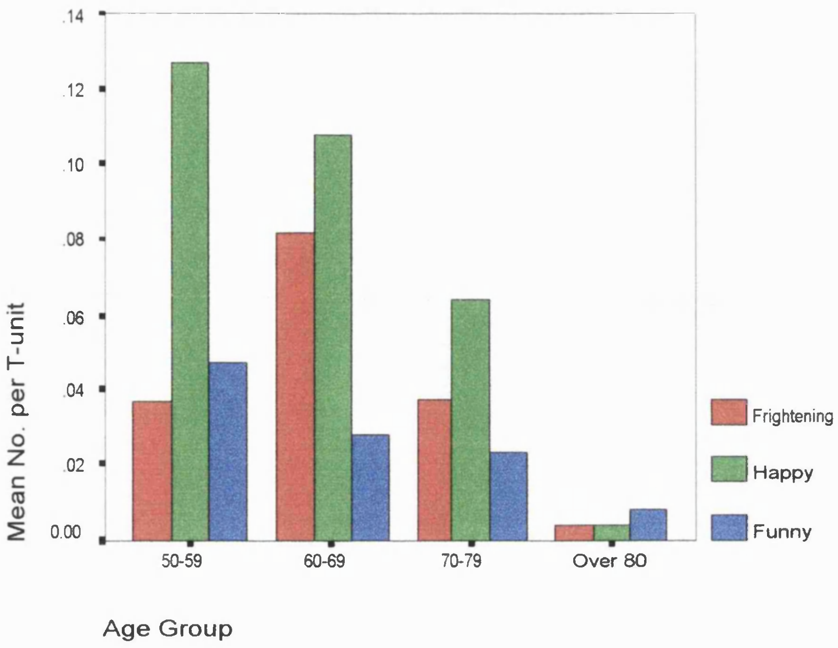
Graph A6.38: Age effect on reference of procedural topics



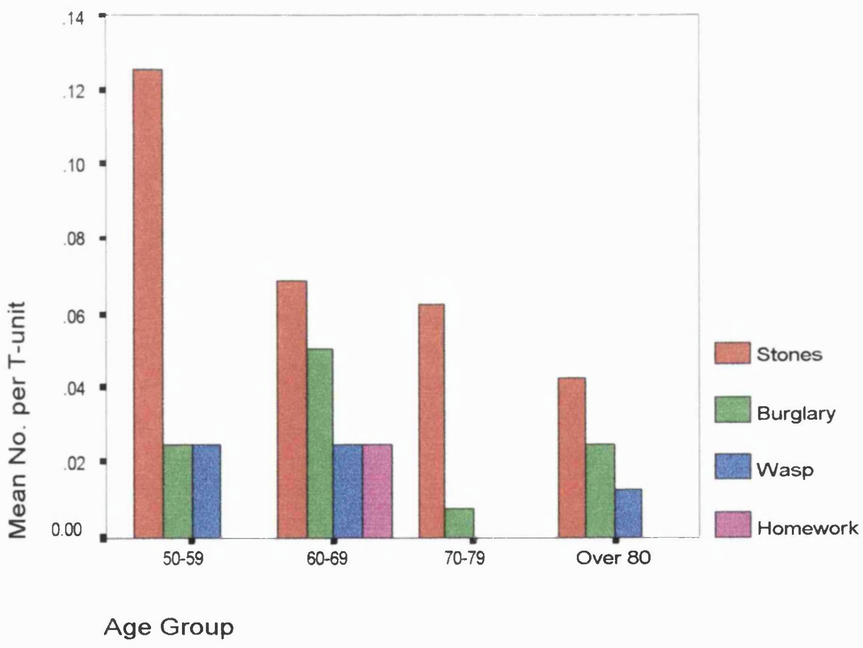
Graph A6.39: Age effect on substitution cohesion of personal topics



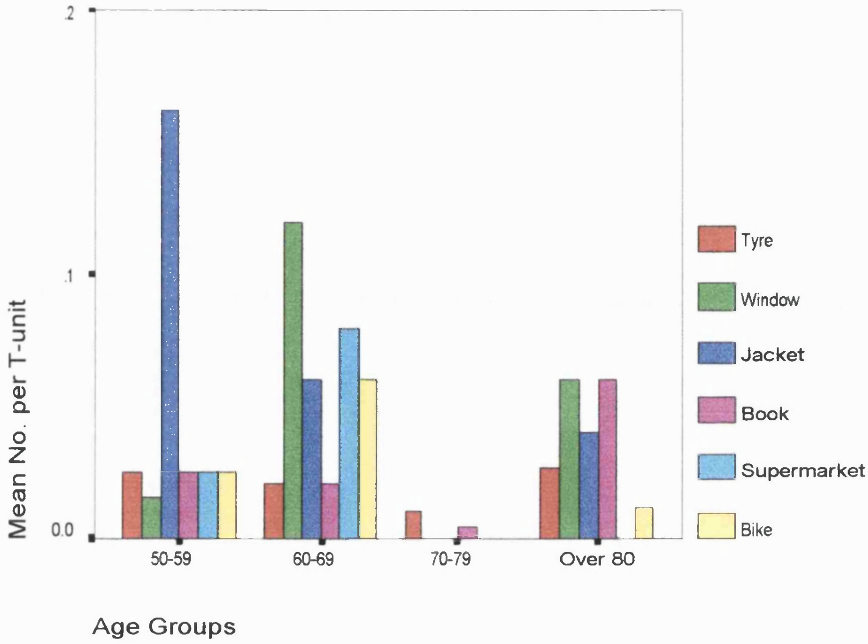
Graph A6.40: Age effect on substitution cohesion on picture topics



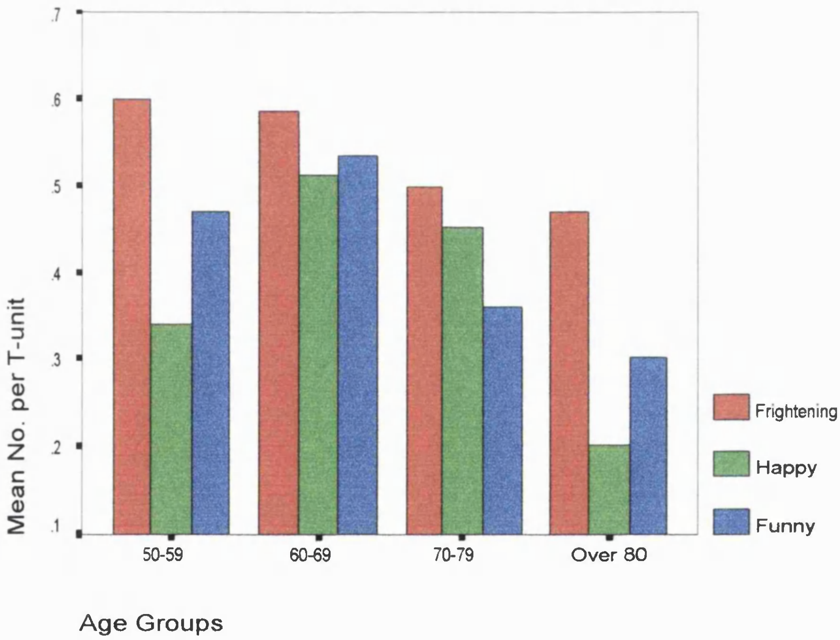
Graph A6.41: Age effect on ellipsis in personal narrative topics



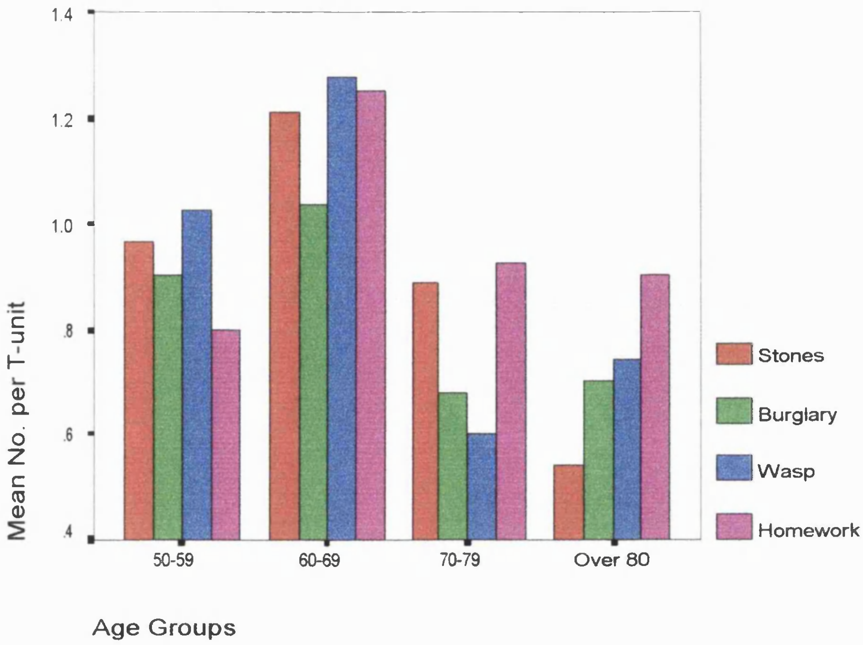
Graph A6.42: Age effect on ellipsis in picture sequence topics



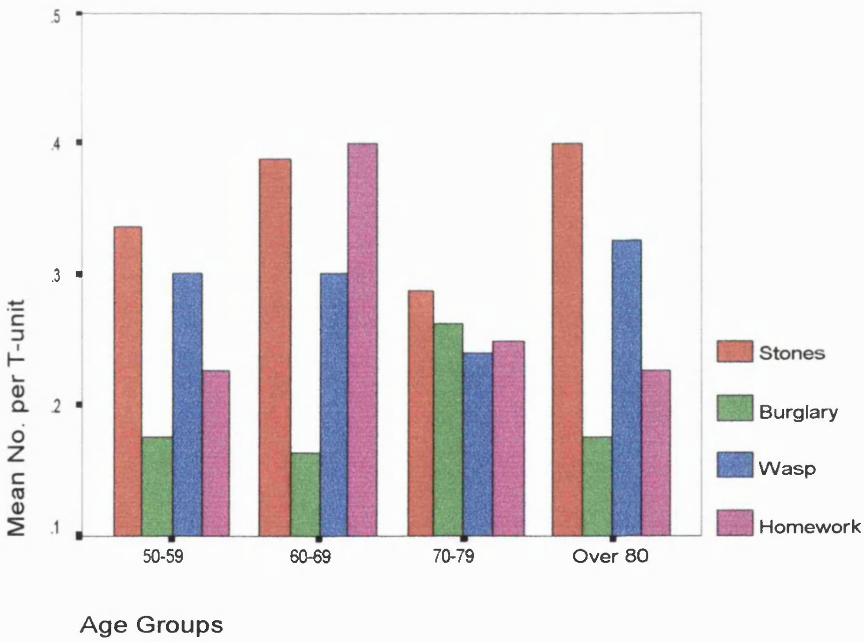
Graph A6.43: Age effect on ellipsis in procedural topics



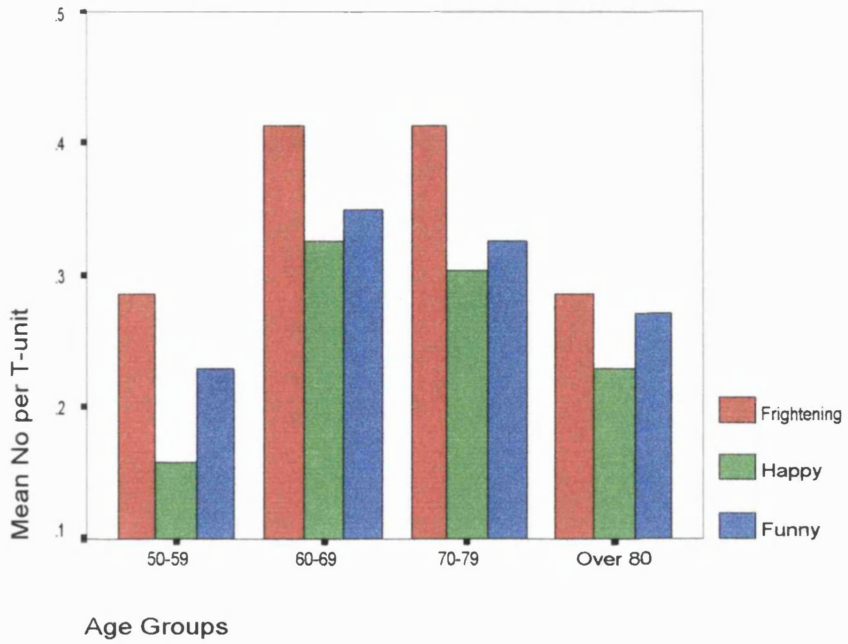
Graph A6.44: Age effect on lexicalisation of personal narrative topics



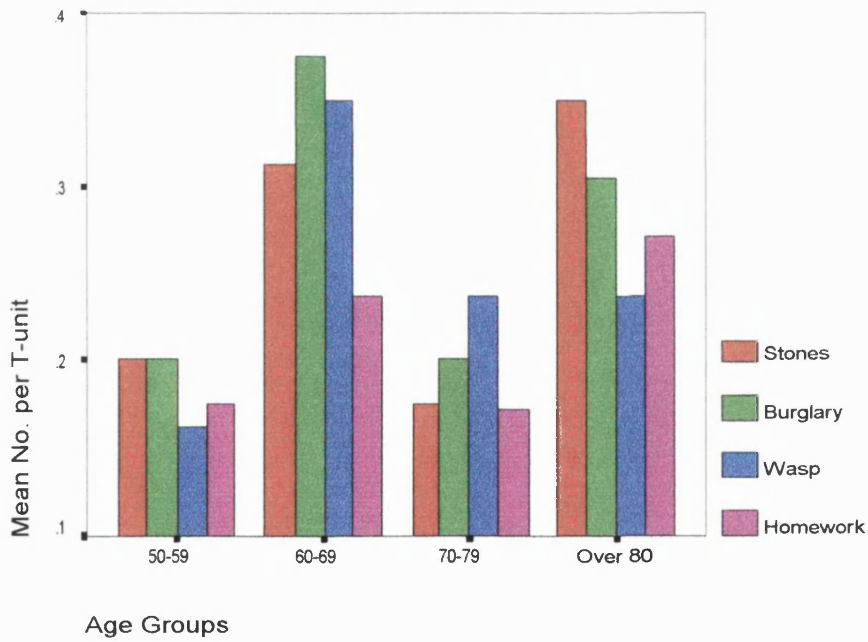
Graph A6.45: Age effect on lexicalisation of picture sequence topics



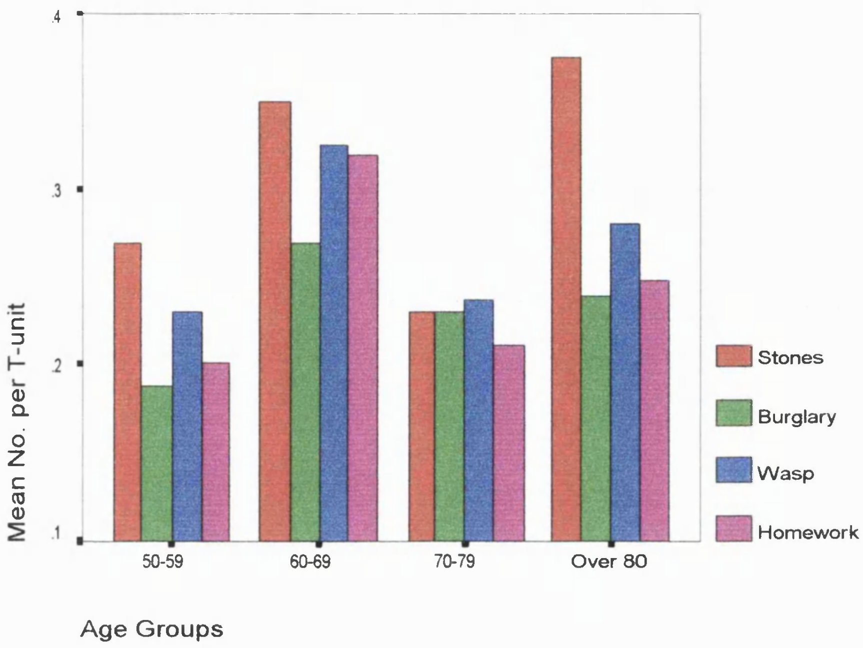
Graph A6.46: Age effect on conjunctions in picture sequence topics



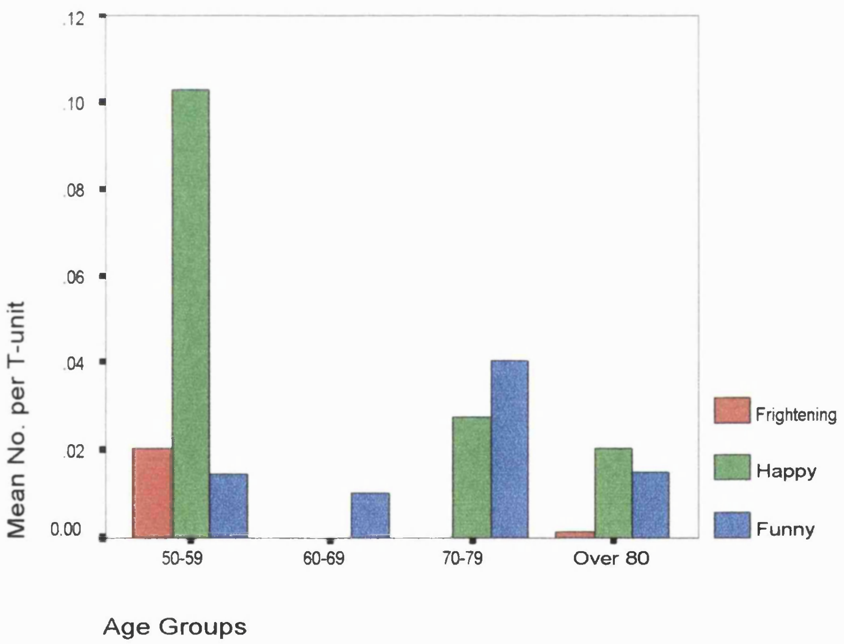
Graph A6.47: Age effect on "and" in personal narrative topics



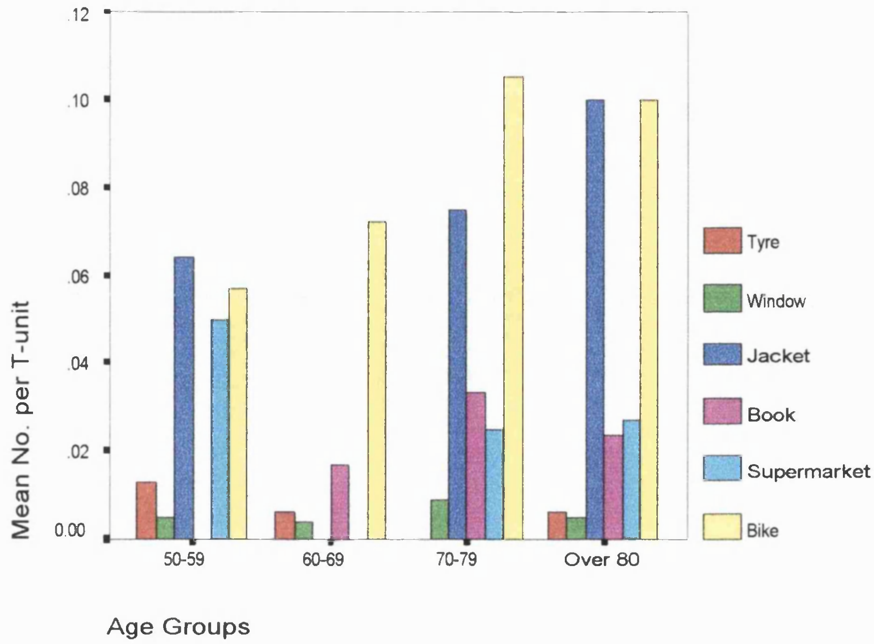
Graph A6.48: Age effect on "and" in picture sequence topics



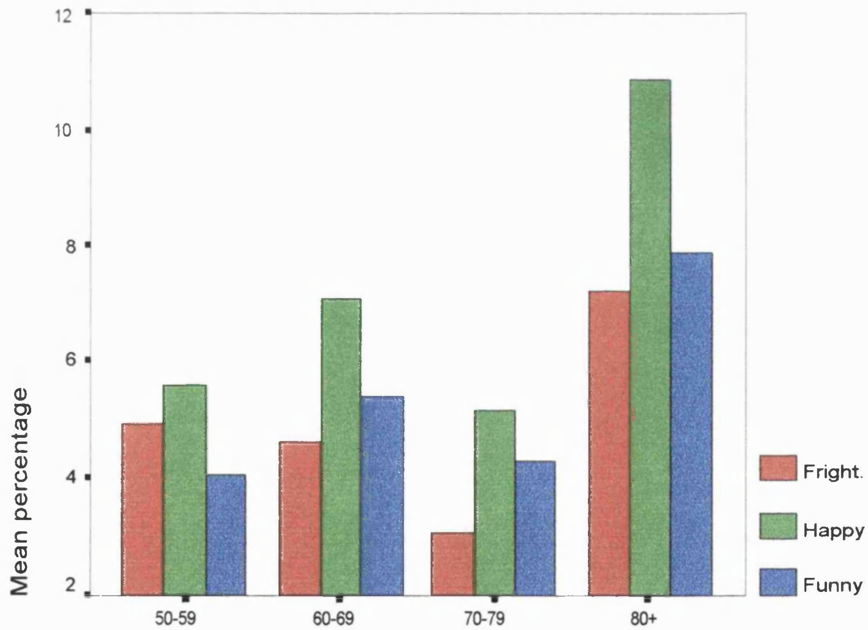
Graph A6.49: Age effect on connectives in picture sequence topics



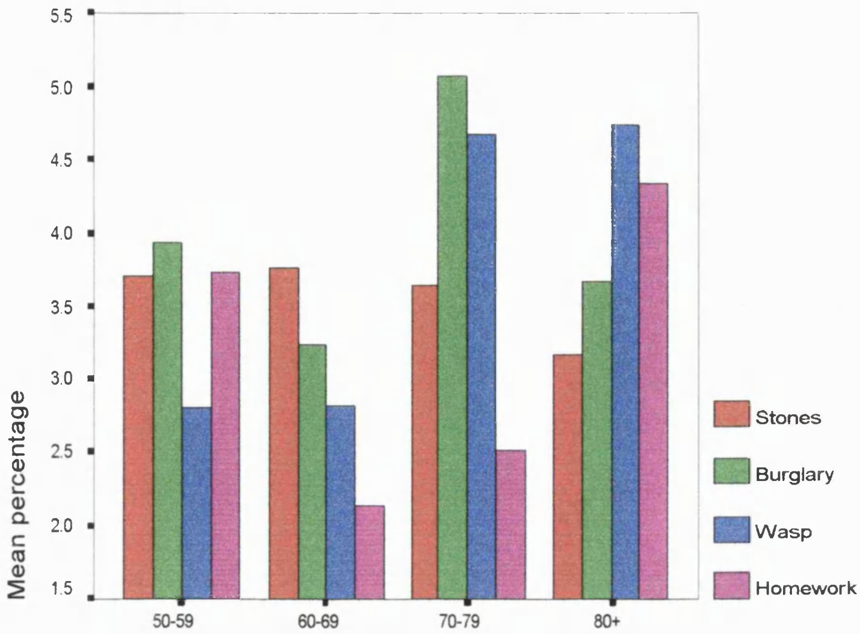
Graph A6.50: Age effect on attempted cohesion in personal experience topics



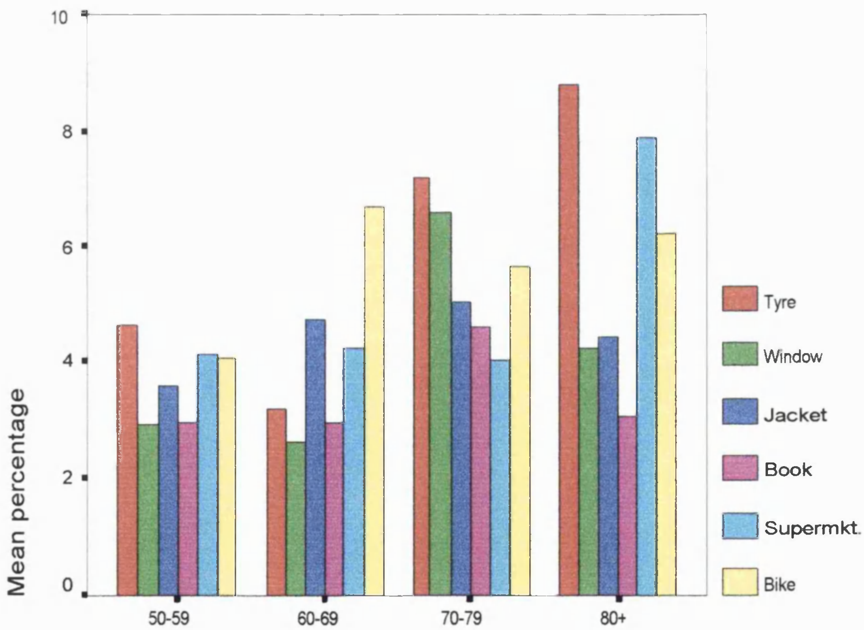
Graph A6.51: Age effect on attempted cohesion in procedural topics



Graph A6.52: Age effects on dysfluencies in personal narrative topics



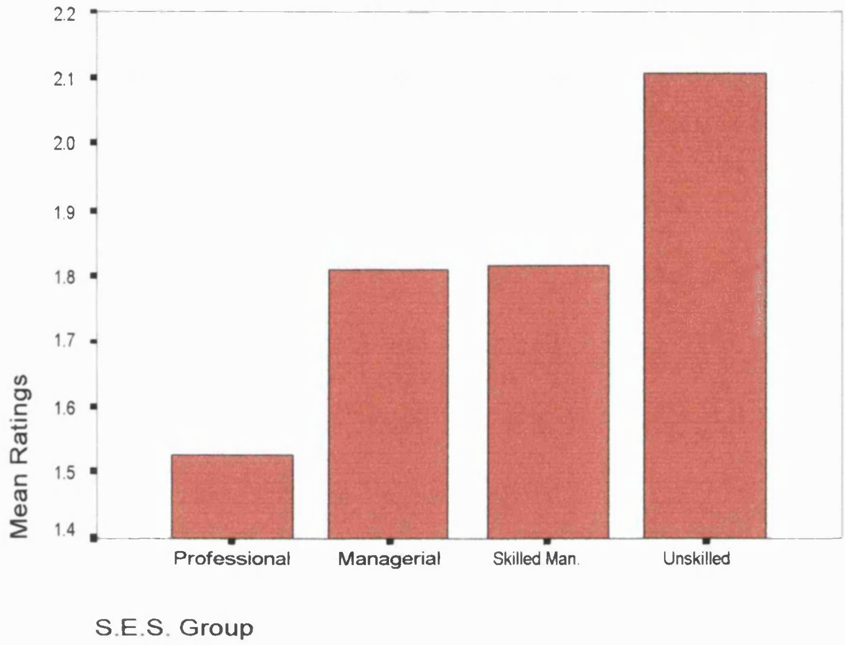
Graph A6.53: Age effect on dysfluencies on picture sequence topics



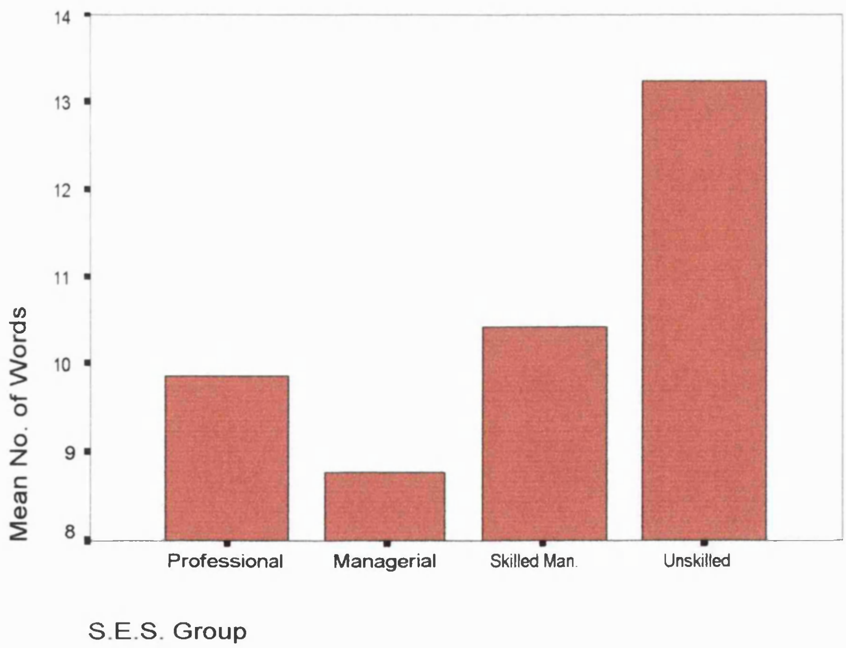
Graph A6.54: Age effect on dysfluencies on procedural topics

Appendix A7

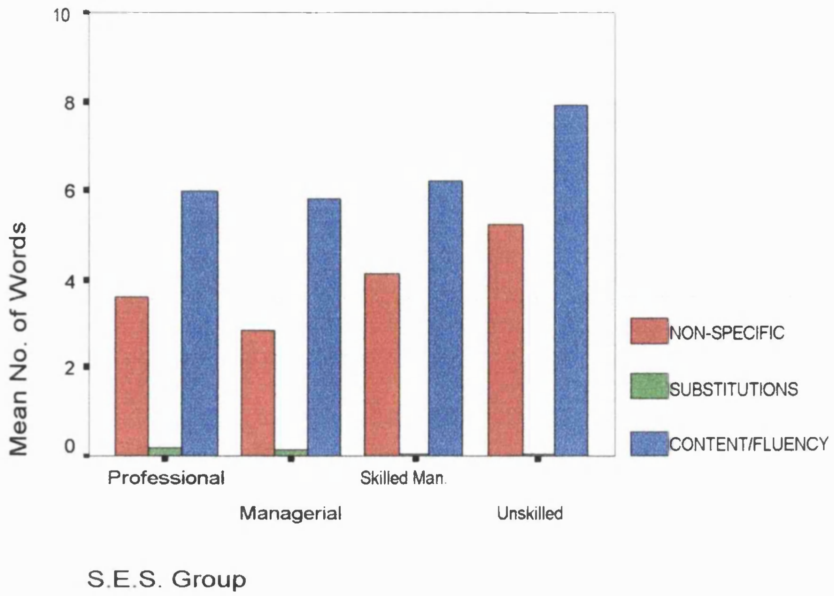
SES Effect on Combined Discourse



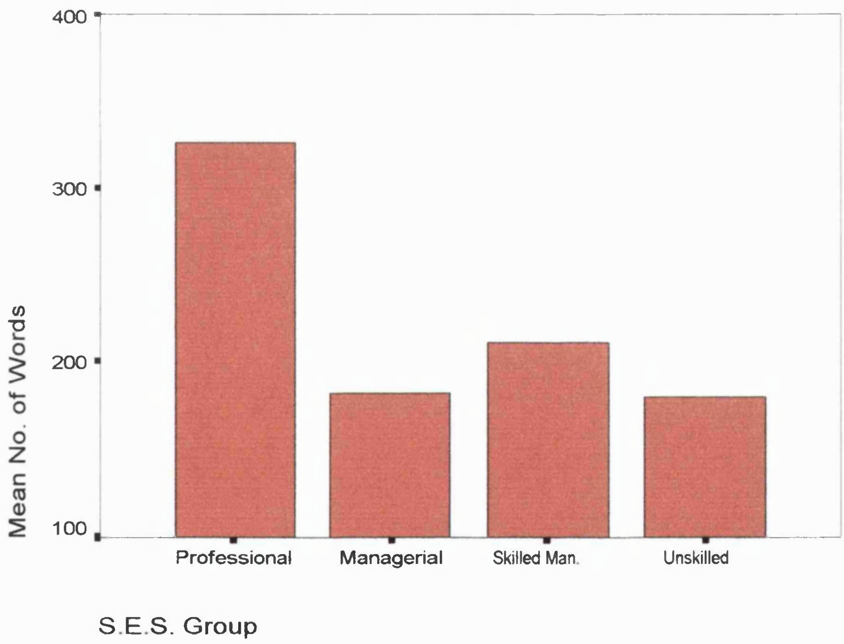
Graph A7.1: SES effect on discourse grammar in combined discourse samples



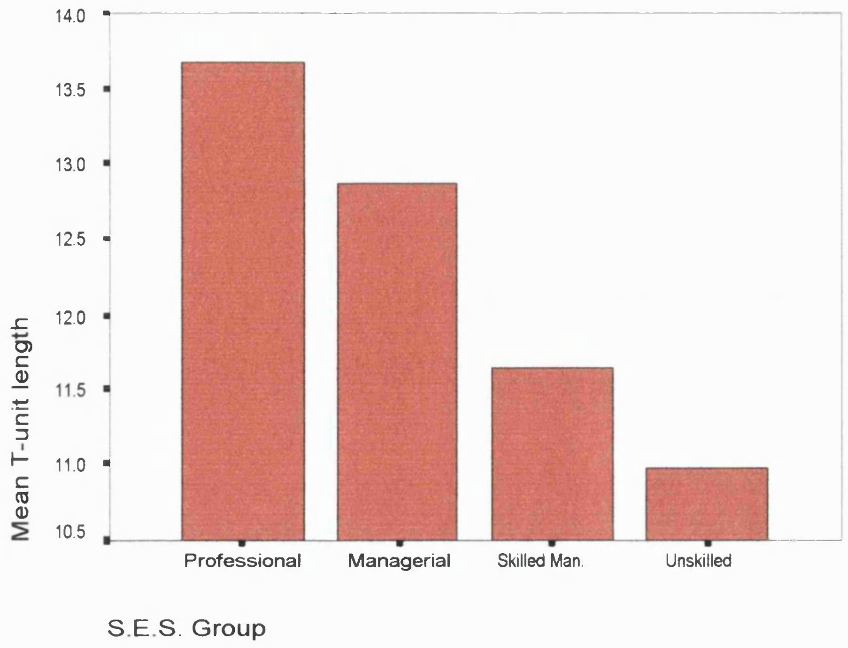
Graph A7.2: SES effect on total clarity disruptors in combined discourse samples



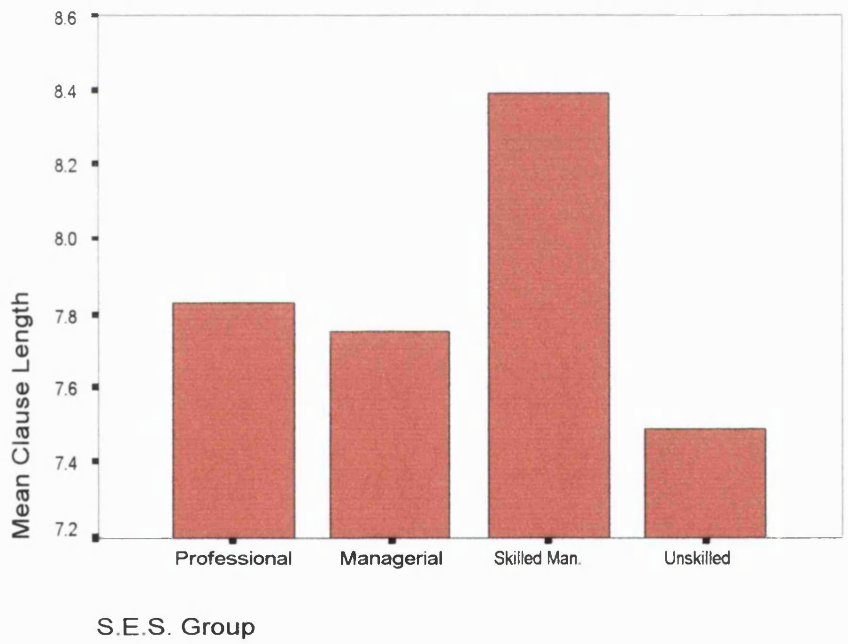
Graph A7.3: SES effect on types of clarity disruptors in combined discourse samples



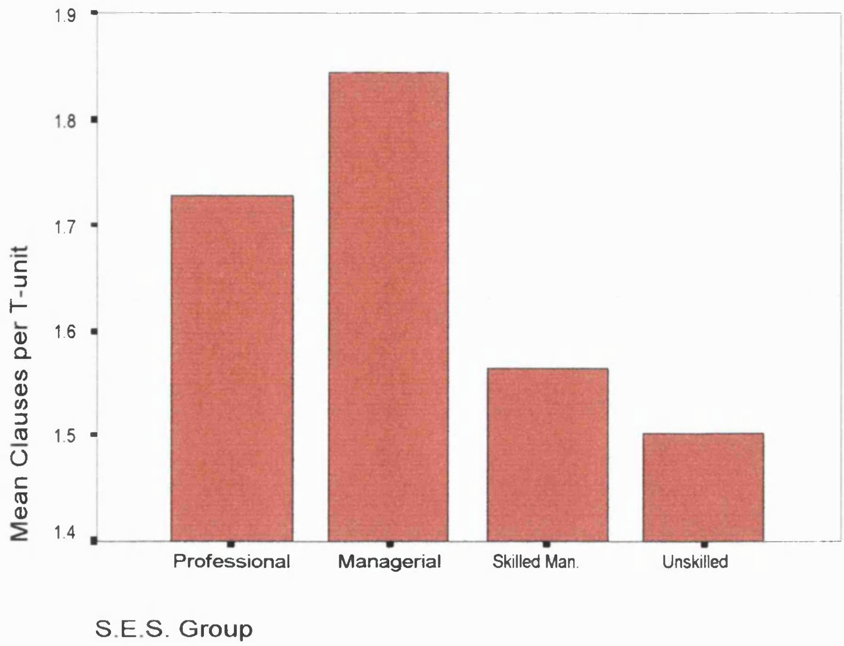
Graph A7.4: SES effect on length of combined discourse samples



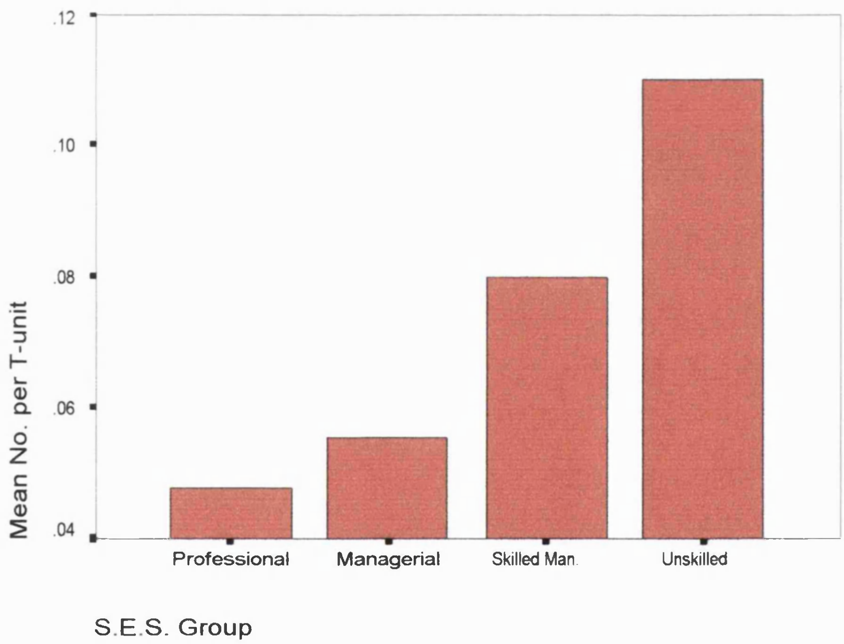
Graph A7.5: SES effect on T-unit length in combined discourse samples



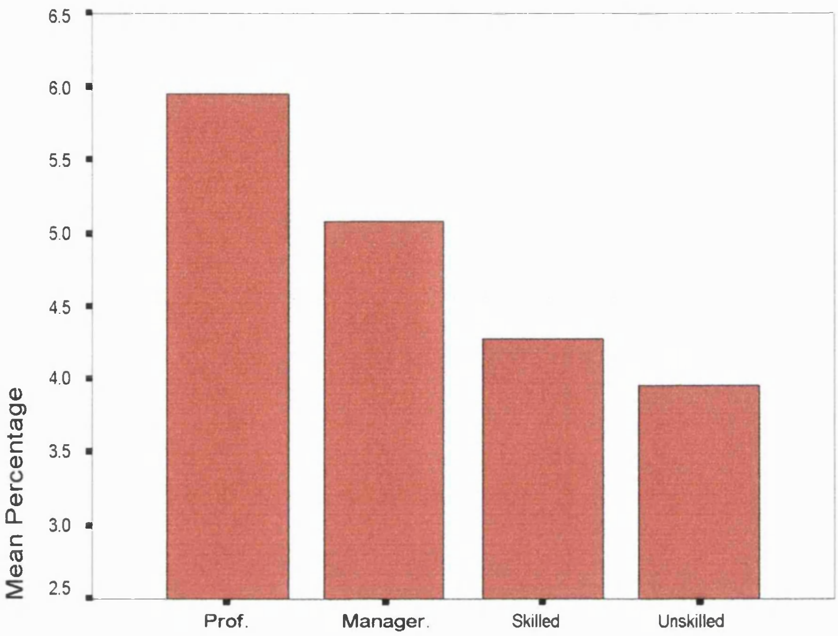
Graph A7.6: SES effect on clause length in combined discourse samples



Graph A7.7: SES effect on clausal embedding in combined discourse samples

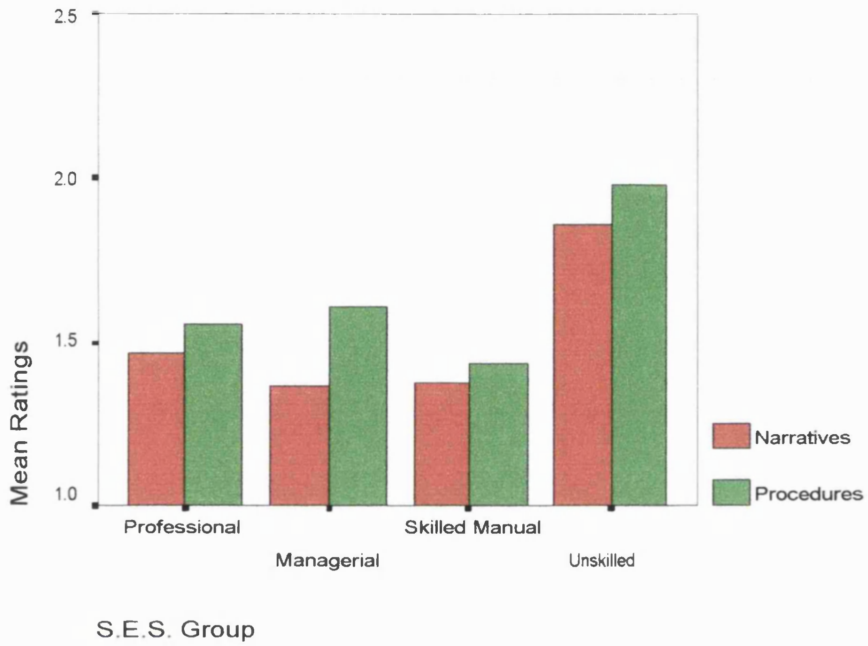


Graph A7.8: SES effect on attempted cohesion in combined discourse samples

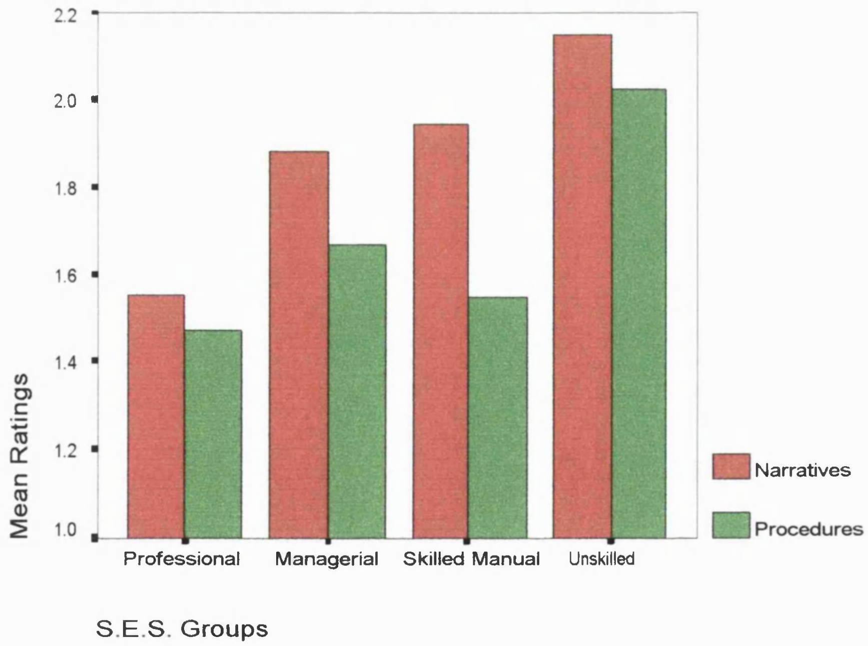


Graph A7.9: SES effect on dysfluencies in combined samples

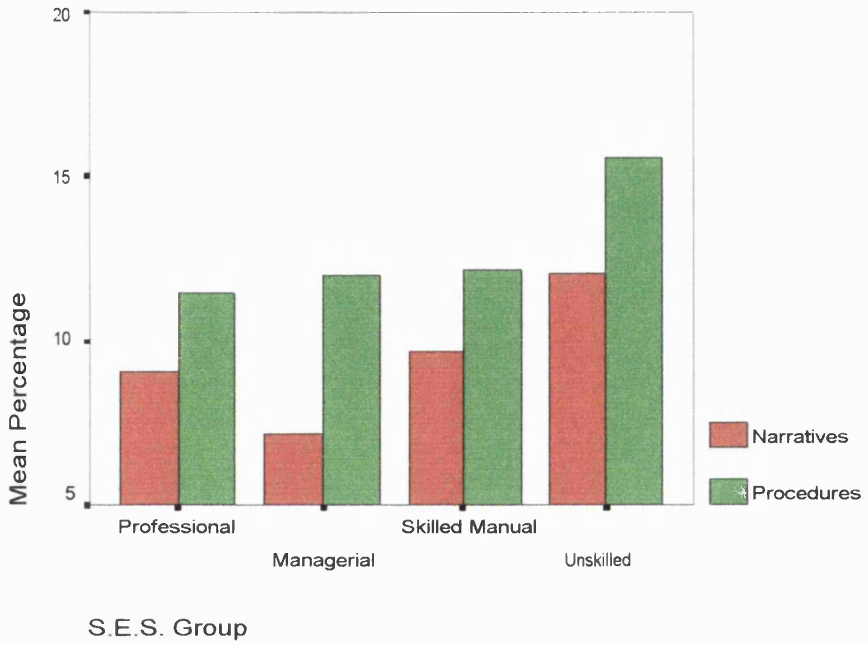
Appendix A8
SES Effect on Discourse Genres



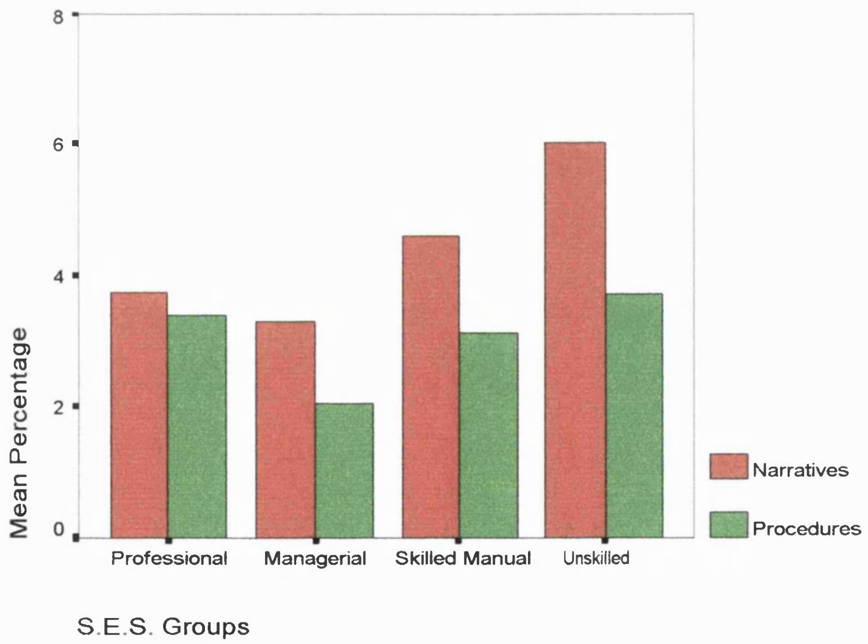
Graph A8.1: Effect of SES on relevance ratings of genres



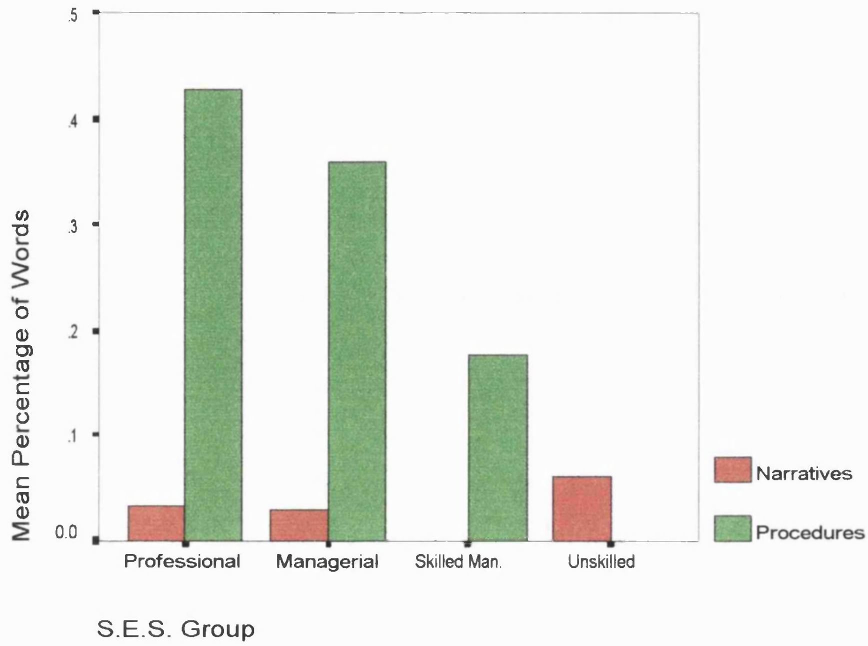
Graph A8.2: Effect of SES on discourse grammar in genres



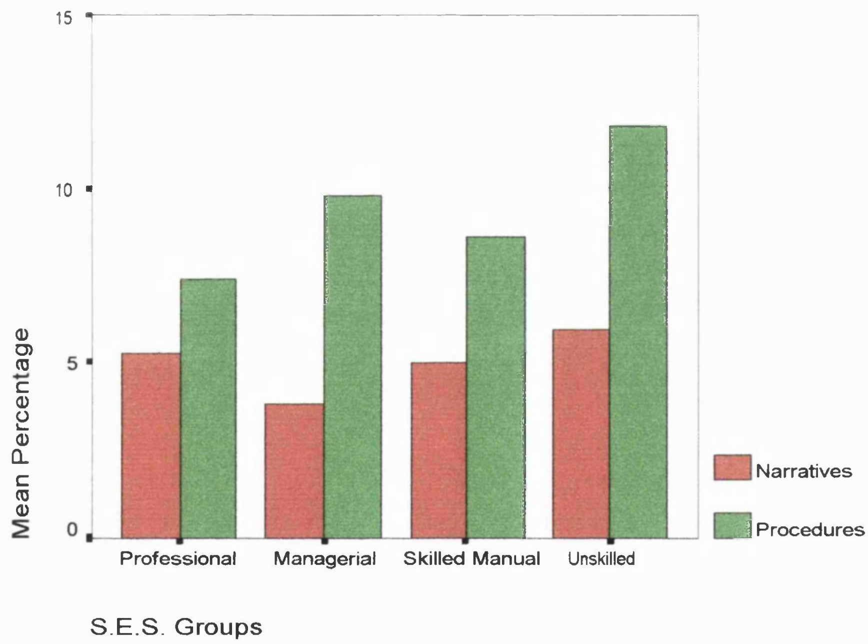
Graph A8.3: Effect of SES on clarity disruptors in genres



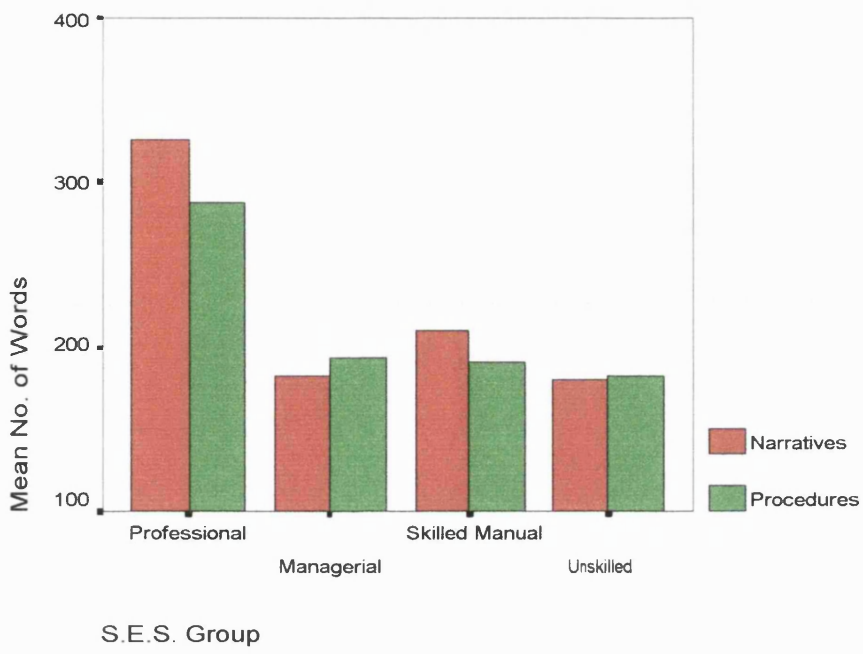
Graph A8.4: Effect of SES on non-specific elements in genres



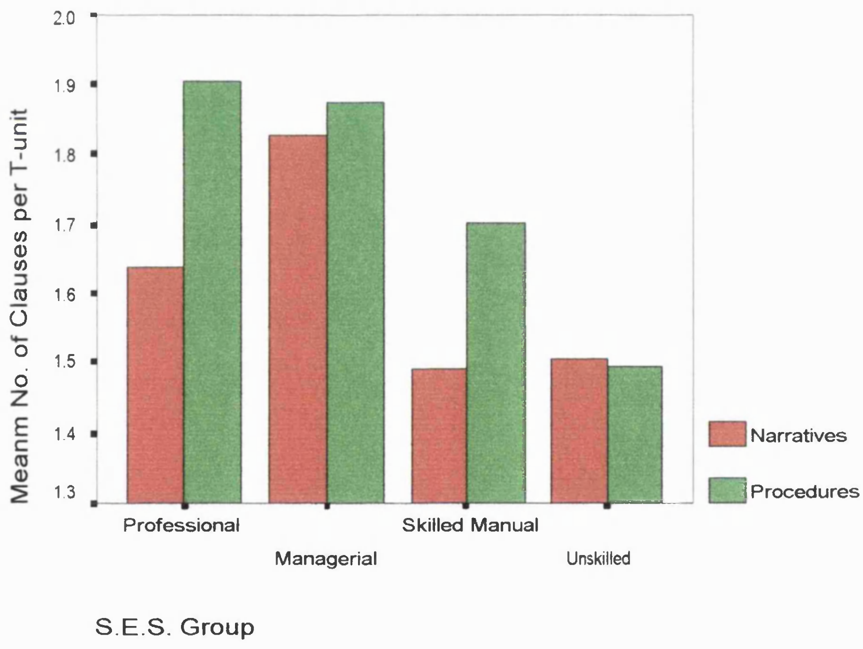
Graph A8.5: Effect of SES on word substitutions of genres



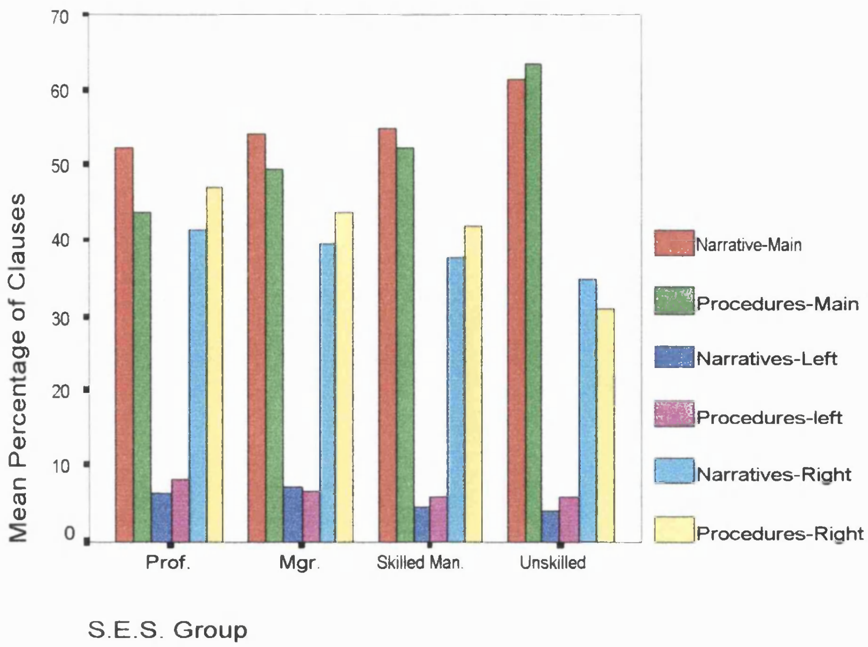
Graph A8.6: Effect of SES on content and fluency disruptors in genres



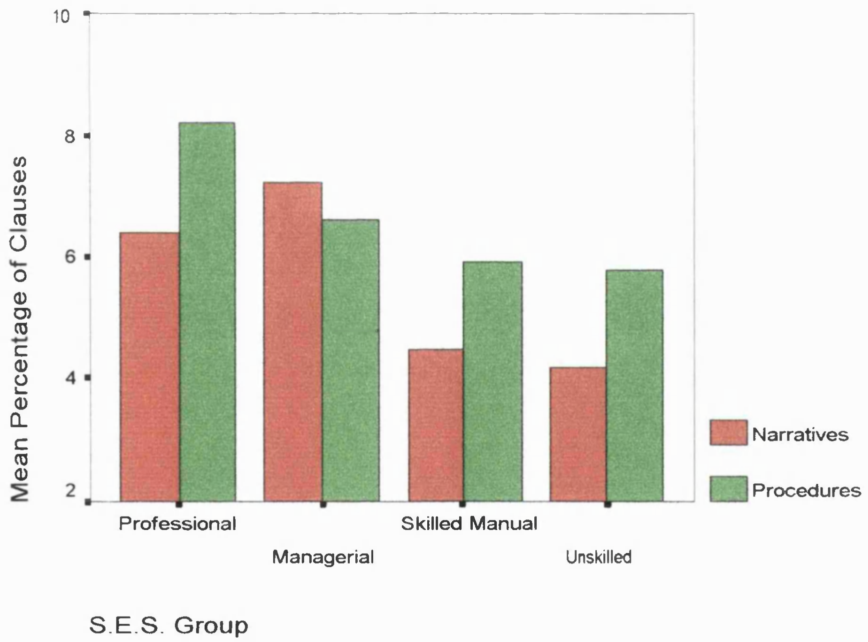
Graph A8.7: Effect of SES on sample length of genres



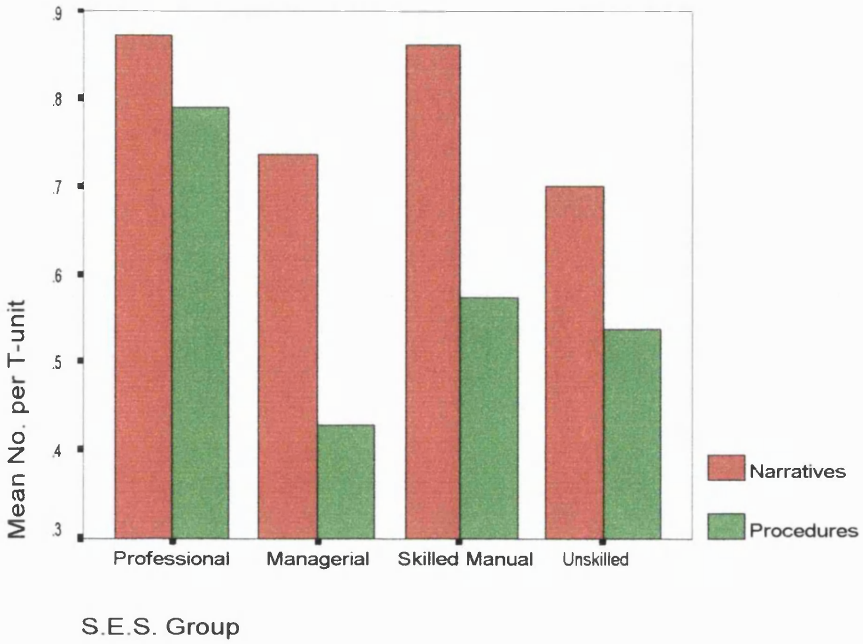
Graph A8.8: Effect of SES on clauses per T-unit of genres



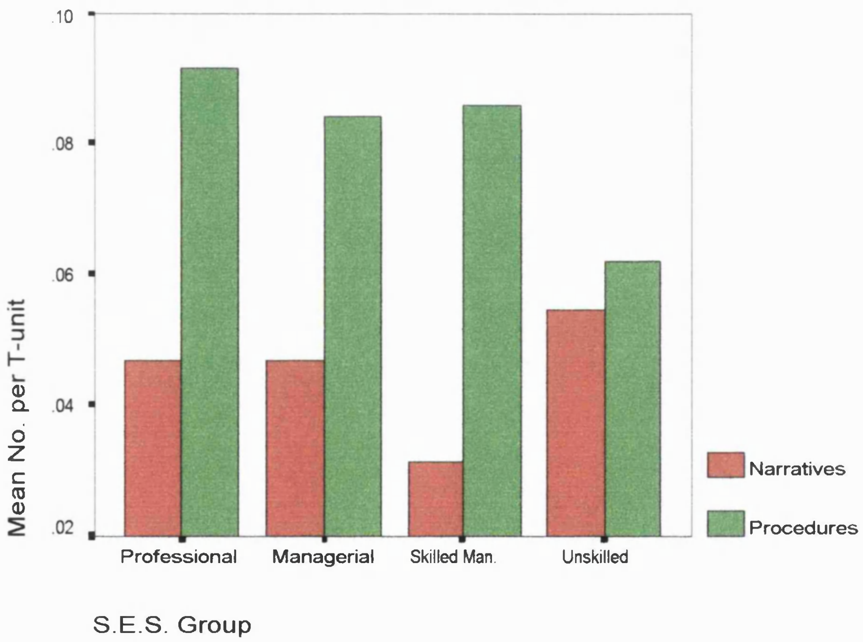
Graph A8.9: Effect on SES on main and branching clauses of two genres



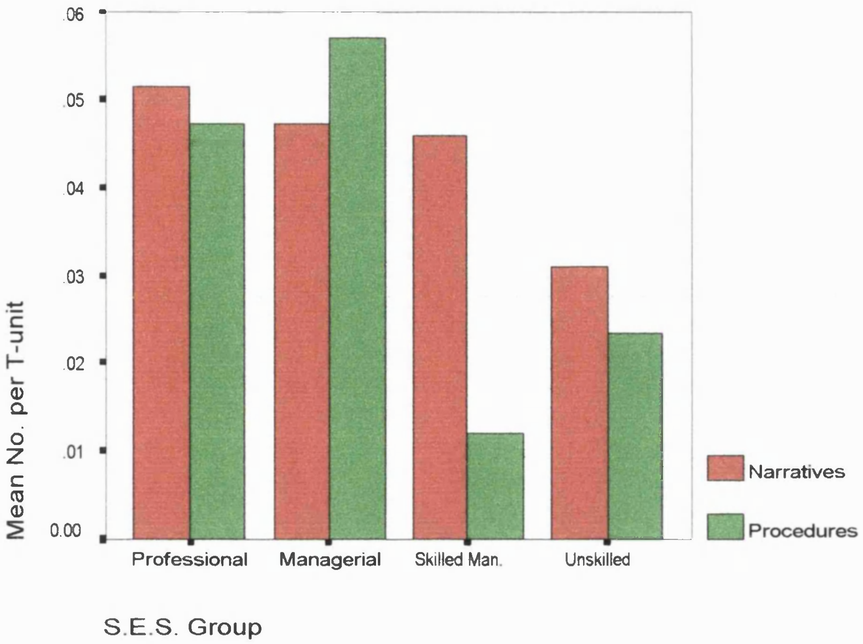
Graph A8.10: Effect of SES on percentage of left-branching clauses of genres



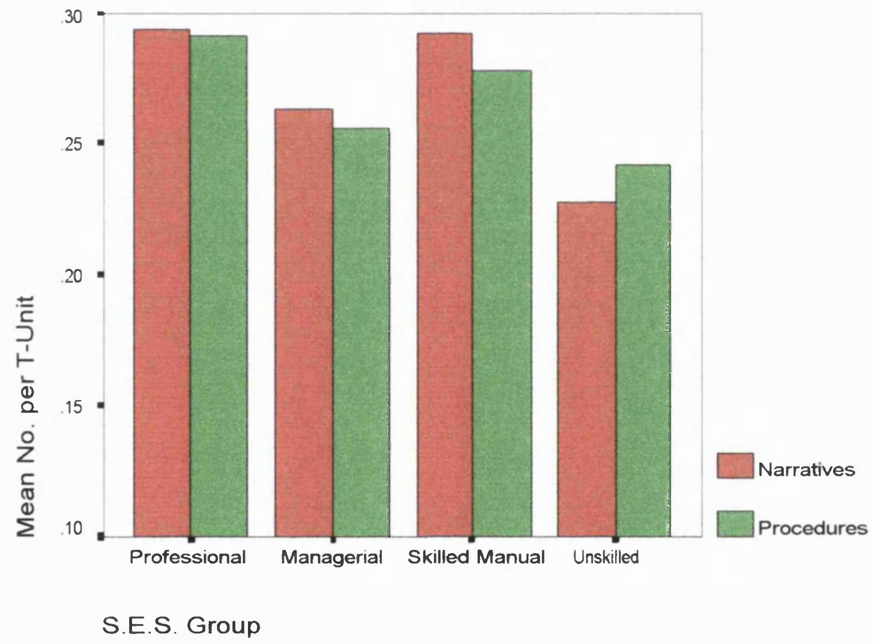
Graph A8.11: Effect of SES on reference in genres



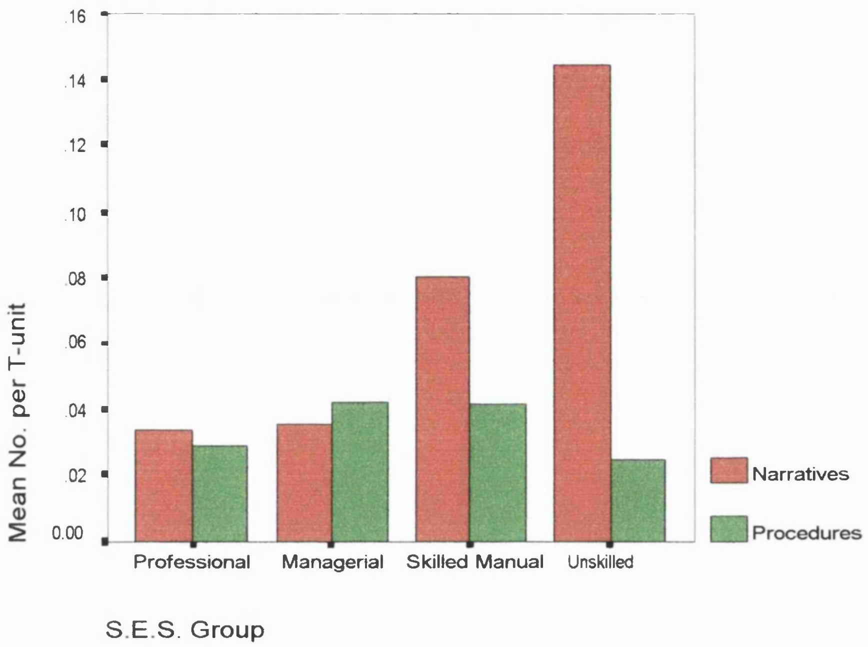
Graph A8.12: Effect on SES on substitutive cohesion in genres



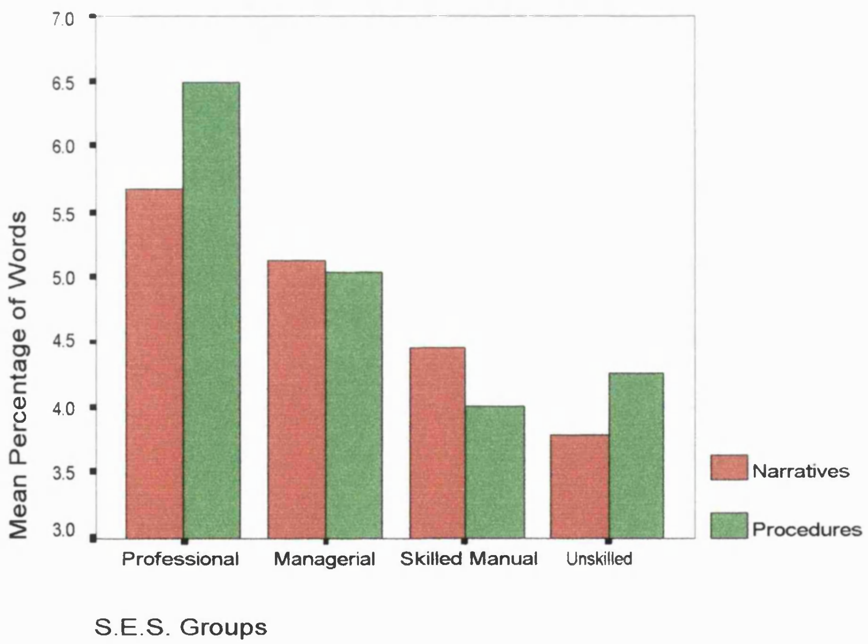
Graph A8.13: Effect of SES on ellipsis in genres



Graph A8.14: Effect of SES on "and" in genres

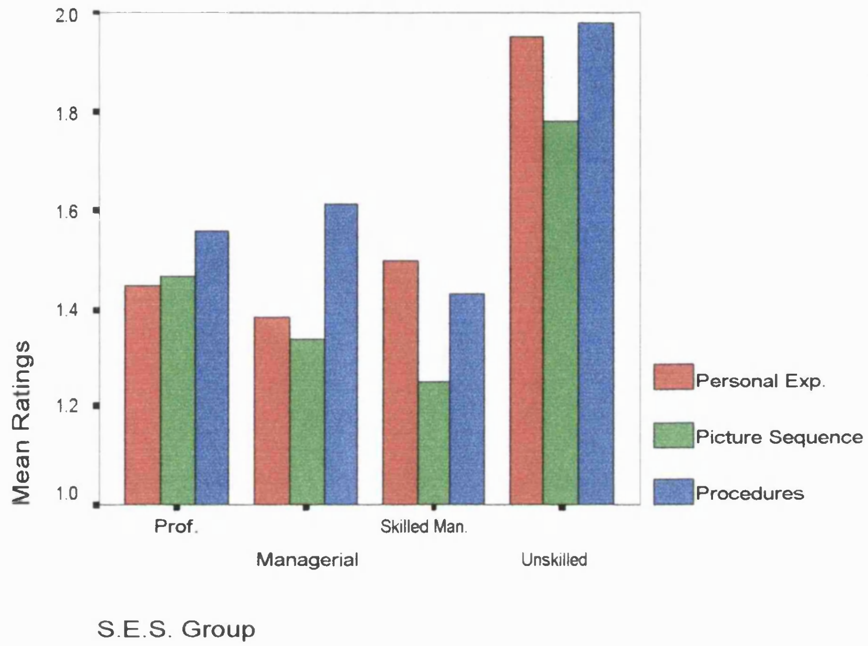


Graph A8.15: Effect of SES on attempted cohesion in genres

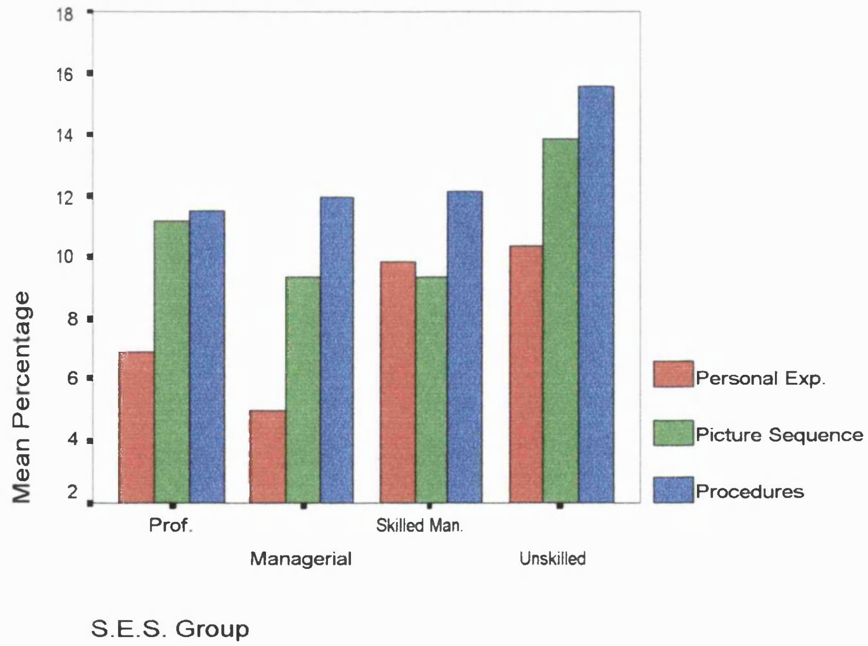


Graph A8.16: Effect of SES on dysfluencies of two genres

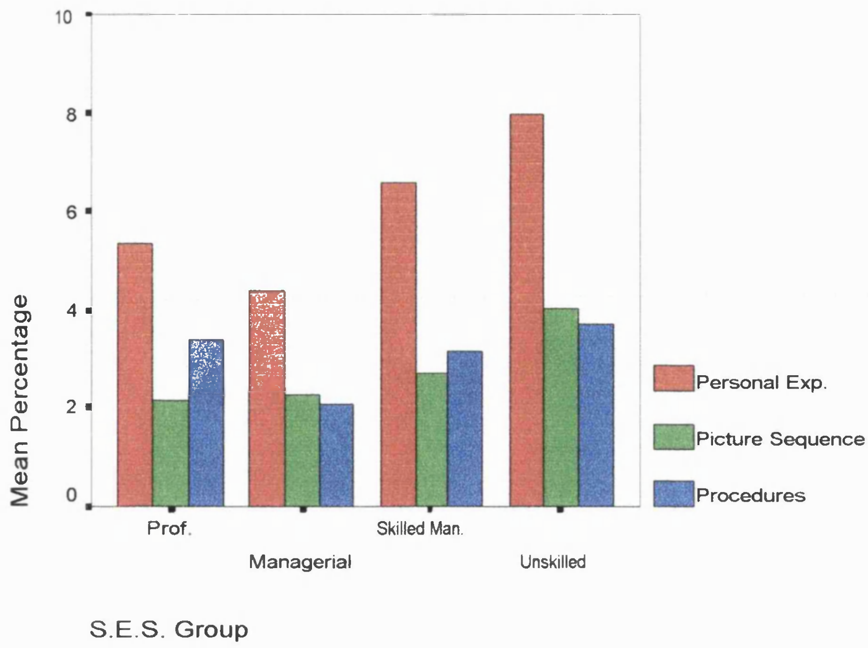
Appendix A9
SES Effect on Discourse Tasks



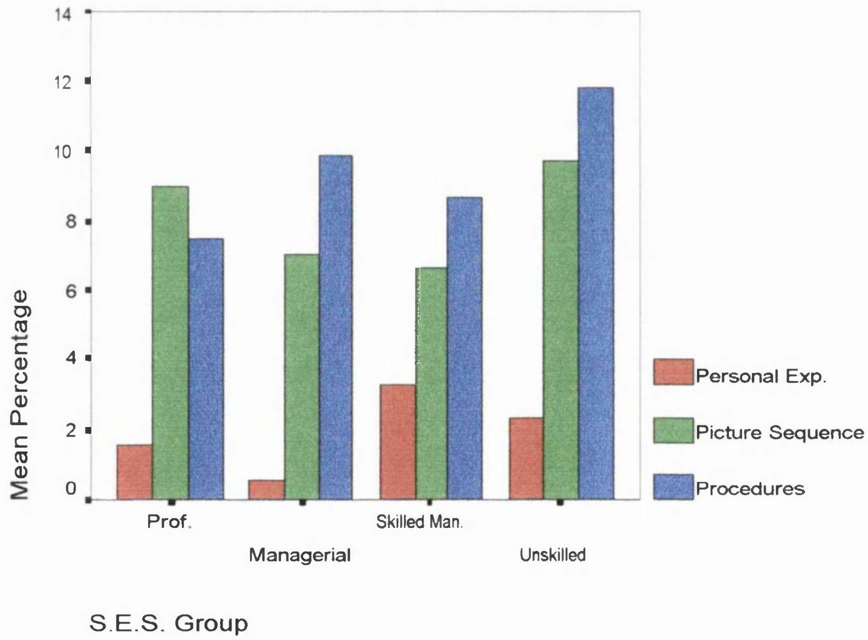
Graph A9.1: Effect of SES on relevance ratings of tasks



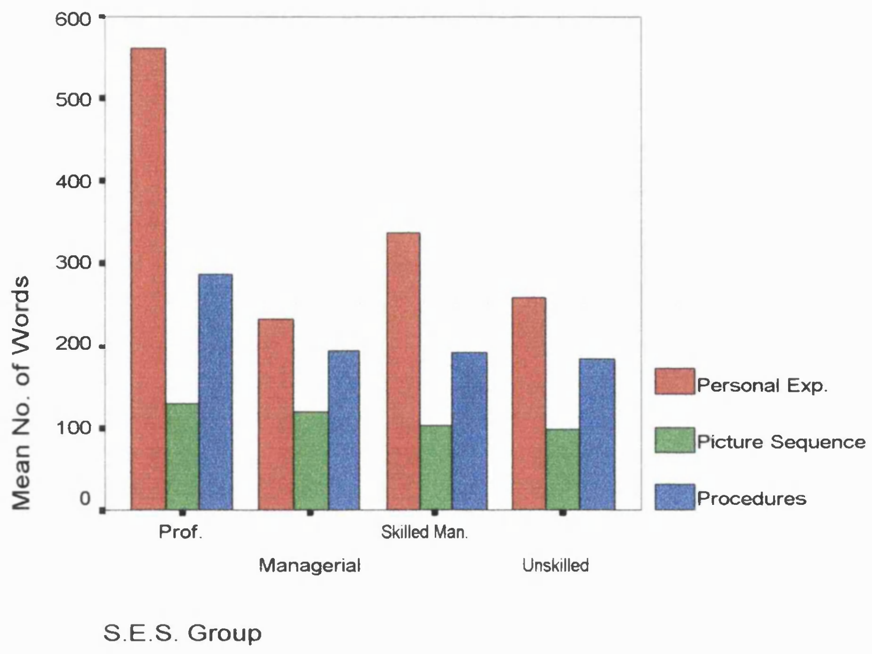
Graph A9.2: Effect of SES on total clarity disruptors of tasks



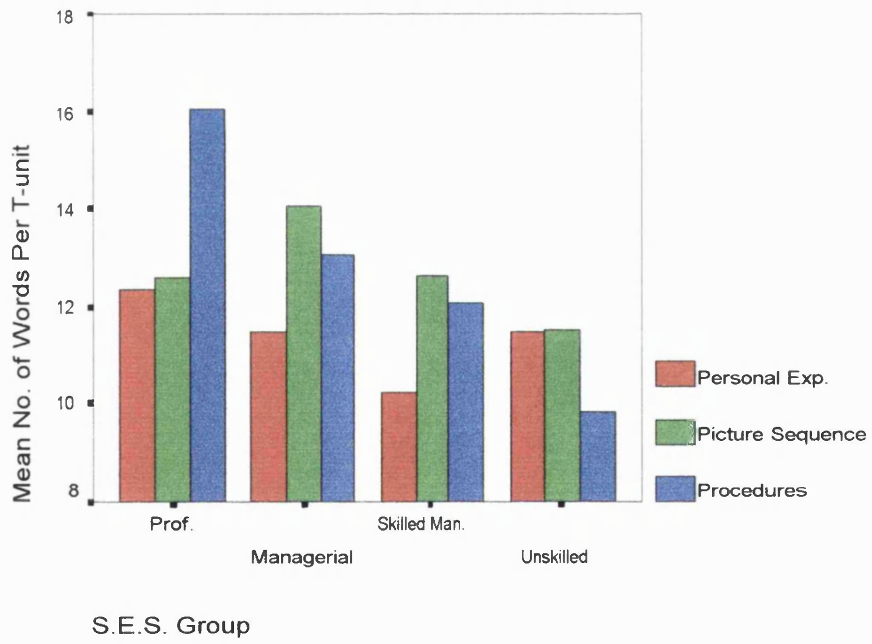
Graph A9.3: Effect of SES on non-specific elements in tasks



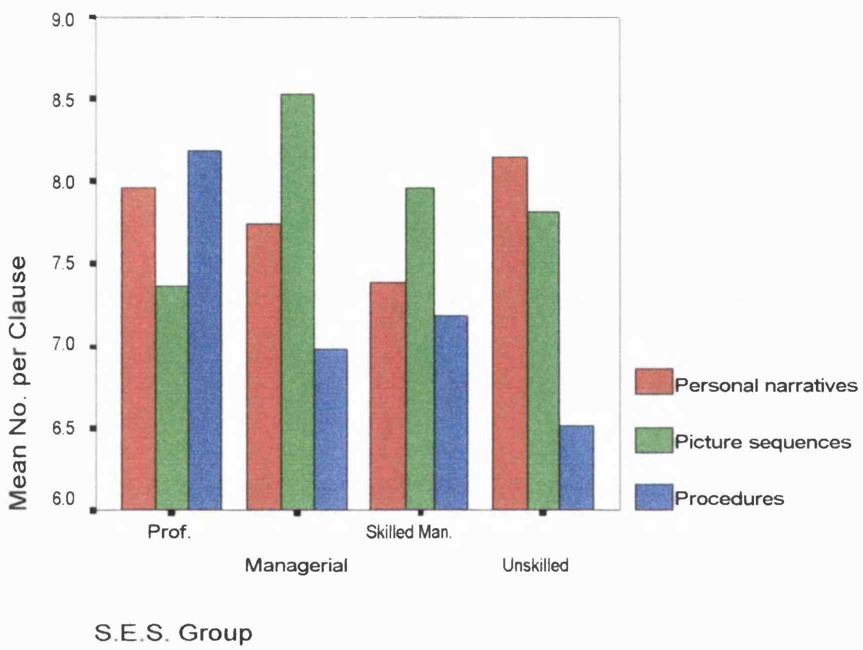
Graph A9.4: Effect of SES on content disruptors of tasks



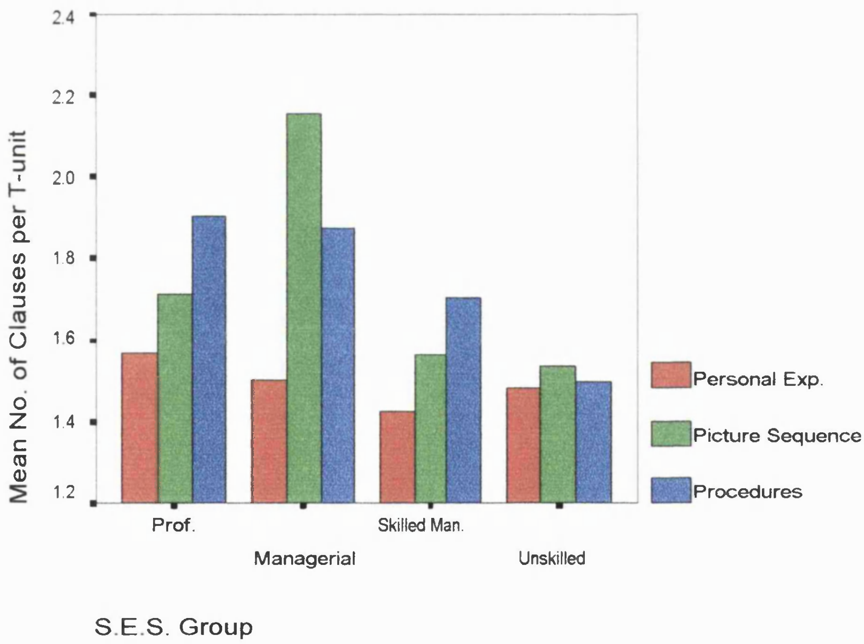
Graph A9.5: Effect of SES on sample length of tasks



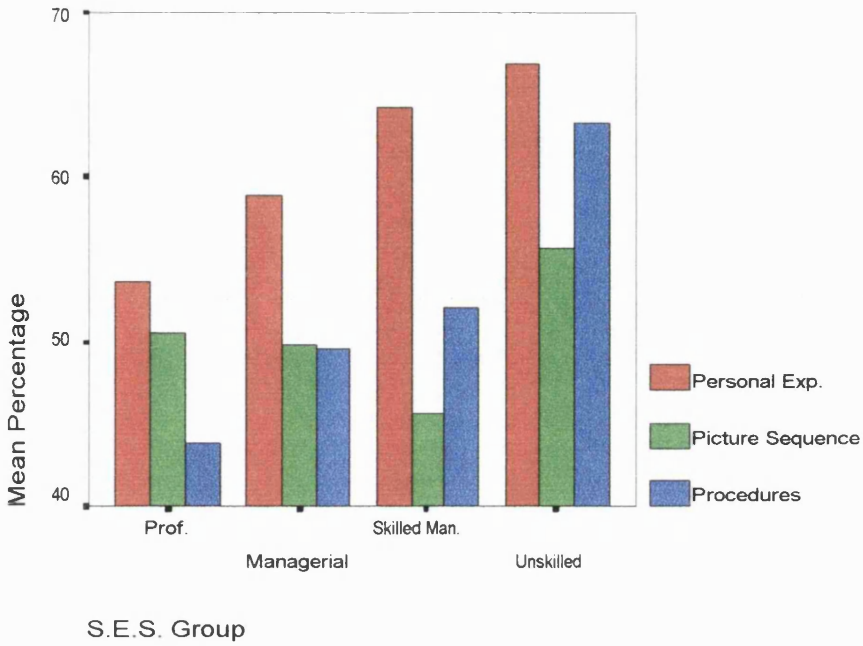
Graph A9.6: Effect of SES on T-length of tasks



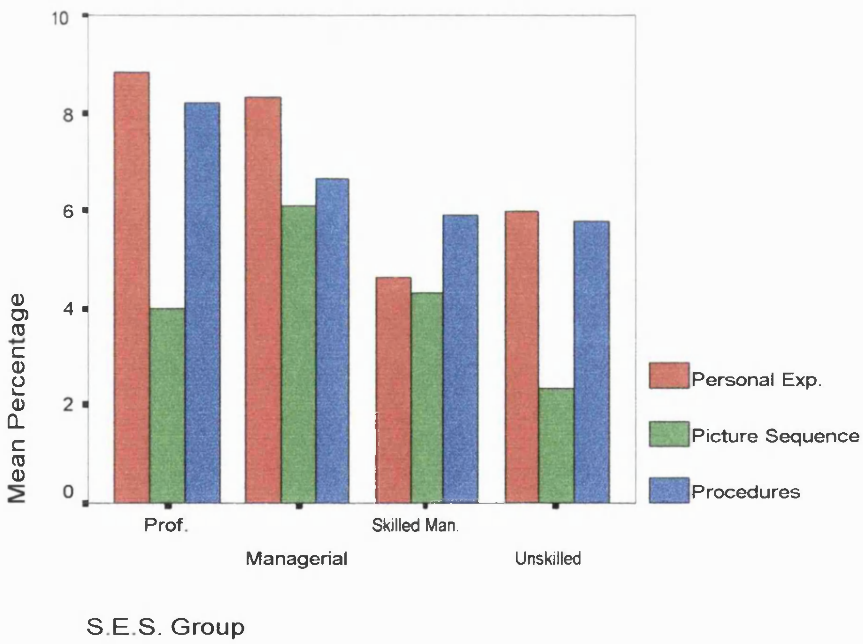
Graph A9.7: Effect of SES on clause length of tasks



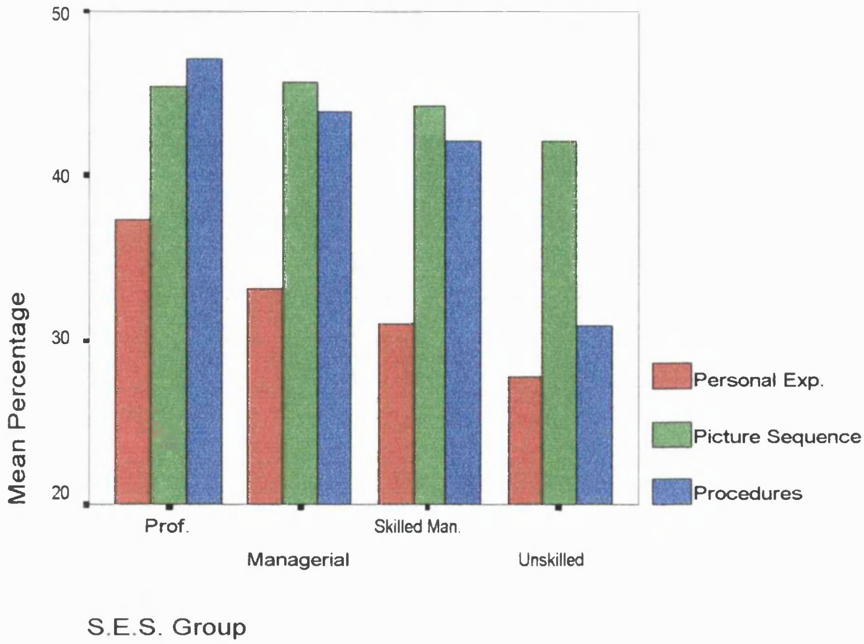
Graph A9.8: Effect of SES on clausal embedding of tasks



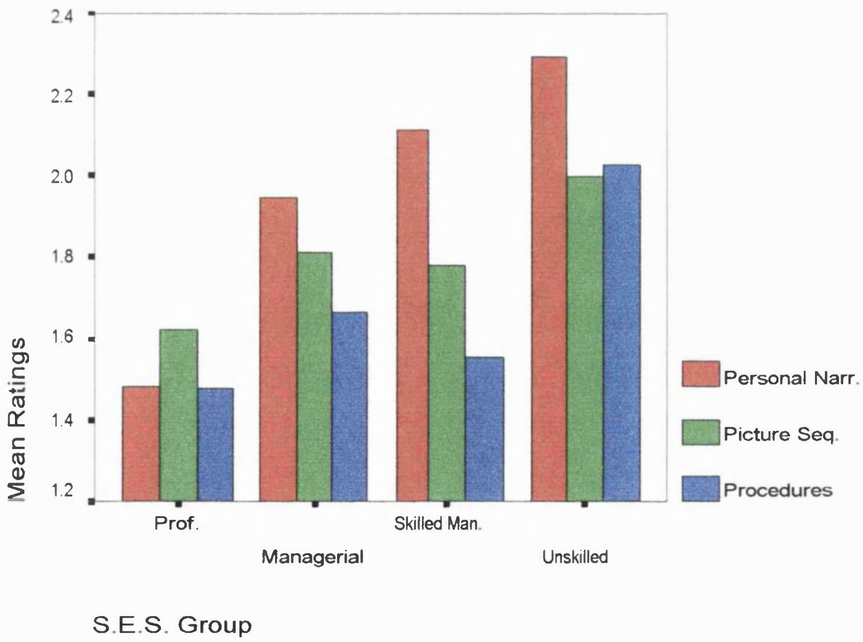
Graph A9.9: Effect of SES on main clauses of tasks



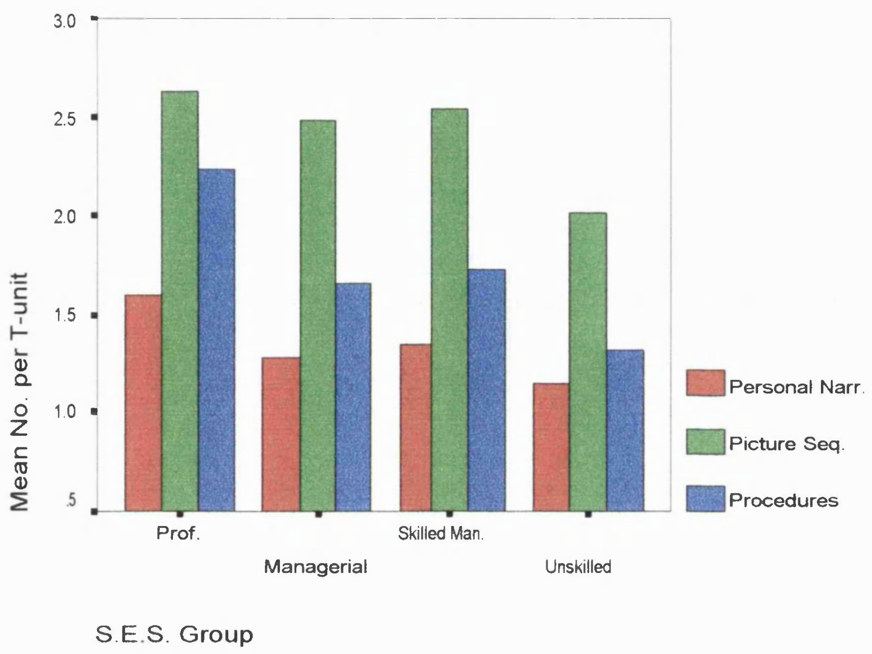
Graph A9.10: Effect of SES on left-branching clauses of tasks



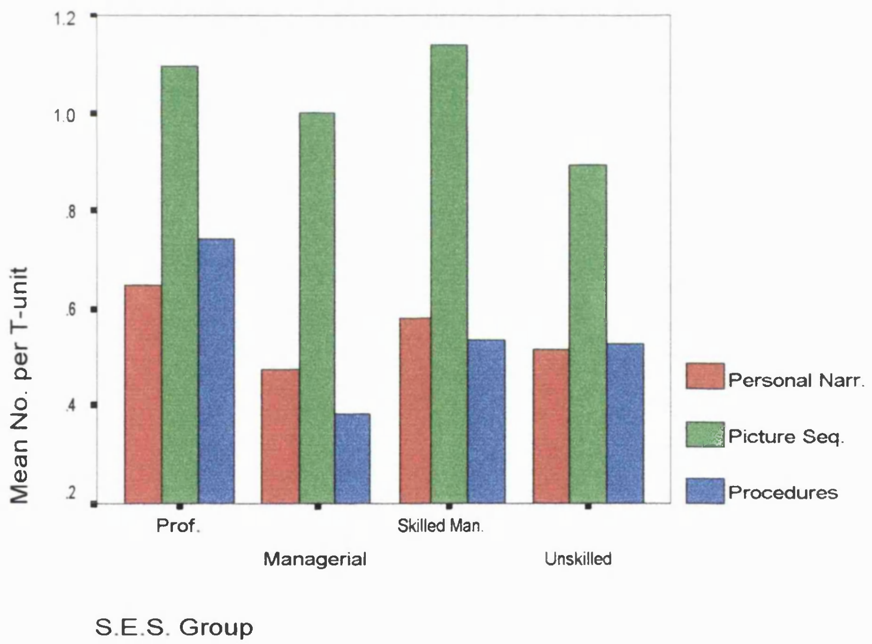
Graph A9.11: Effect of SES on right-branching clauses of tasks



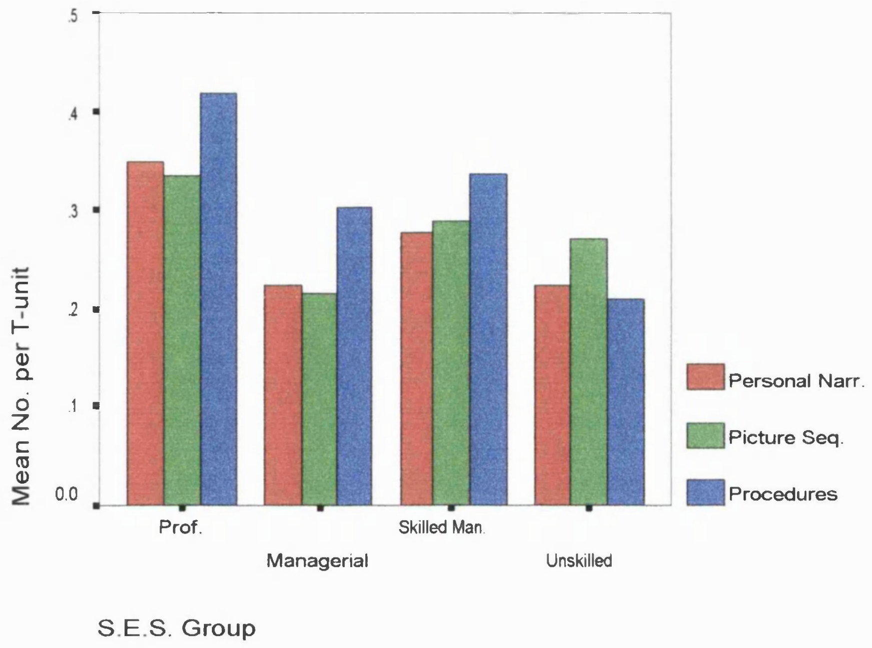
Graph A9.12: The effect of SES on discourse grammar of discourse tasks



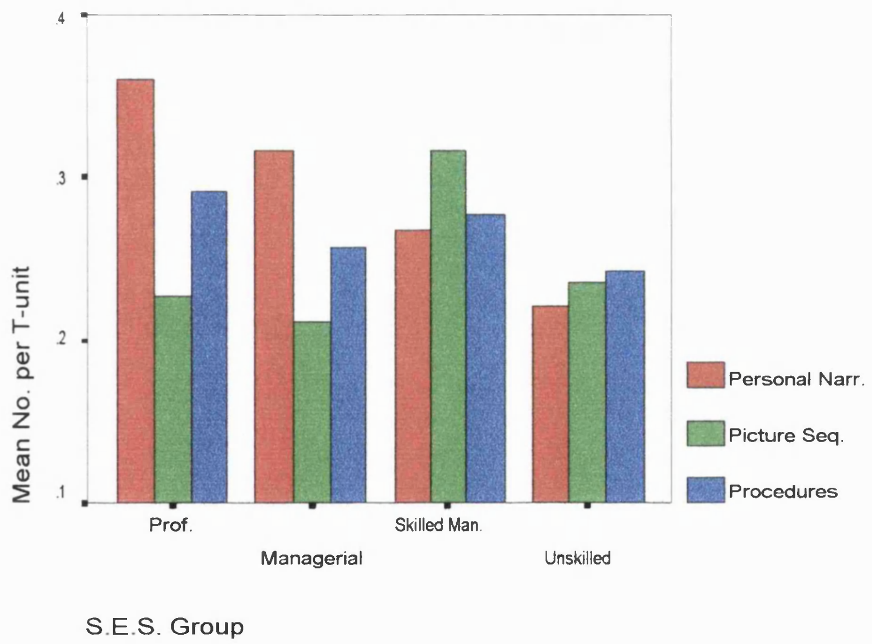
Graph A9.13: The effect of SES on total cohesion of discourse tasks



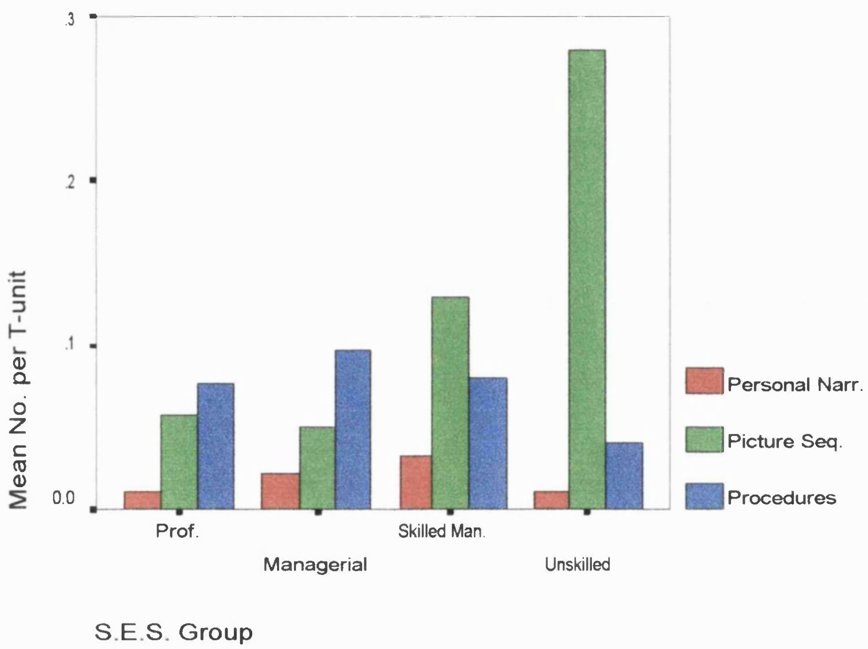
Graph A9.14: The effect of SES on reference of discourse tasks



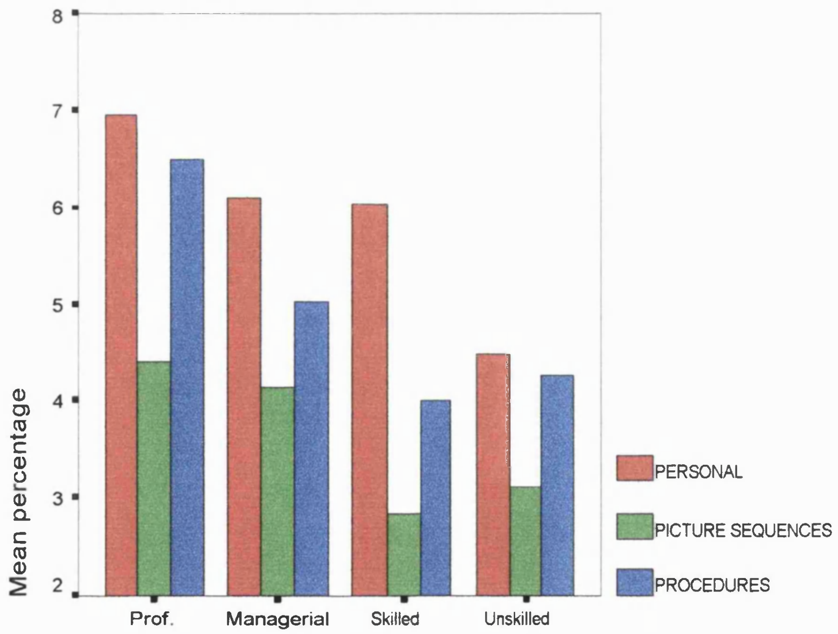
Graph A9.15: The effect of SES on conjunctions of discourse tasks



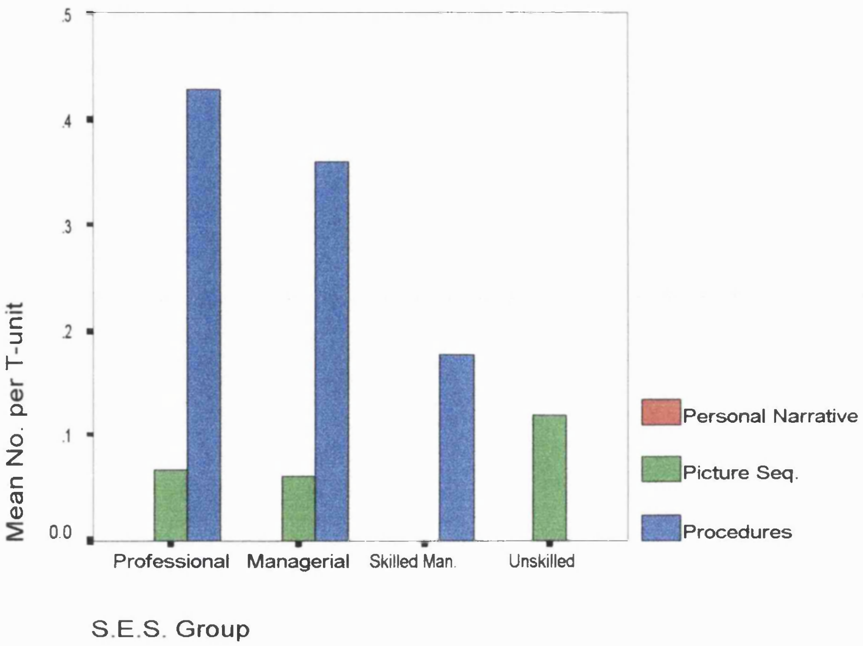
Graph A9.16: The effect of SES on "and" of discourse tasks



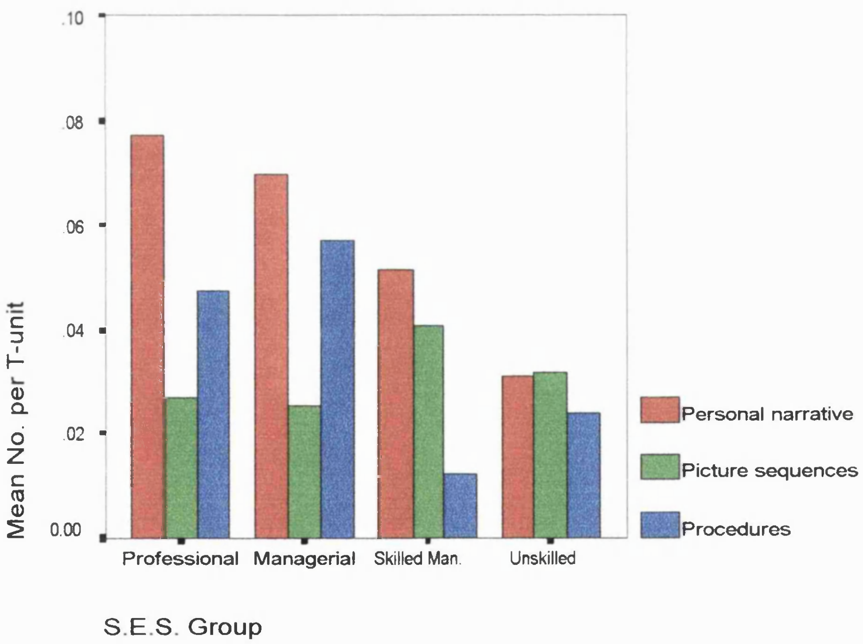
Graph A9.17: The effect of SES on attempted cohesion of discourse tasks



Graph A9.18: SES effect on dysfluencies of three tasks

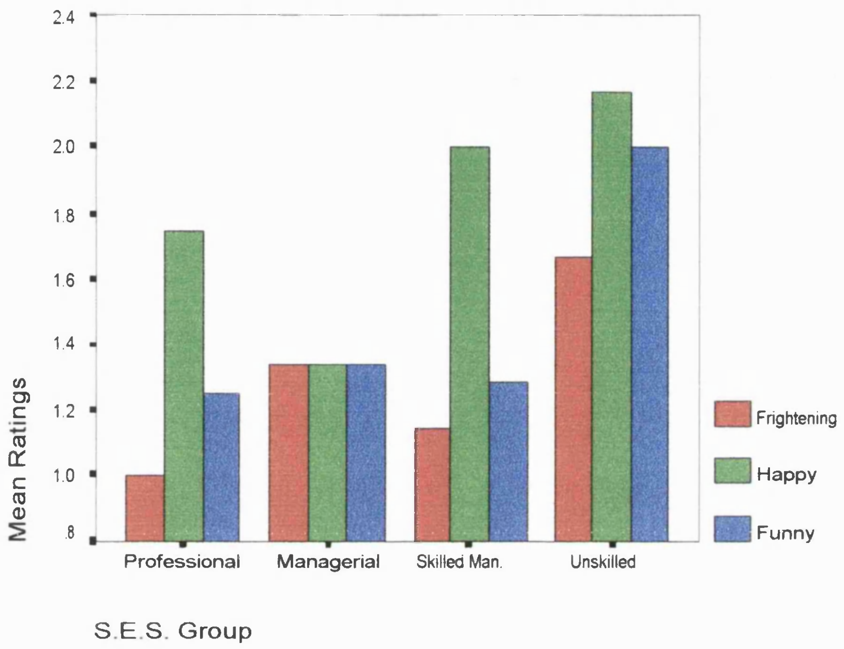


Graph A9.19: SES effects on word substitutions in three tasks

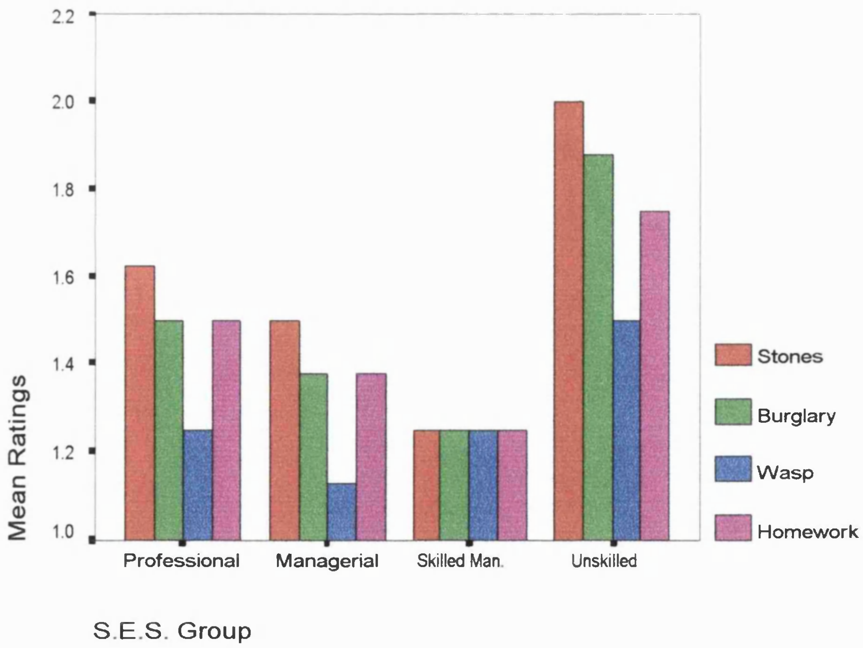


Graph A9.20: SES effect on ellipsis in three tasks

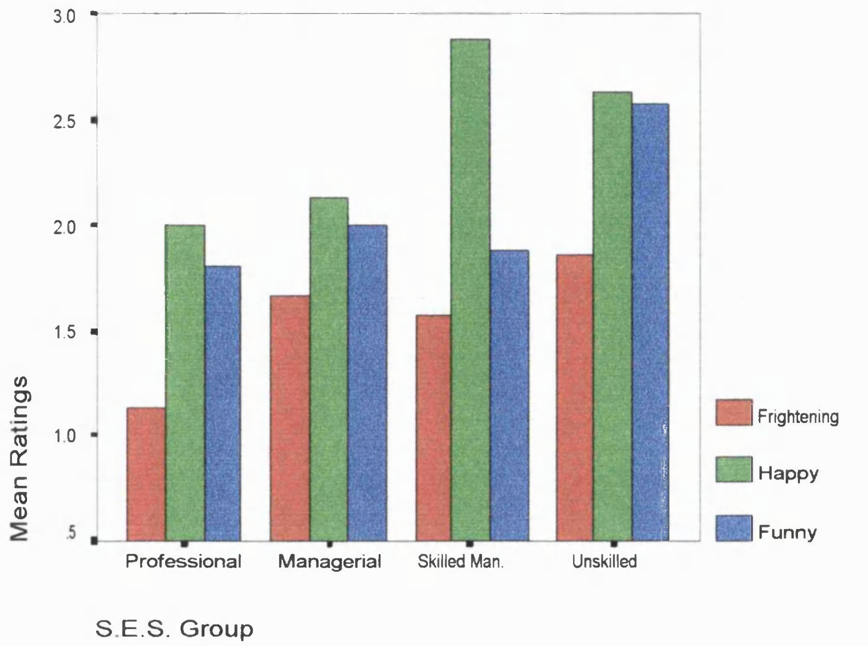
Appendix A10
SES Effect on Discourse Topics



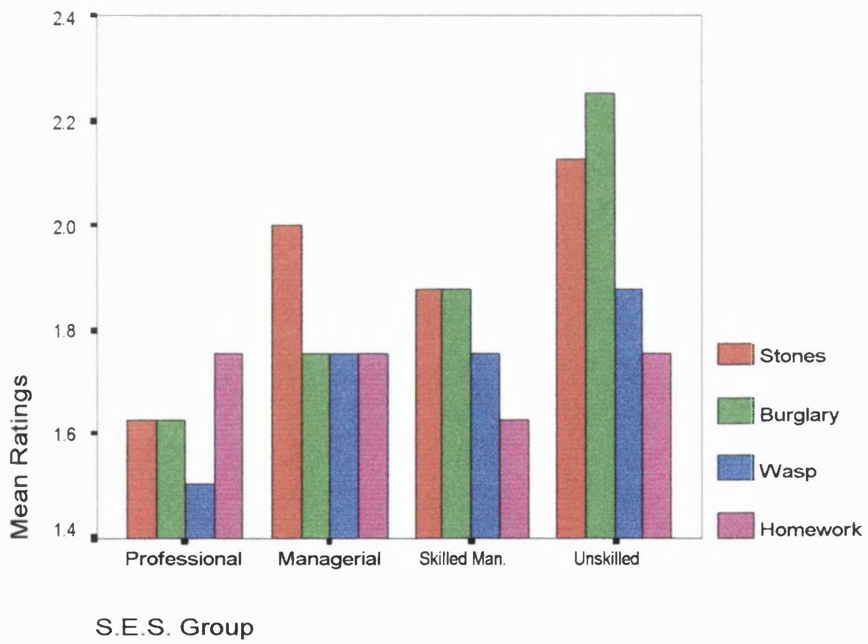
Graph A10.1: SES effect on relevance in personal narrative topics



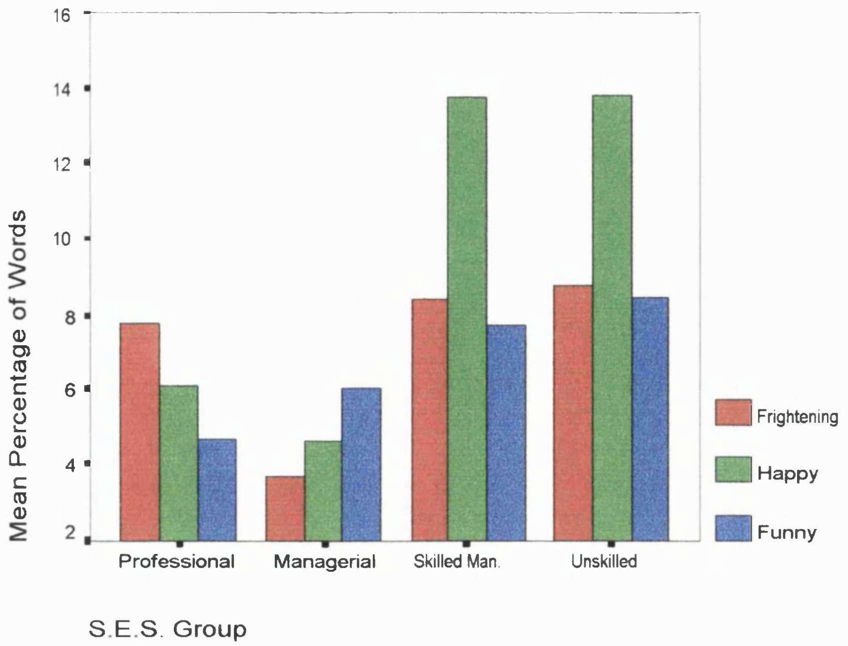
Graph A10.2: SES effect on relevance of picture sequence topics



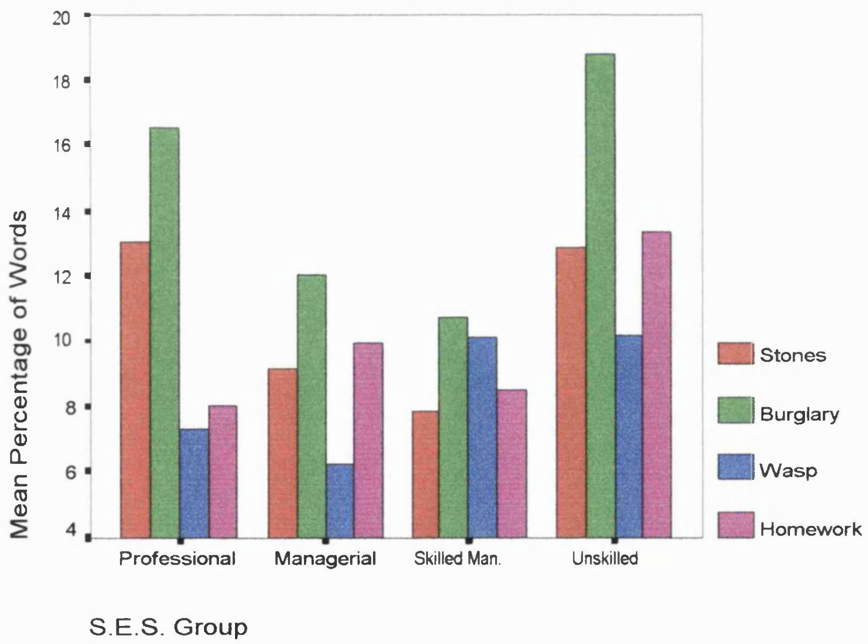
Graph A10.3: SES effect on discourse grammar of personal narrative topics



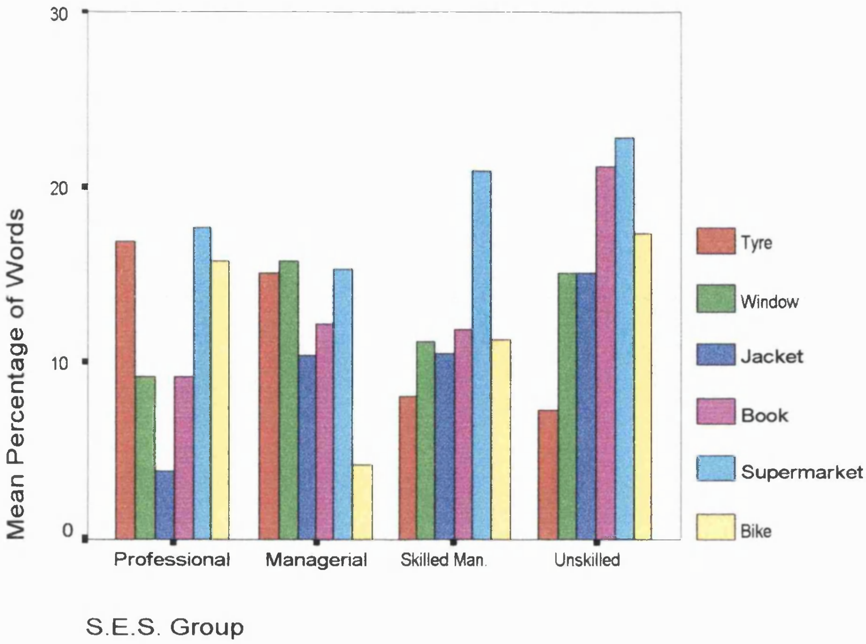
Graph A10.4: SES effect on discourse grammar of picture sequence topics



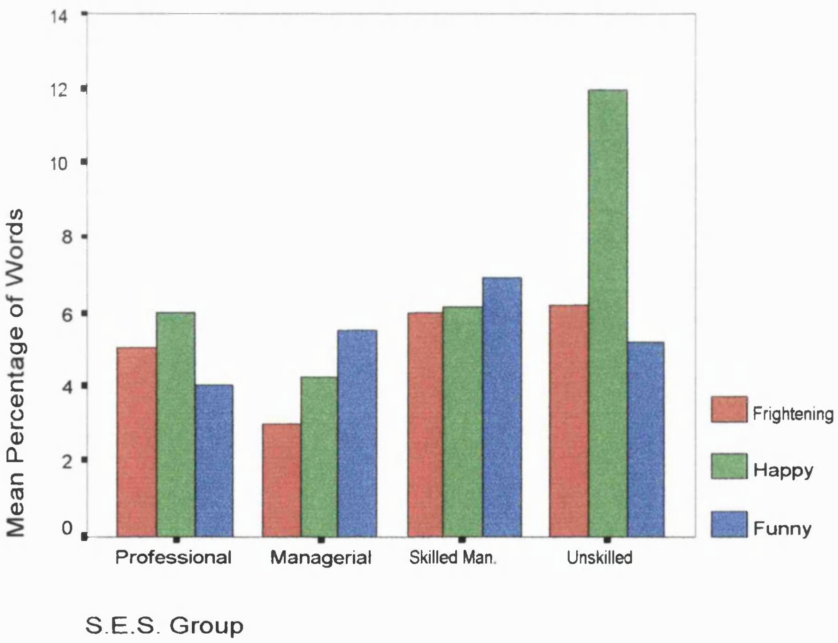
Graph A10.5: SES effect on total clarity disruptors in personal narrative topics



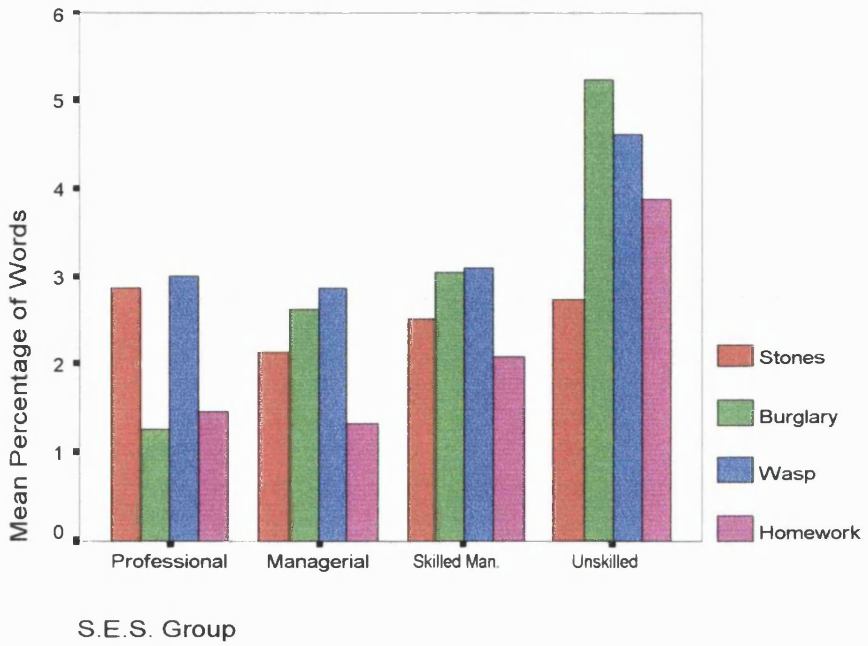
Graph A10.6: SES effect on total clarity disruptors in picture sequence topics



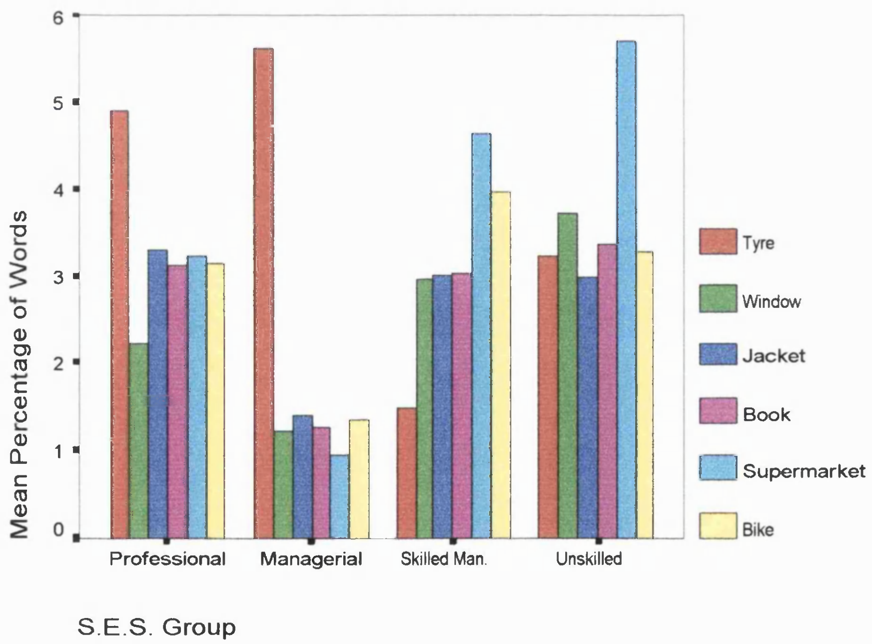
Graph A10.7: SES effect on total clarity disruptors in procedural topics



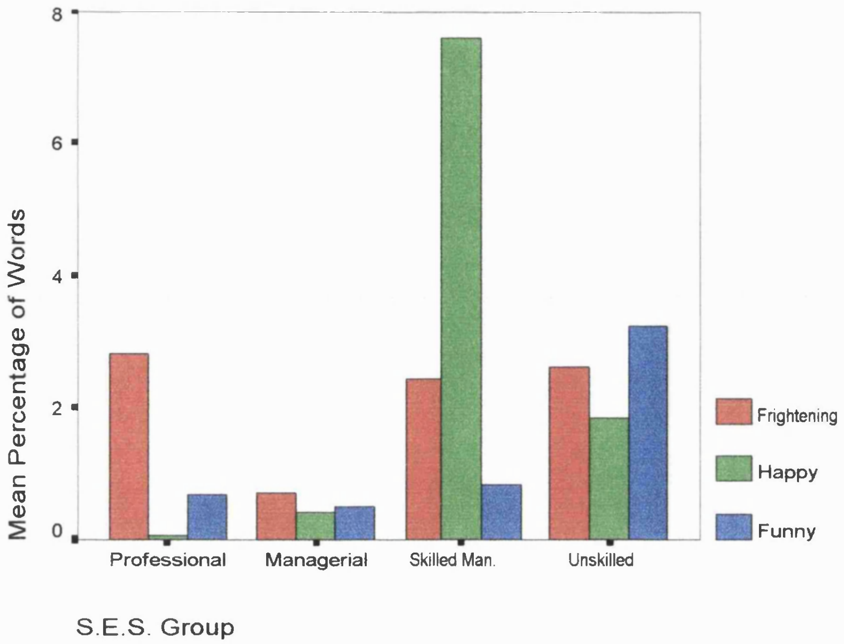
Graph A10.8: SES effect on non-specific elements of personal narrative topics



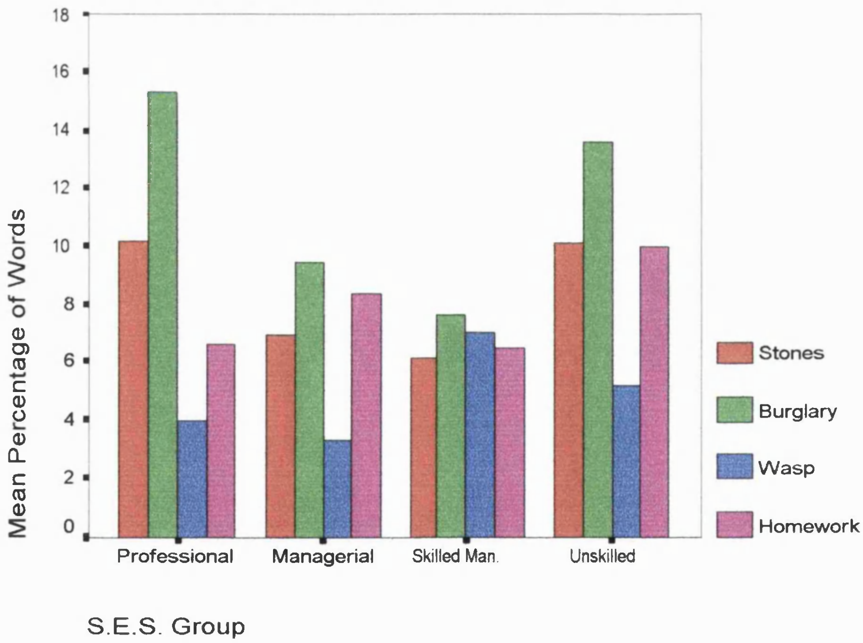
Graph A10.9: SES effect on non-specific elements in picture sequence topics



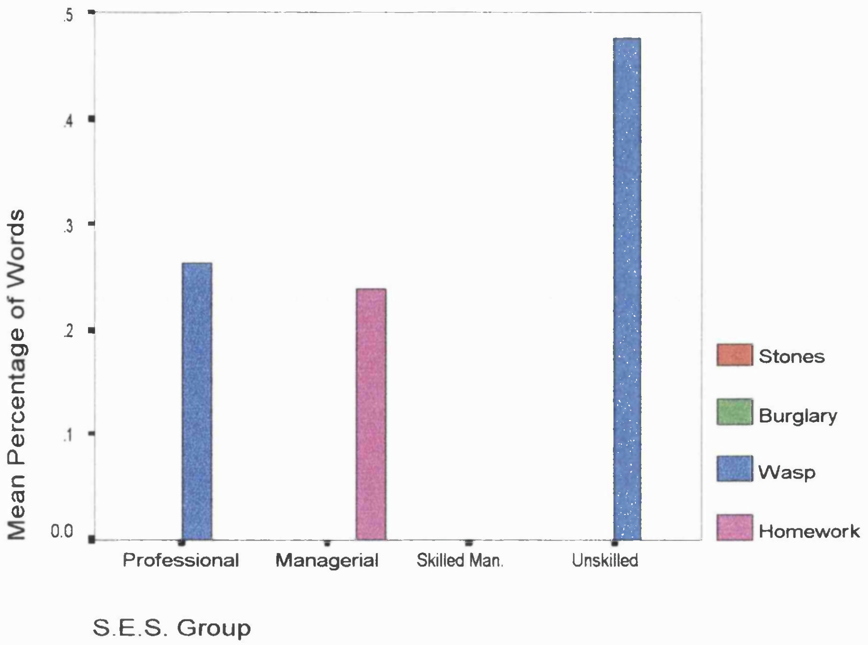
Graph A10.10: SES effect on non-specific elements on procedural topics



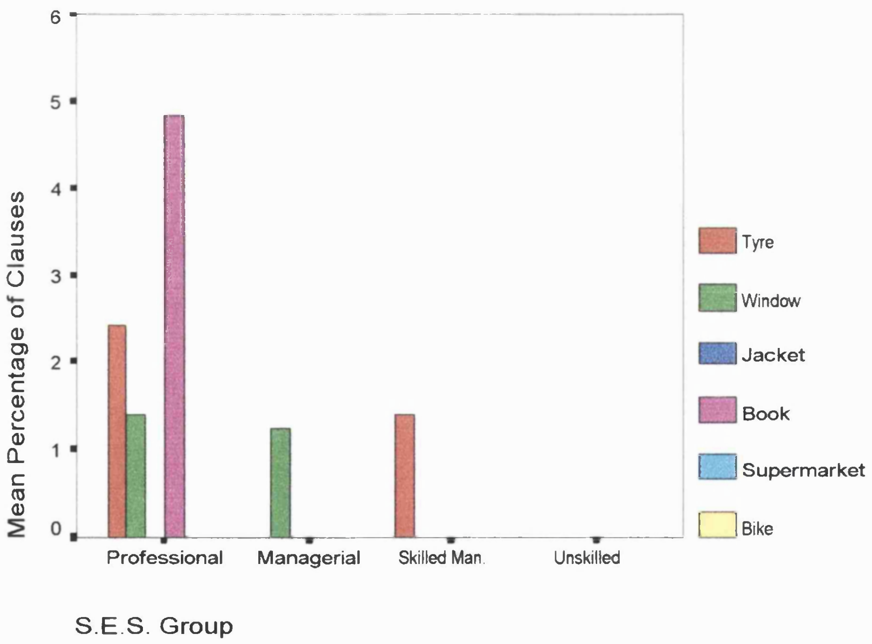
Graph A10.11: SES effect on content and fluency disruptors in personal narrative topics



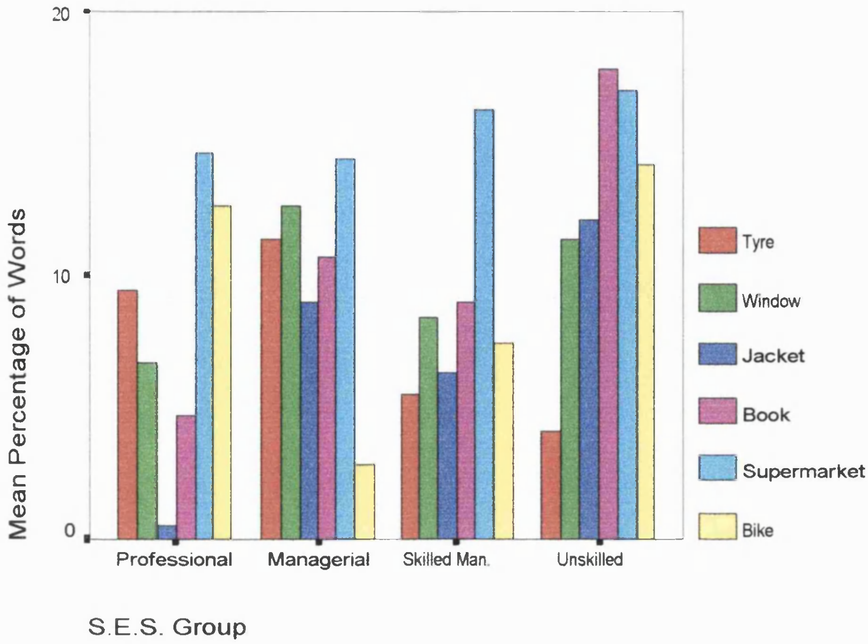
Graph A10.12: SES effect on content and fluency disruptors in picture sequence topics



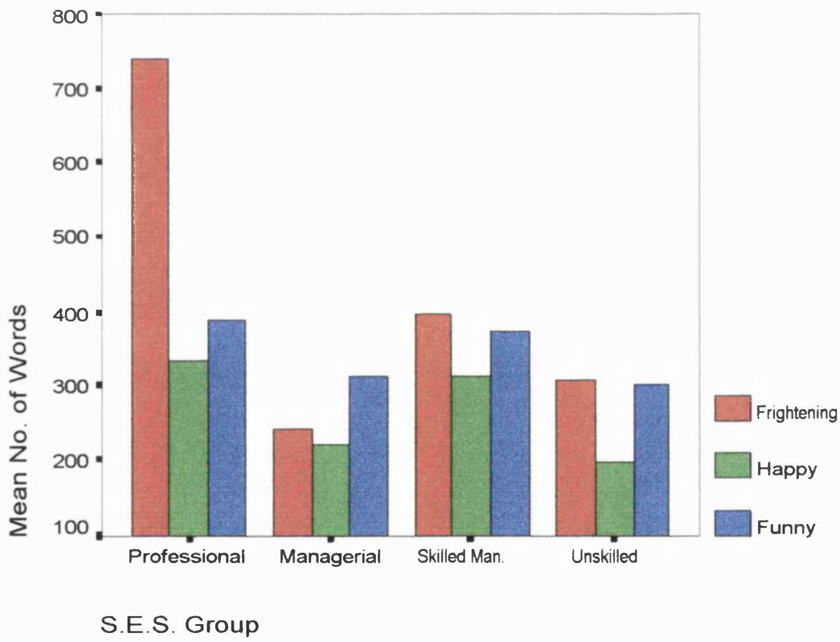
Graph A10.13: SES effect on word substitutions in picture sequence topics



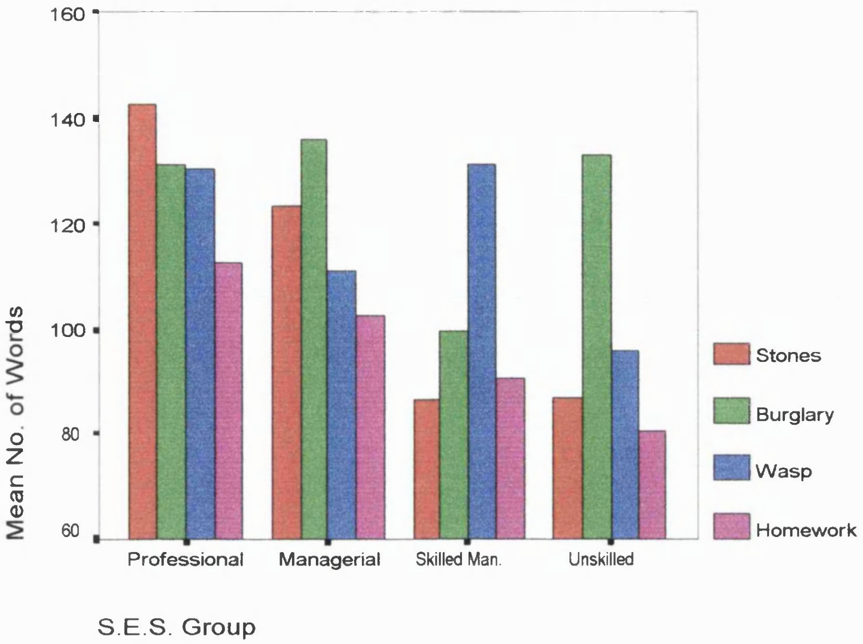
Graph A10.14: SES effect on word substitutions in procedural topics



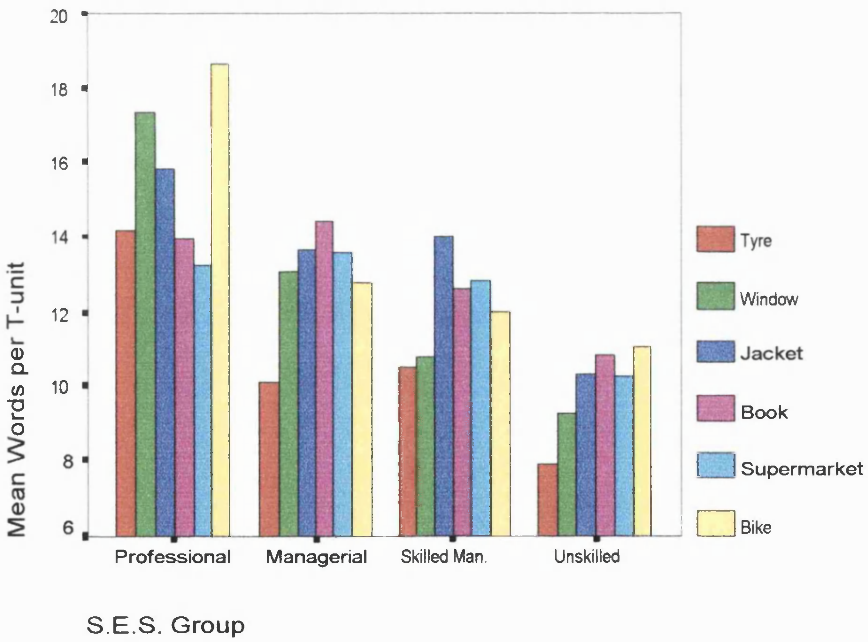
Graph A10.15: SES effect on content and fluency disruptors in procedural topics



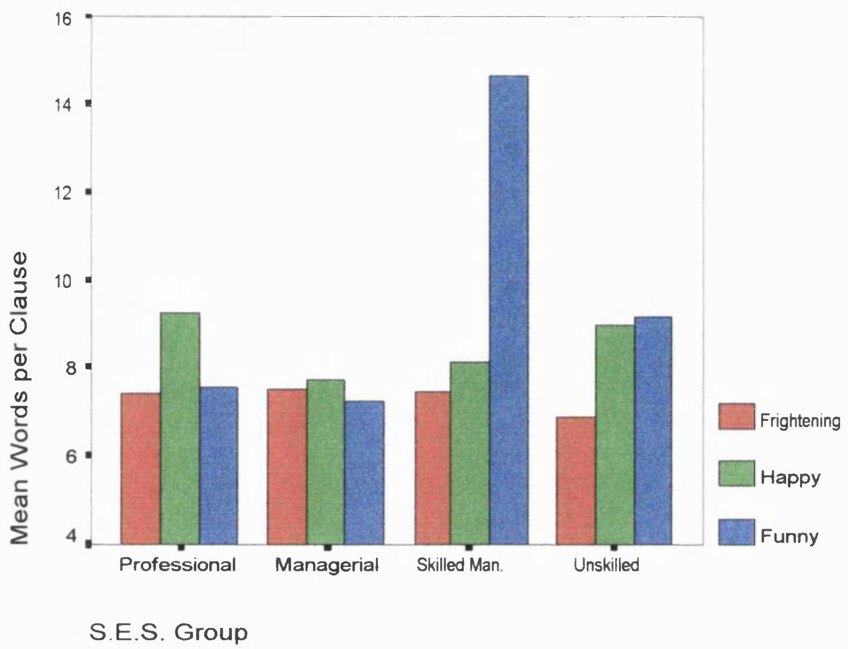
Graph A10.16: SES effect on sample length of personal narrative topics



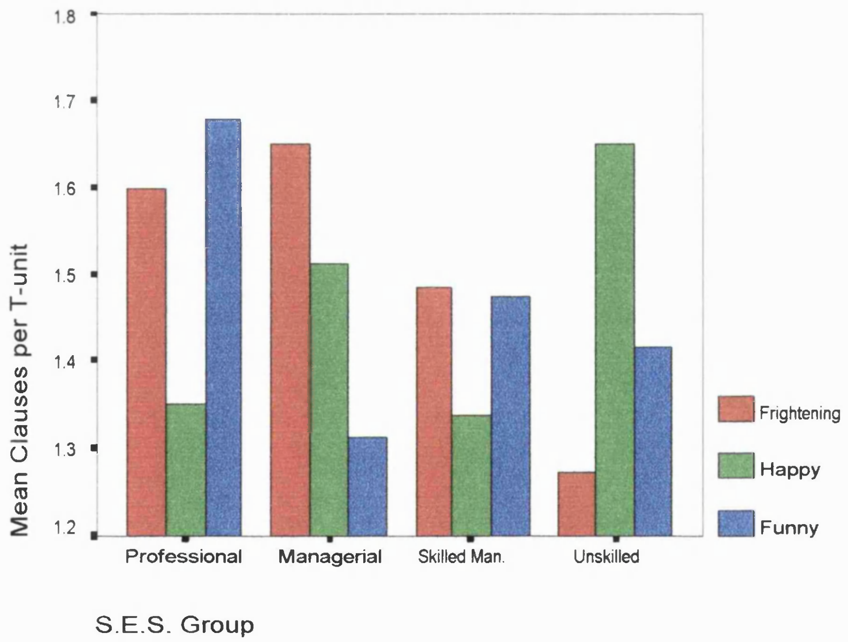
Graph A10.17: SES effect on sample length of picture sequence topics



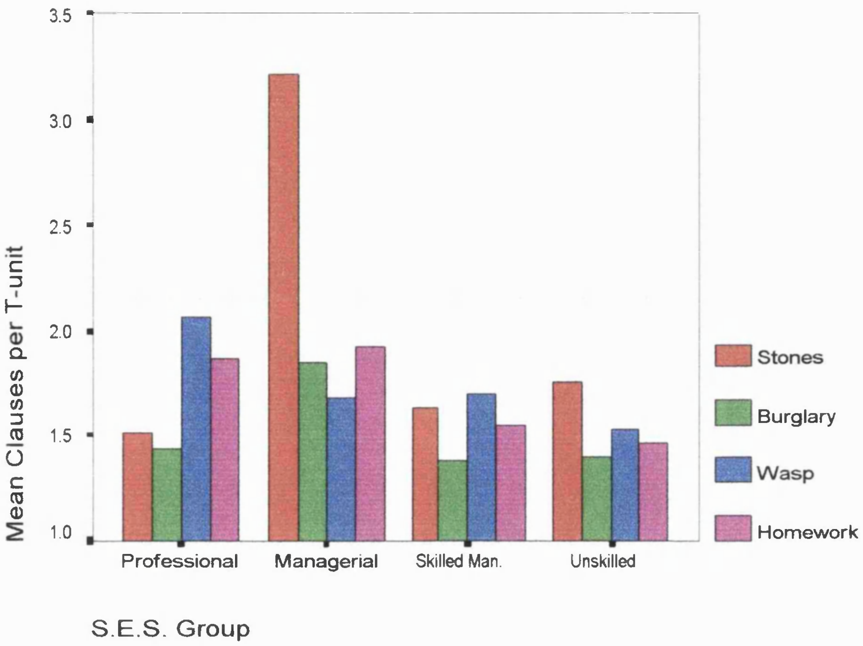
Graph A10.18: SES effect on T-unit length of procedural topics



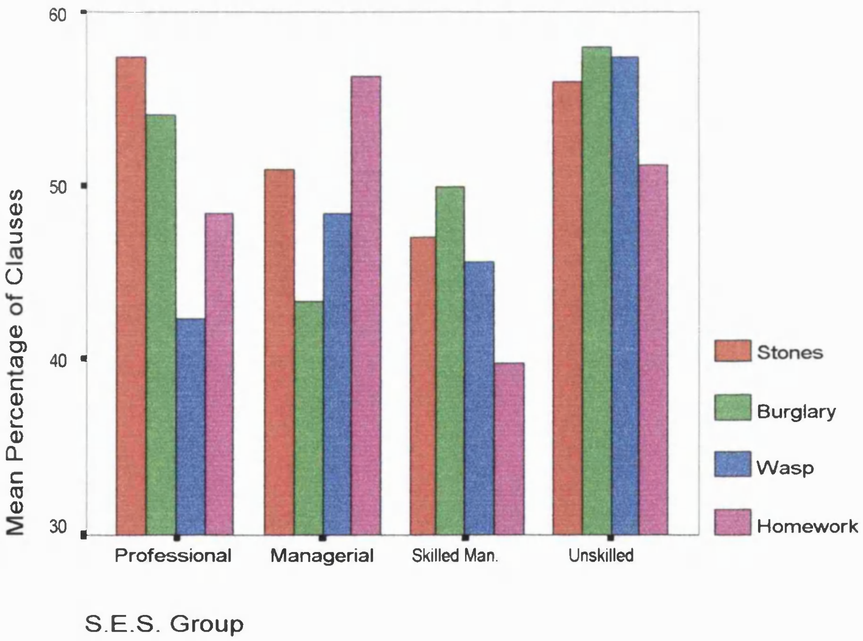
Graph A10.19: SES effect on clause length of personal narrative topics



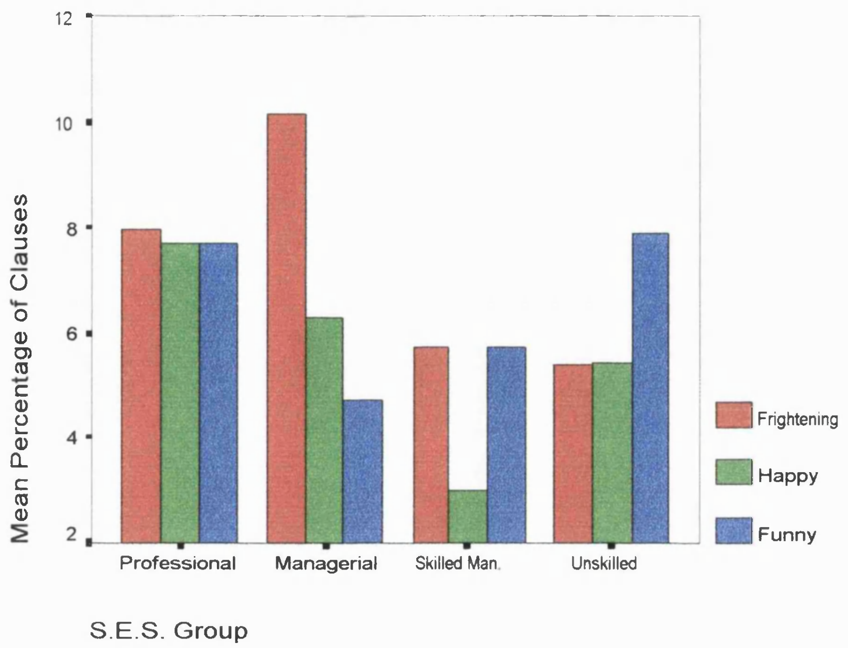
Graph A10.20: SES effect on clausal embedding in personal narrative topics



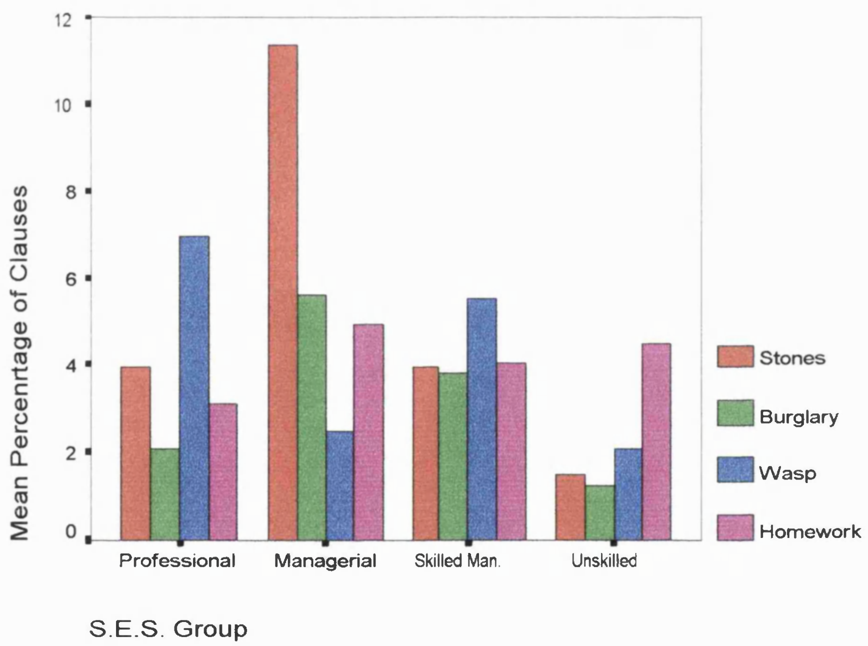
Graph A10.21: SES effect on clausal embedding of picture sequence topics



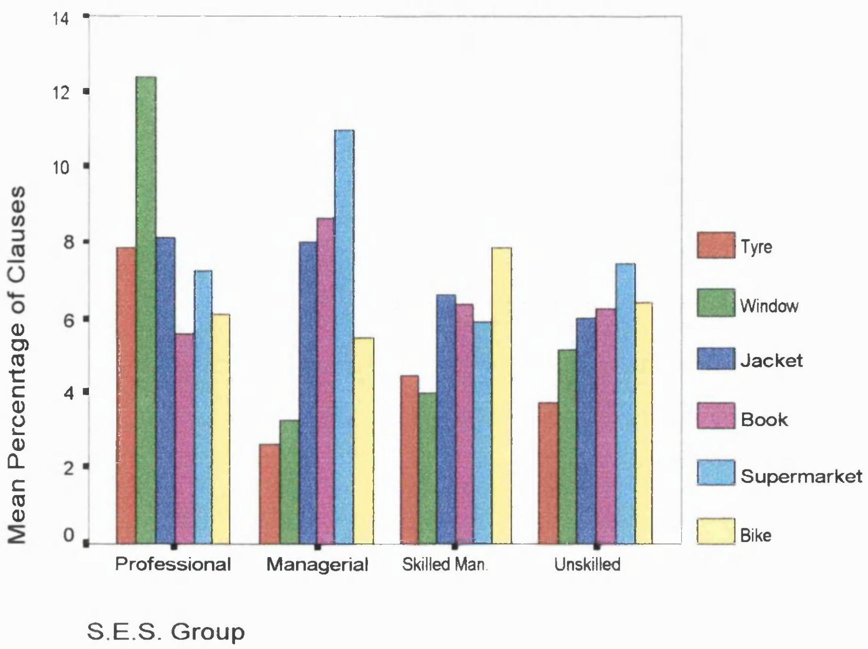
Graph A10.22: SES effect on main clauses in picture sequence topics



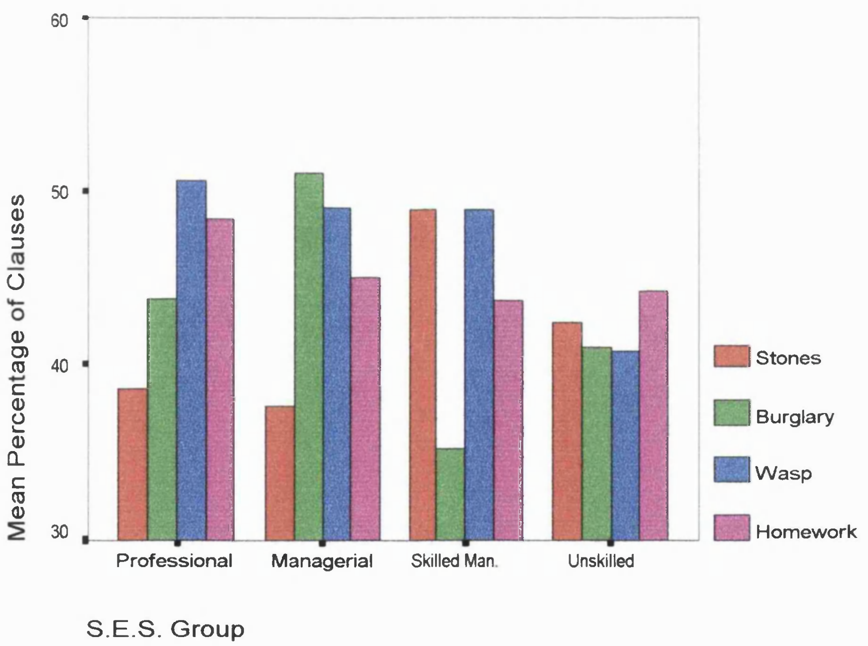
Graph A10.23: SES effect on left-branching clauses in personal topics



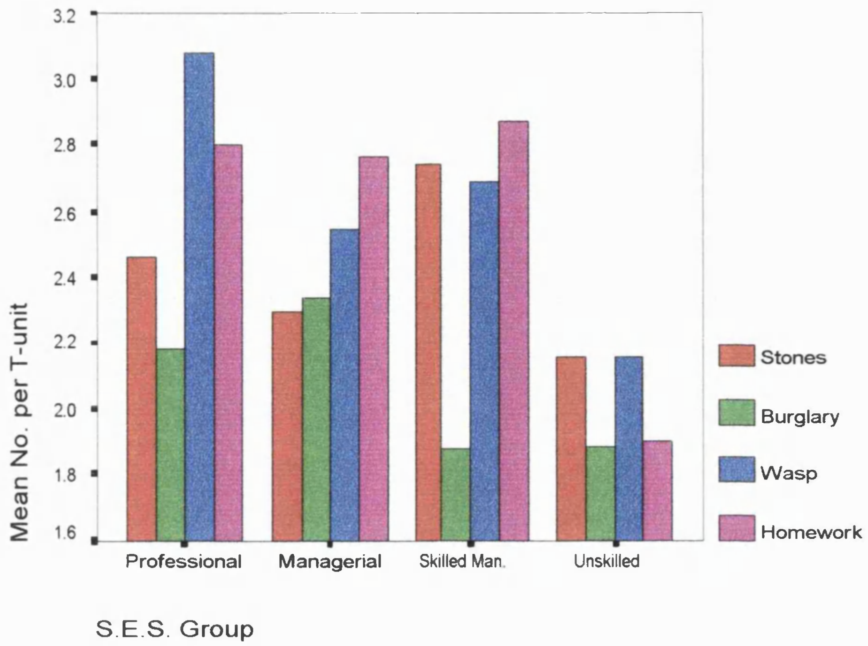
Graph A10.24: SES effect on left-branching clauses of picture sequence topics



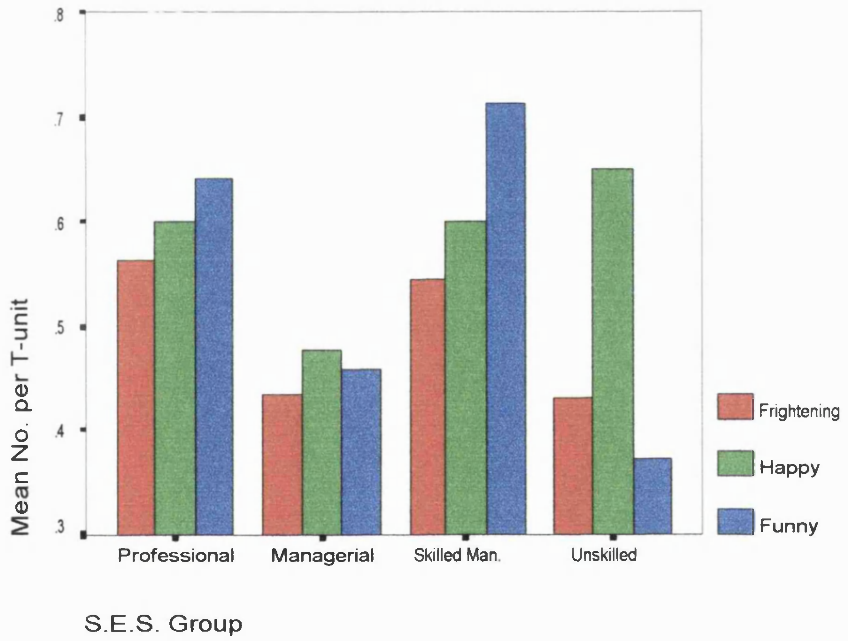
Graph A10.25: SES effect on left-branching clauses of procedural topics



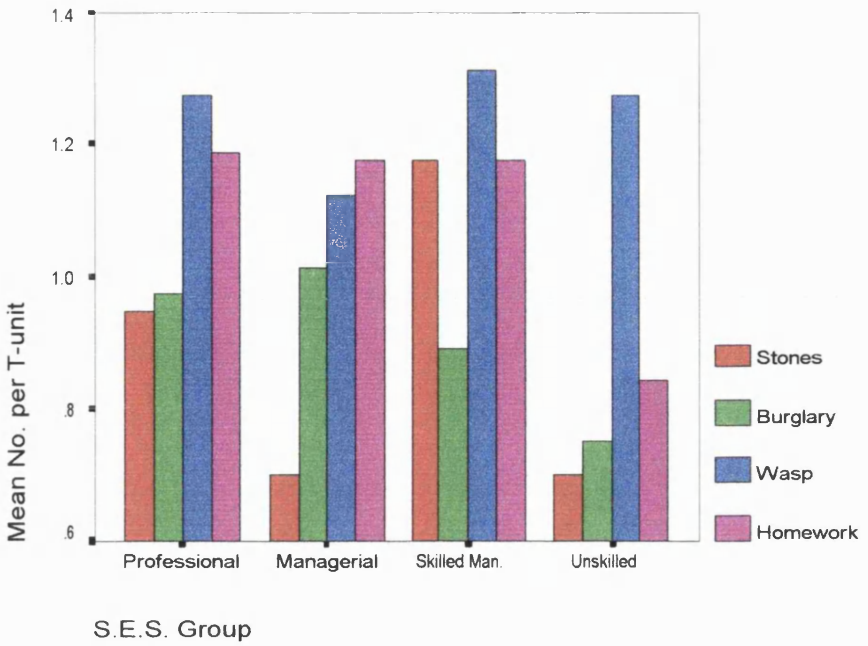
Graph A10.26: SES effect on right-branching clauses in picture sequence topics



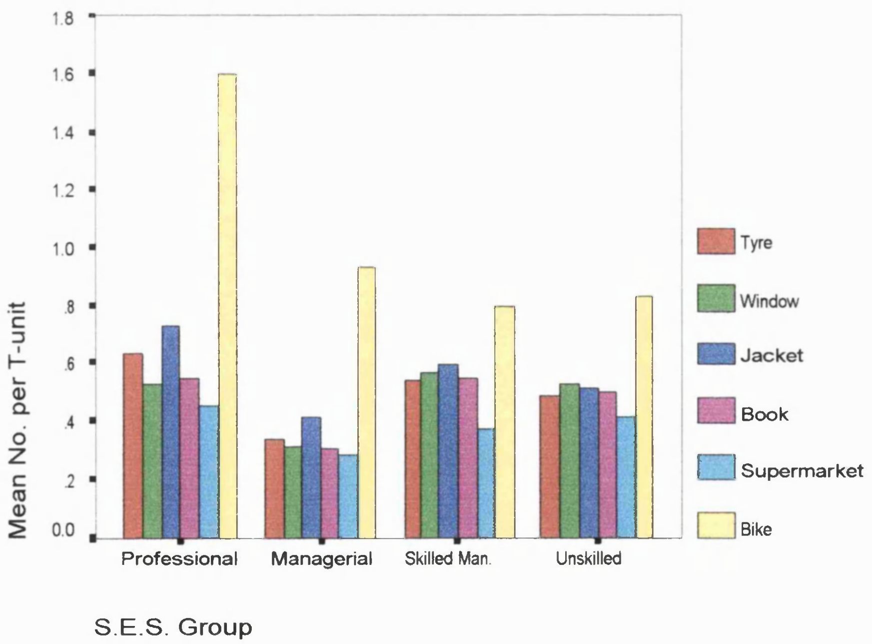
Graph A10.27: SES effect on total cohesion in picture sequence topics



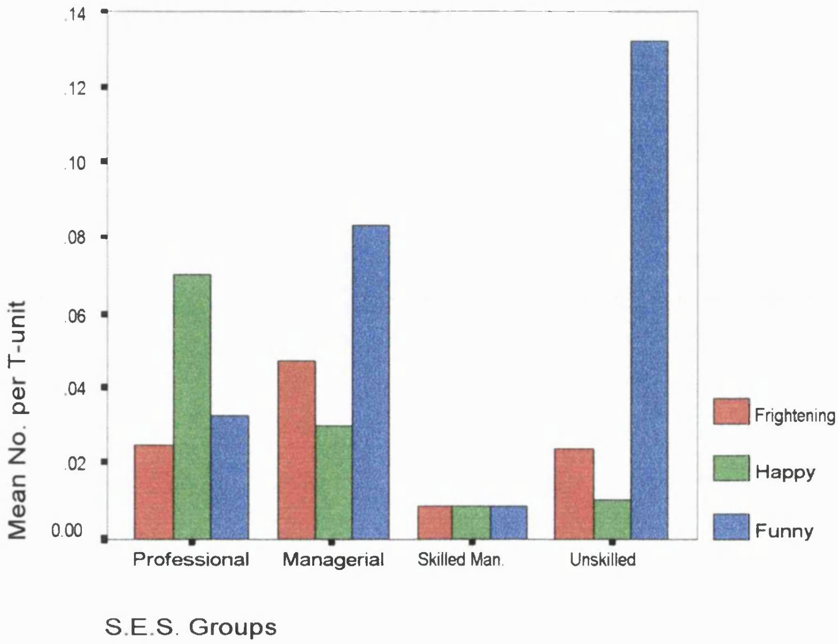
Graph A10.28: SES effect on reference in personal narrative topics



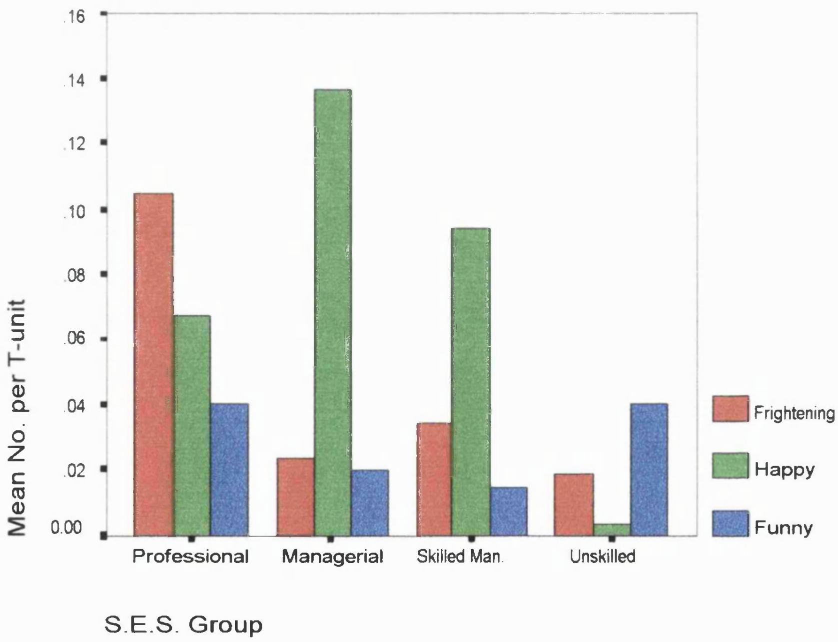
Graph A10.29: SES effect on reference in picture sequence topics



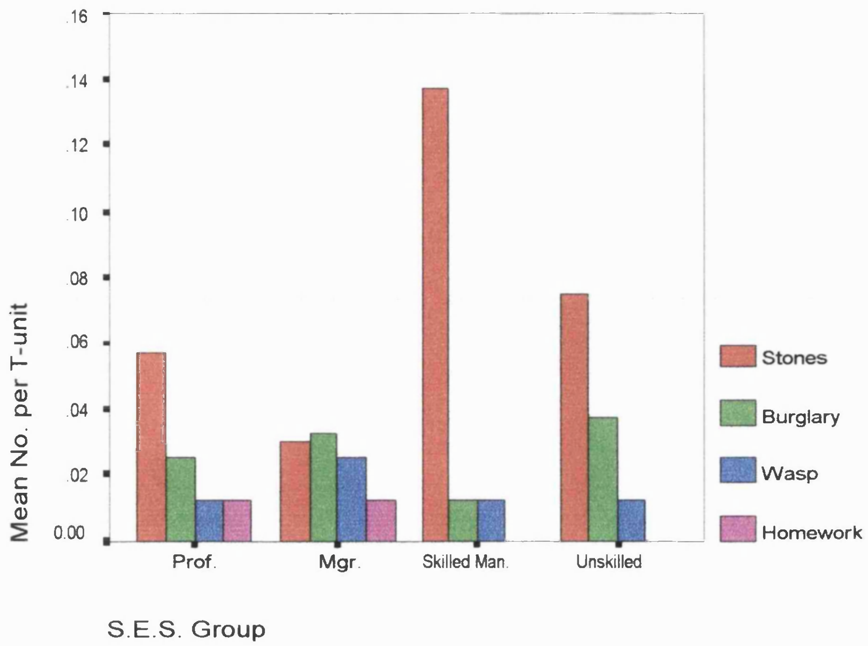
Graph A10.30: SES effect on reference in procedural topics



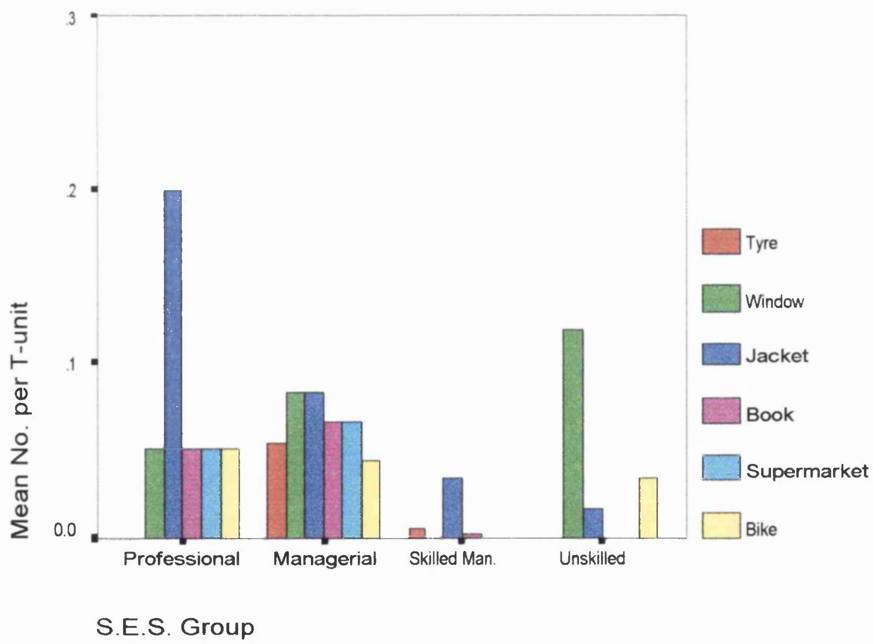
Graph A10.31: SES effect on substitution cohesion in personal topics



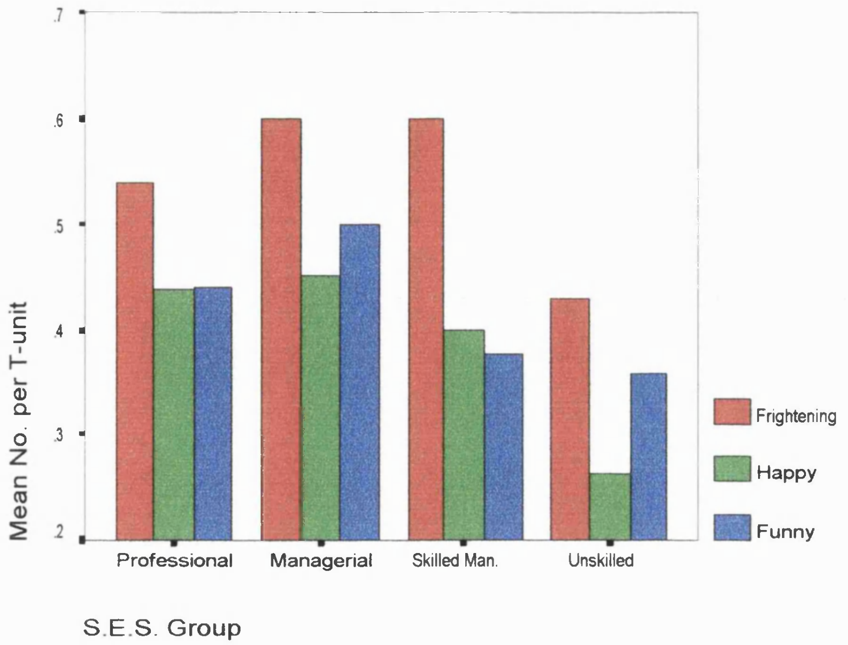
Graph A10.32: SES effect on ellipsis in personal narrative topics



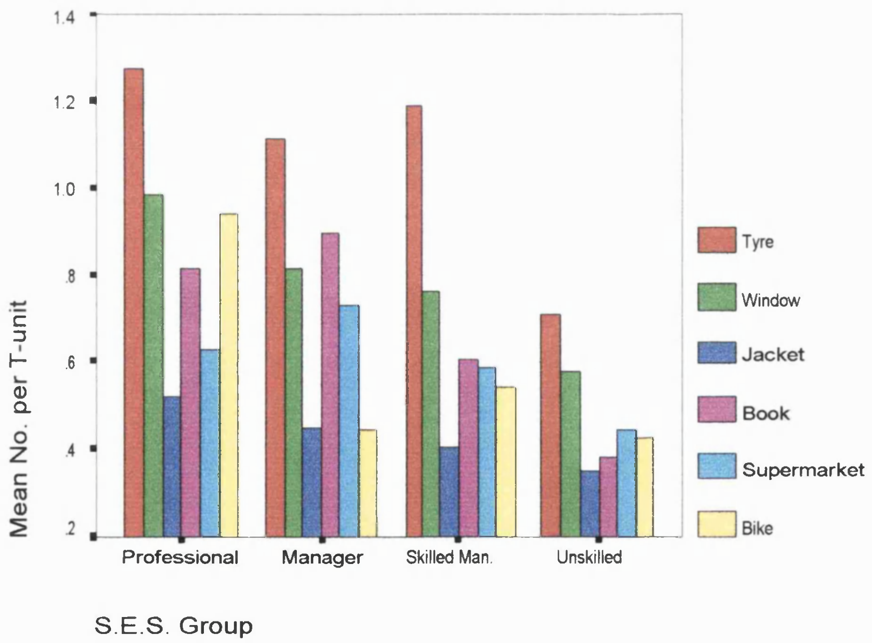
Graph A10.33: SES effect on ellipsis in picture sequence topics



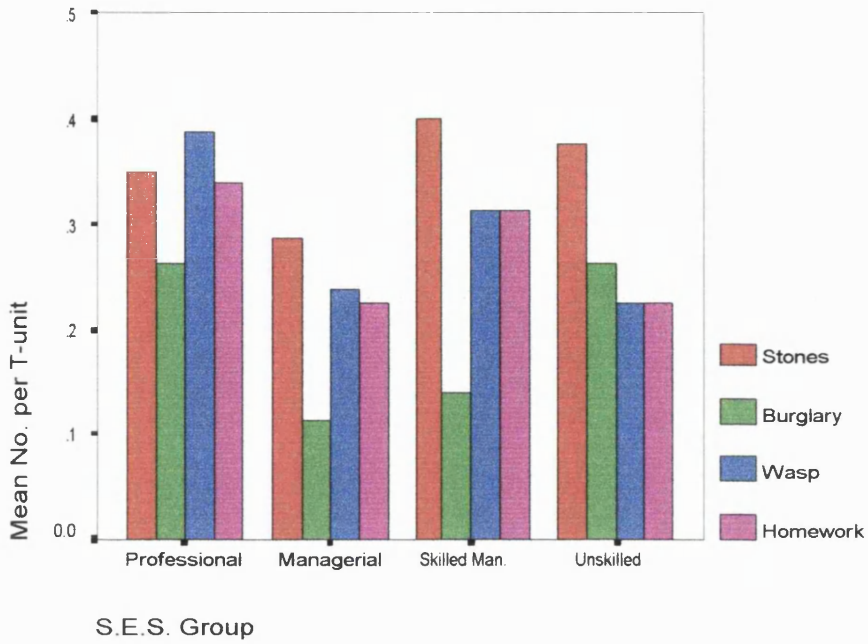
Graph A10.34: SES effect on ellipsis in procedural topics



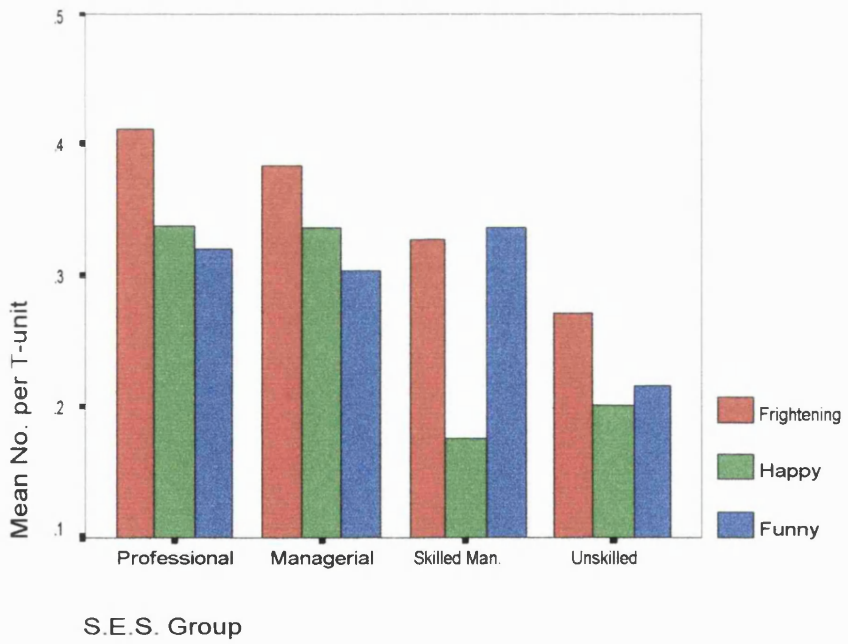
Graph A10.35: SES effect on lexicalisation of personal narrative topics



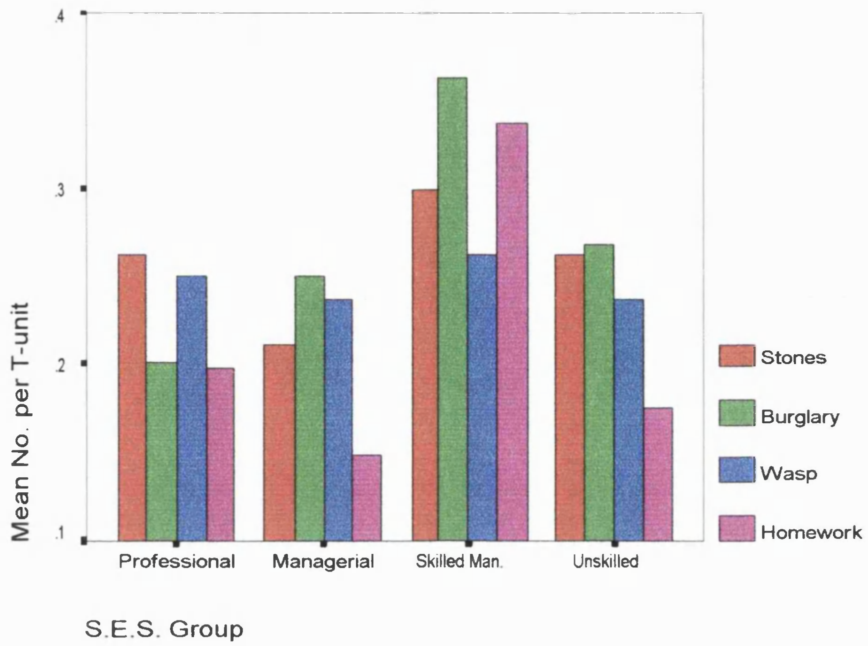
Graph A10.36: SES effect on lexicalisation of procedural topics



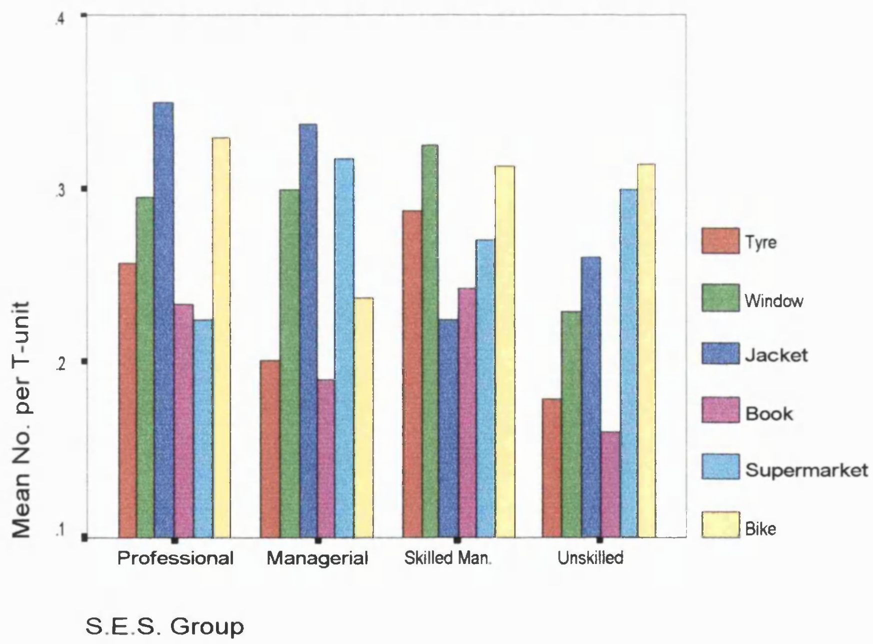
Graph A10.37: SES effect on conjunctions of picture sequence topics



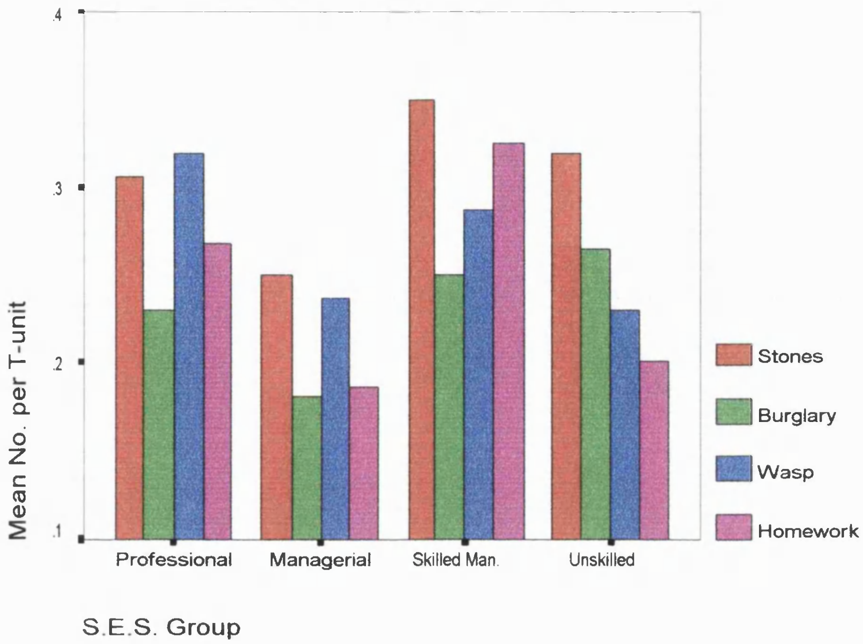
Graph A10.38: SES effect on "and" in personal narrative topics



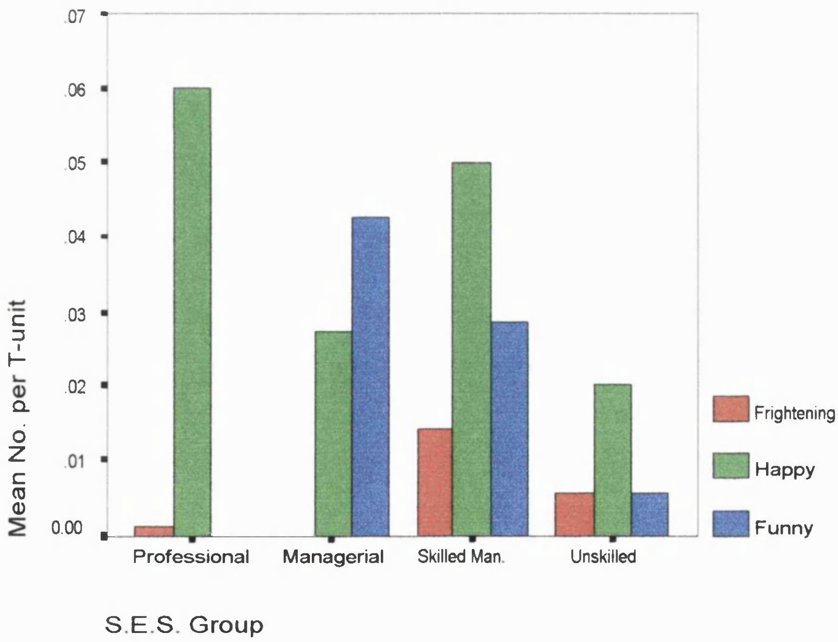
Graph A10.39: SES effect on "and" in picture sequence topics



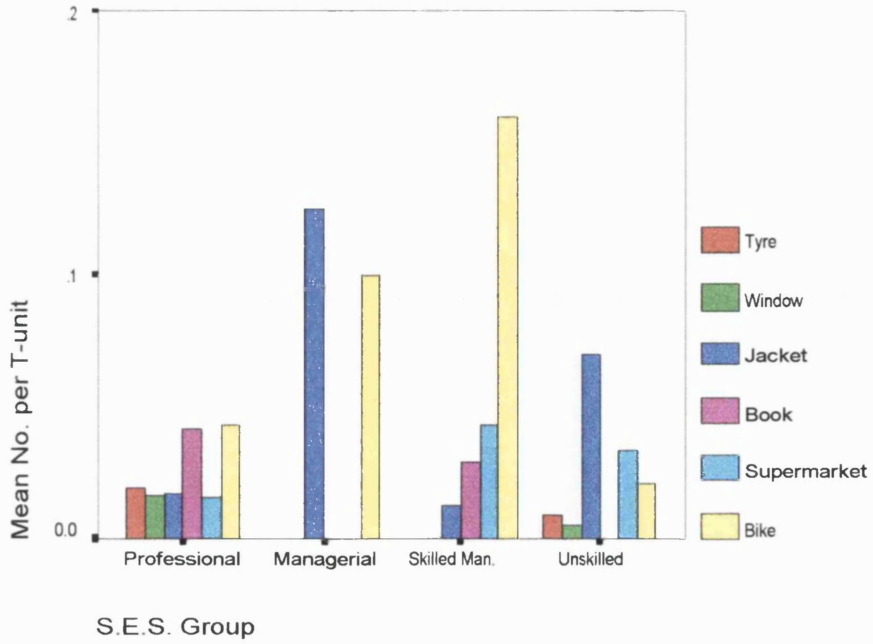
Graph A10.40: SES effect on "and" in procedural topics



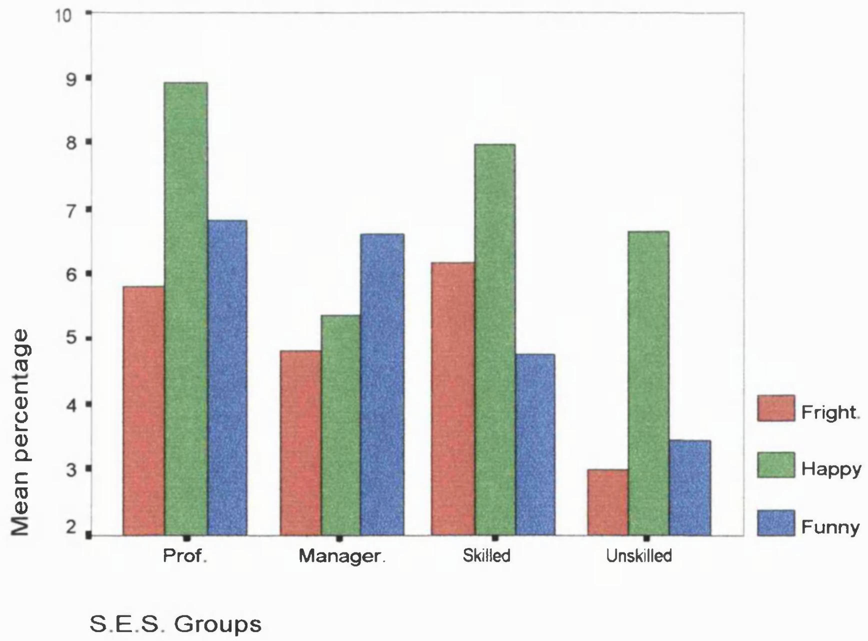
Graph A10.41: SES effect on connectives in picture sequence topics



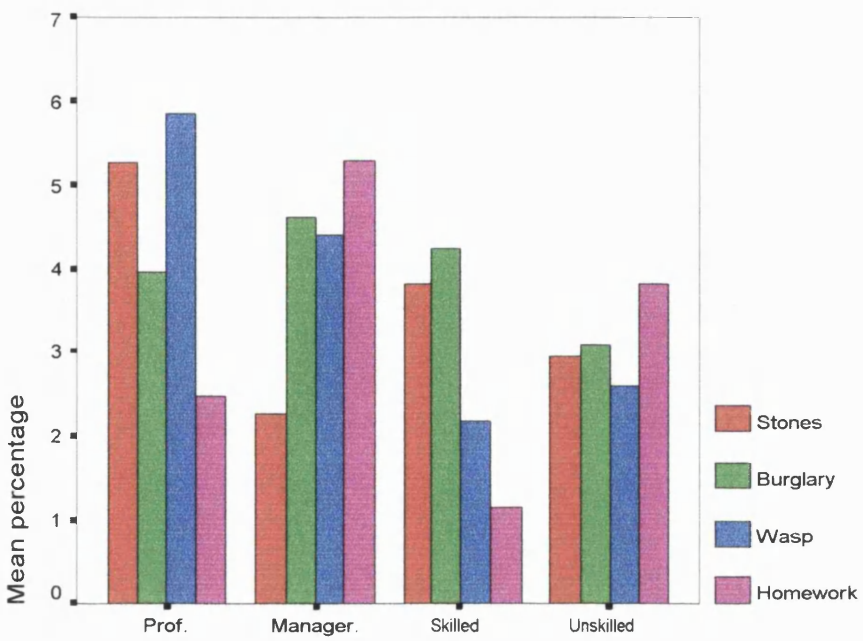
Graph A10.42: SES effect on attempted cohesion in personal narrative topics



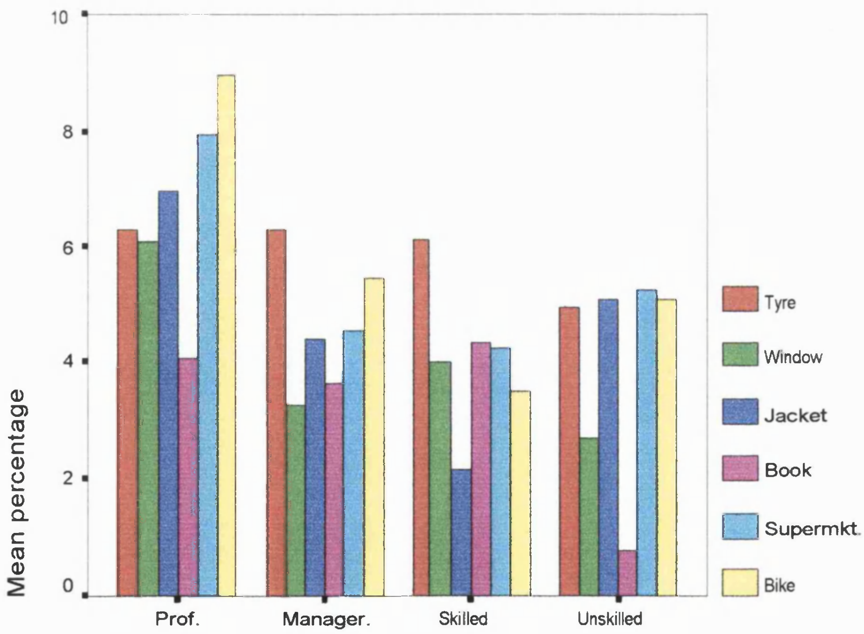
Graph A10.43: SES effect on attempted cohesion in procedural topics



Graph A10.44: SES effect on dysfluencies on personal narrative topics



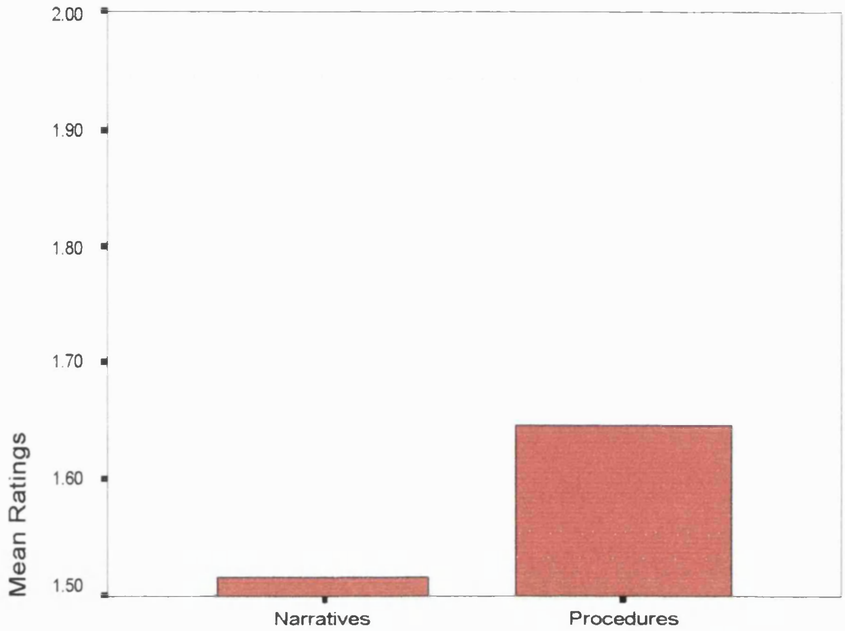
Graph A10.45: SES effect on dysfluencies in picture sequence topics



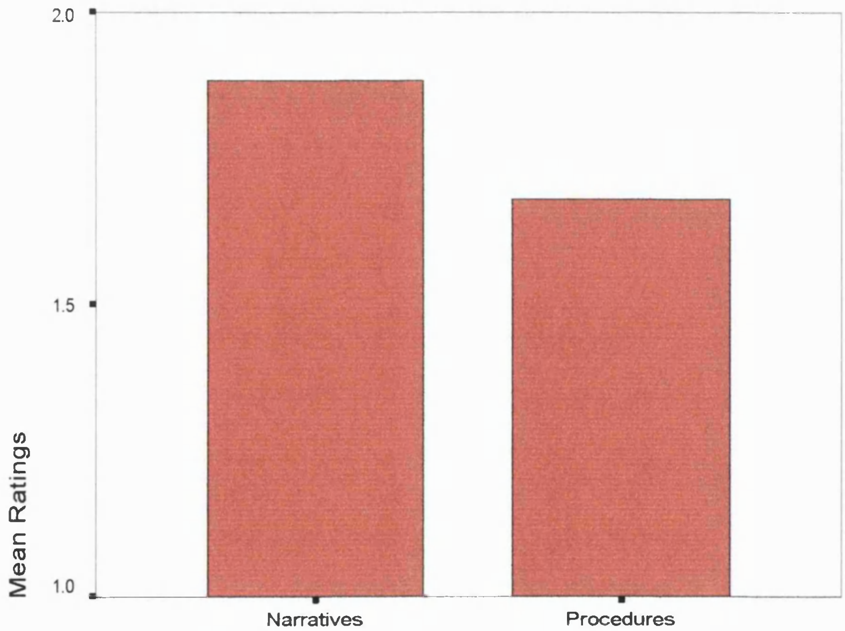
Graph A10.46: SES effect on dysfluencies on procedural topics

Appendix A11

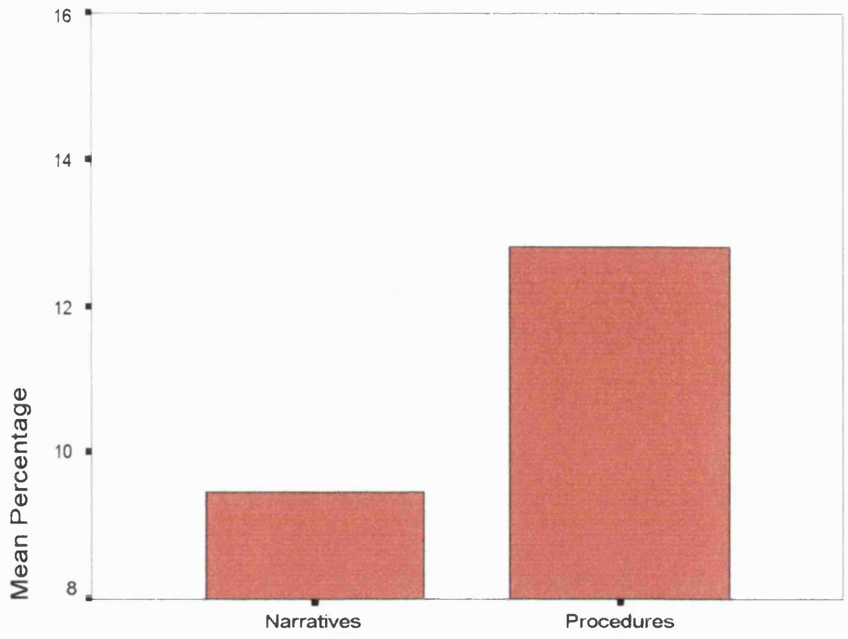
Genre Effects on Combined Samples



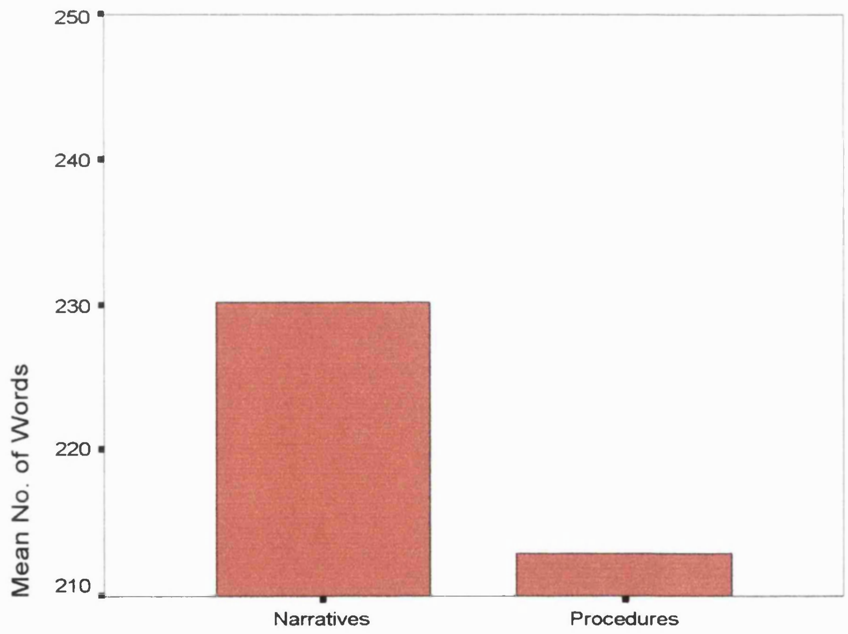
Graph A11.1: The effect of genre on relevance ratings



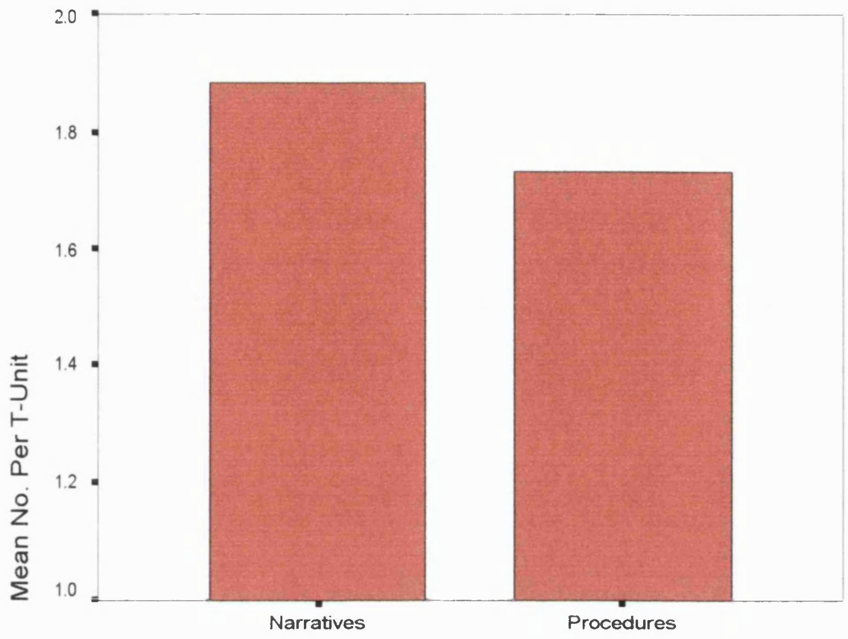
Graph A11.2: The effect of genre on discourse grammar



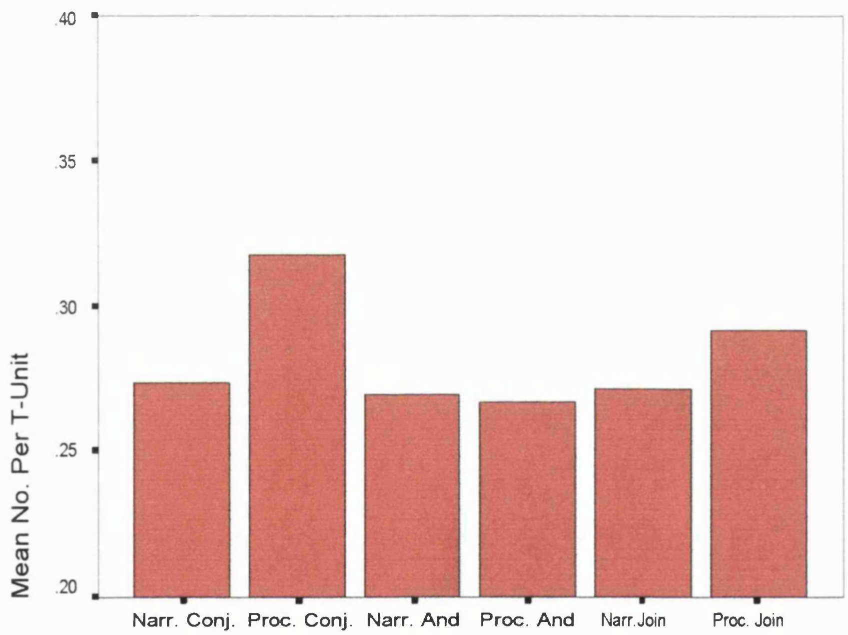
Graph A11.3: The effect of genre on clarity disruptors



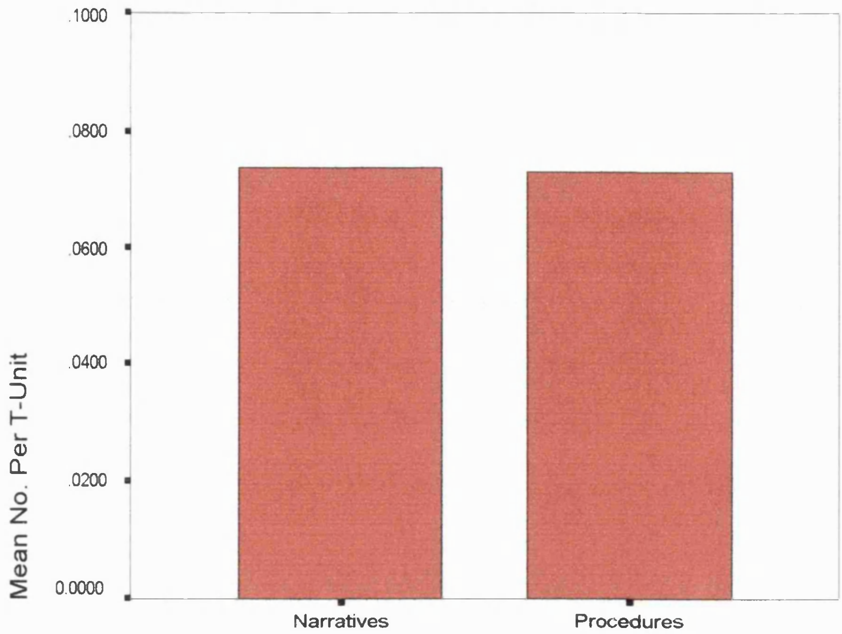
Graph A11.4: The effect of genre on sample length



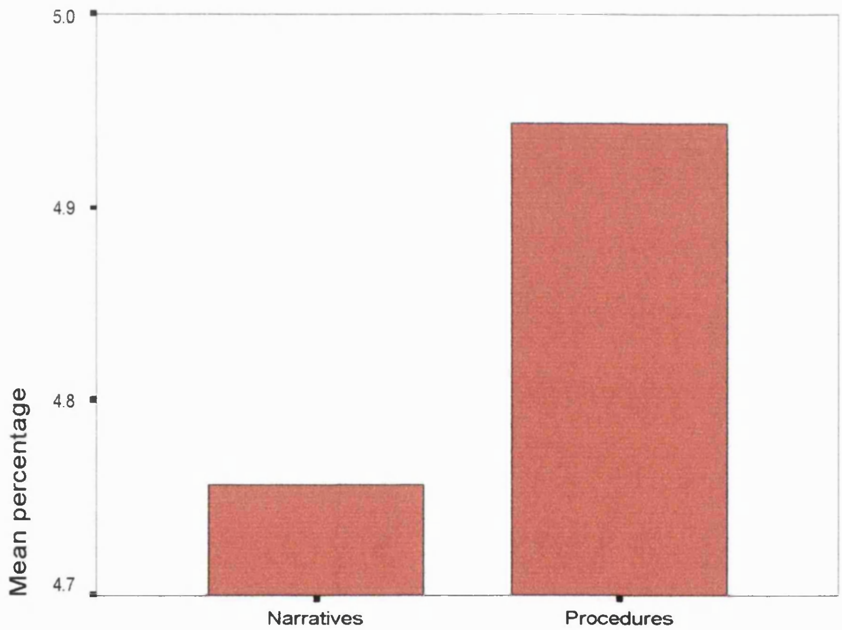
Graph A11.5: The effect of genre on total cohesive ties



Graph A11.6: The effect of genre on conjunctions, "and" and connectives

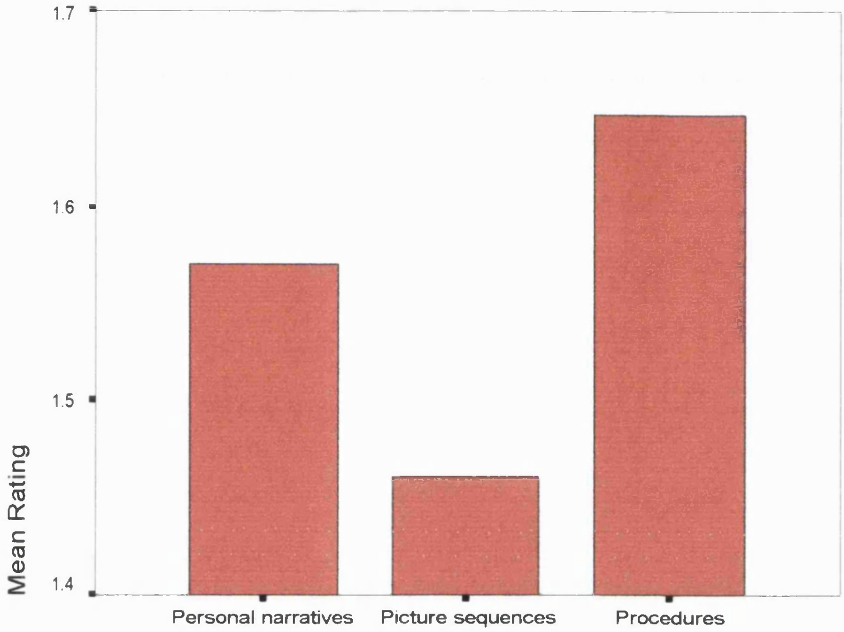


Graph A11.7: The effect of genre on attempted cohesive ties

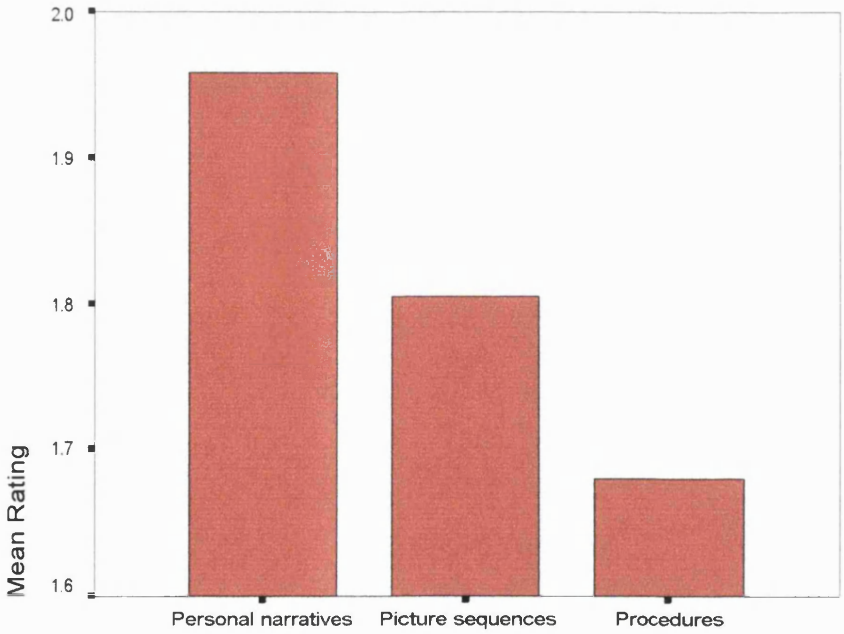


Graph A11.8: The effect of genre on dysfluencies

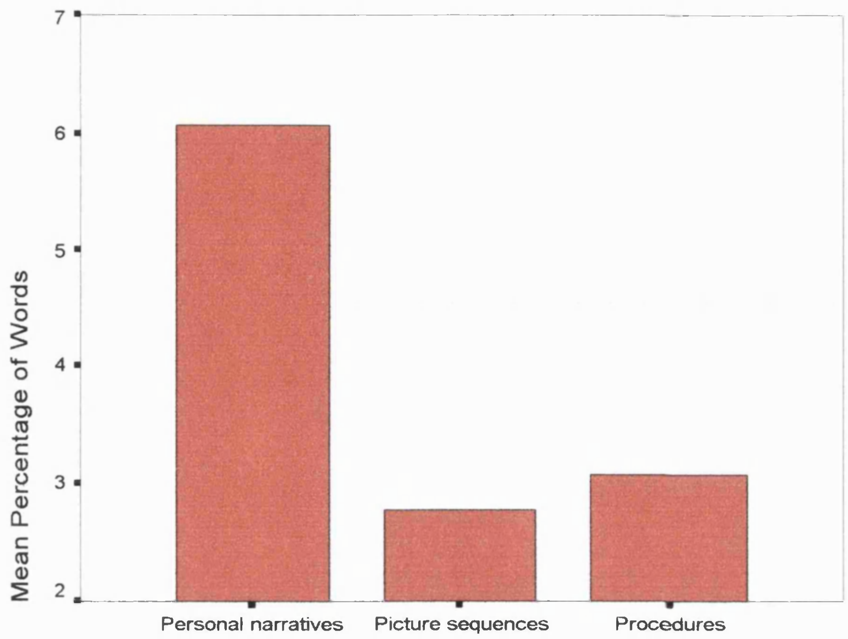
Appendix A12
Task Effects on Combined Samples



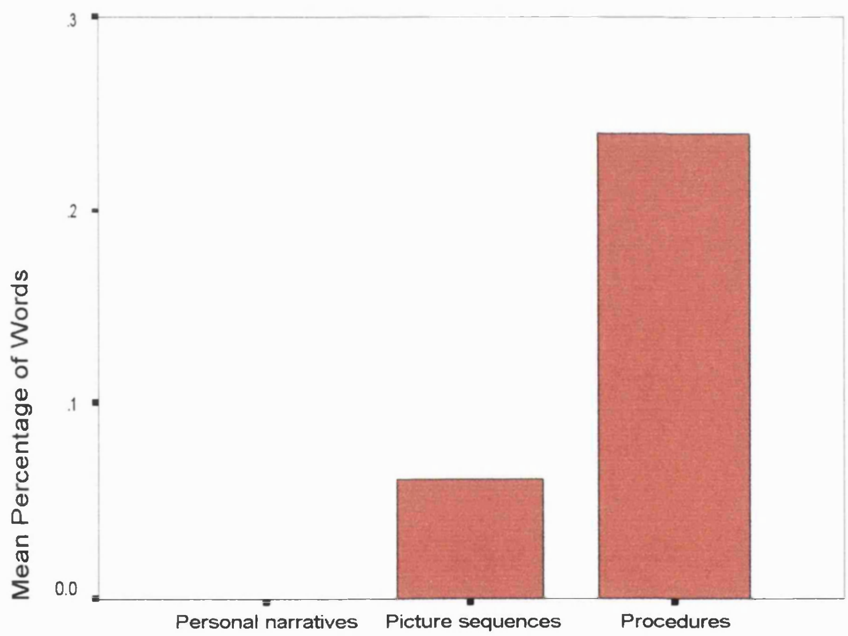
Graph A12.1: Task effect on relevance



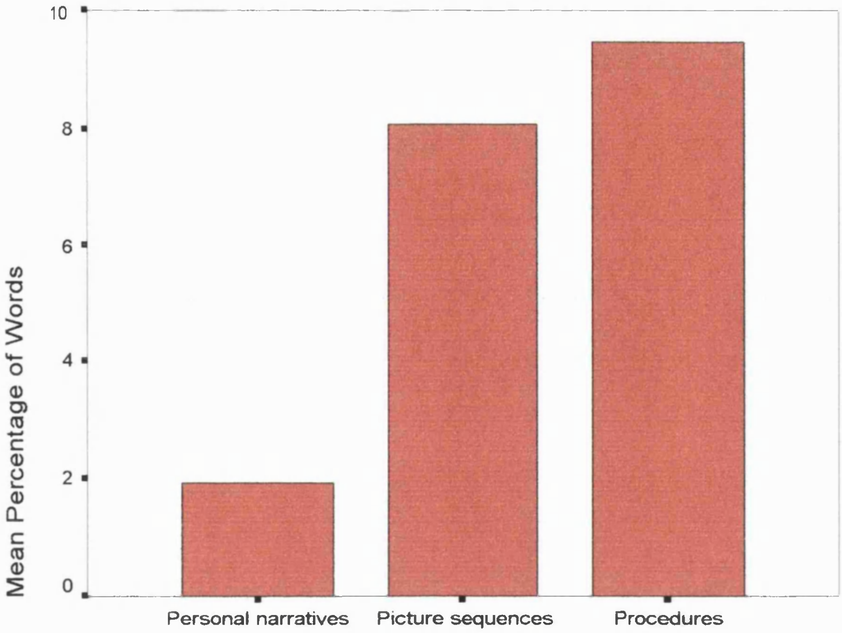
Graph A12.2: Task effect on discourse grammar



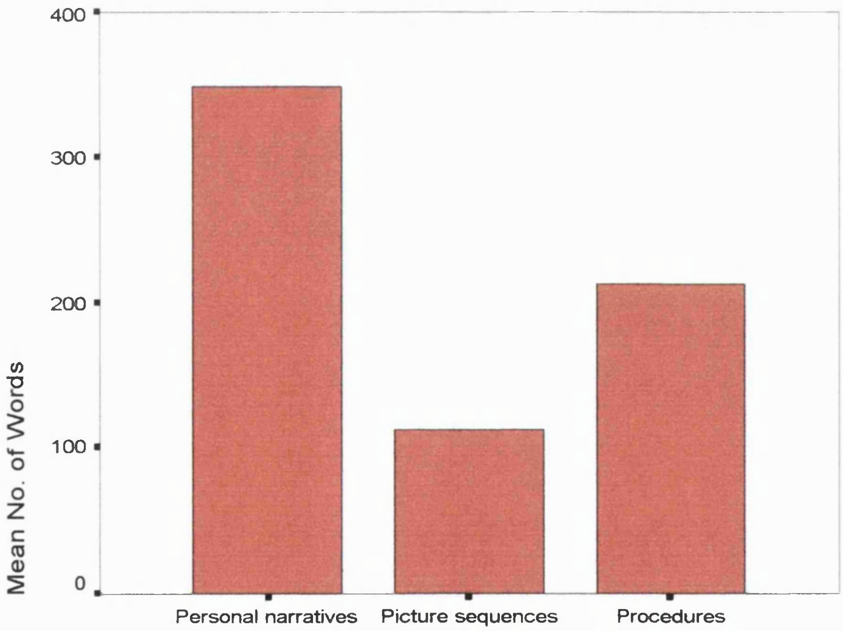
Graph A12.3: Task effect on non-specific elements



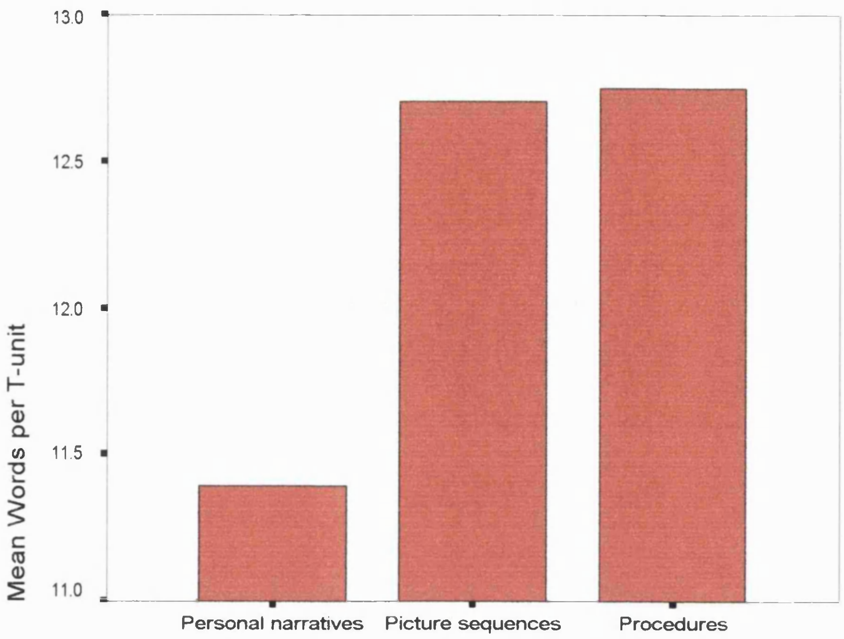
Graph A12.4: Task effect on word substitutions



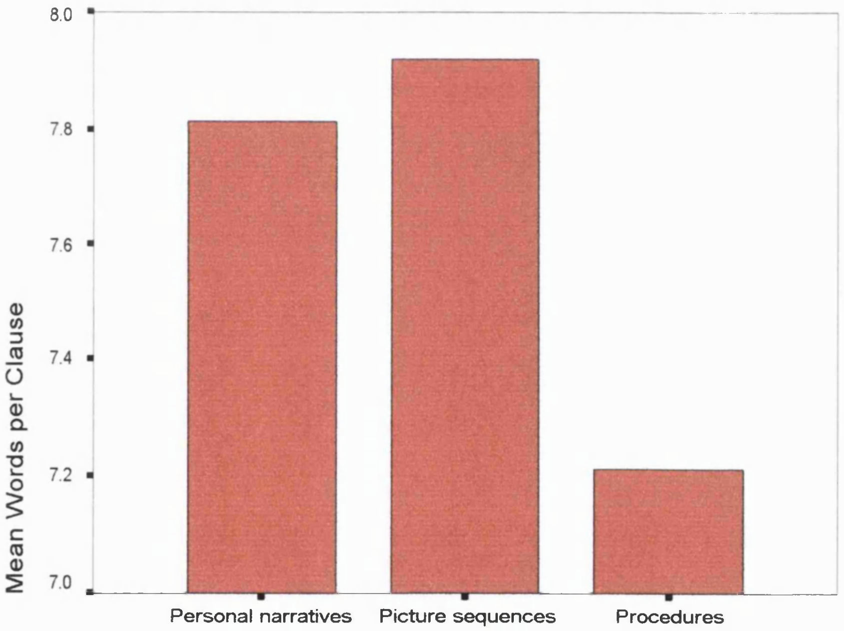
Graph A12.5: Task effect on content and fluency disruptors



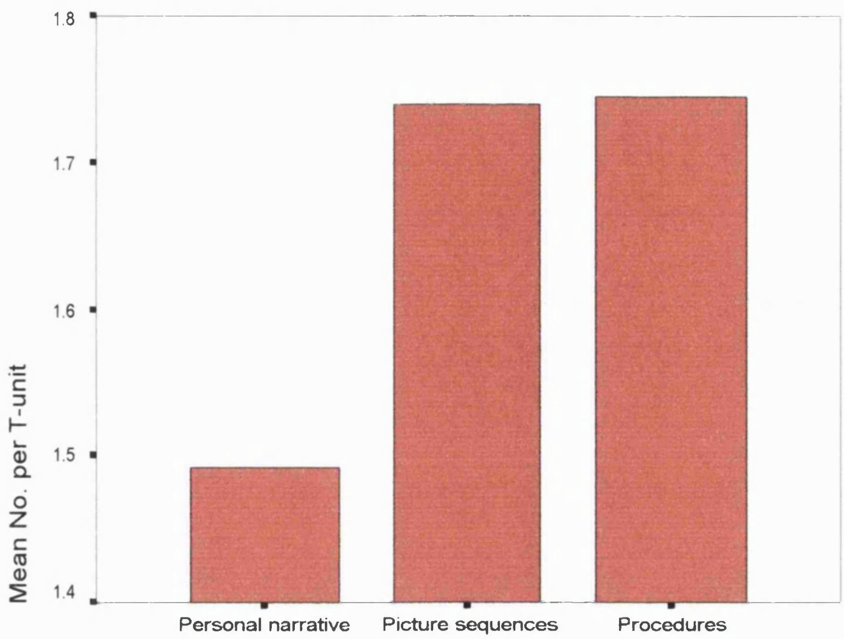
Graph A12.6: Task effect on sample length



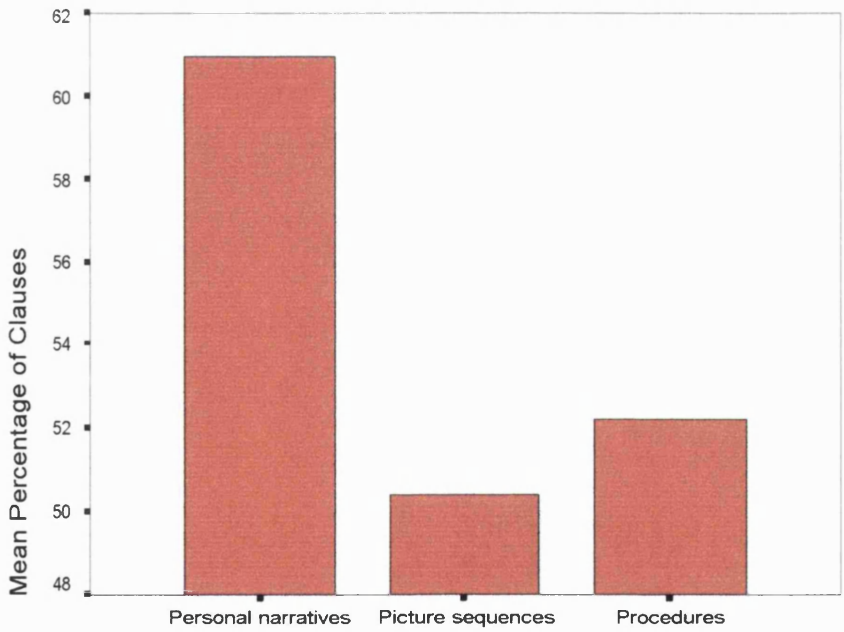
Graph A12.7: Task effect on T-unit length



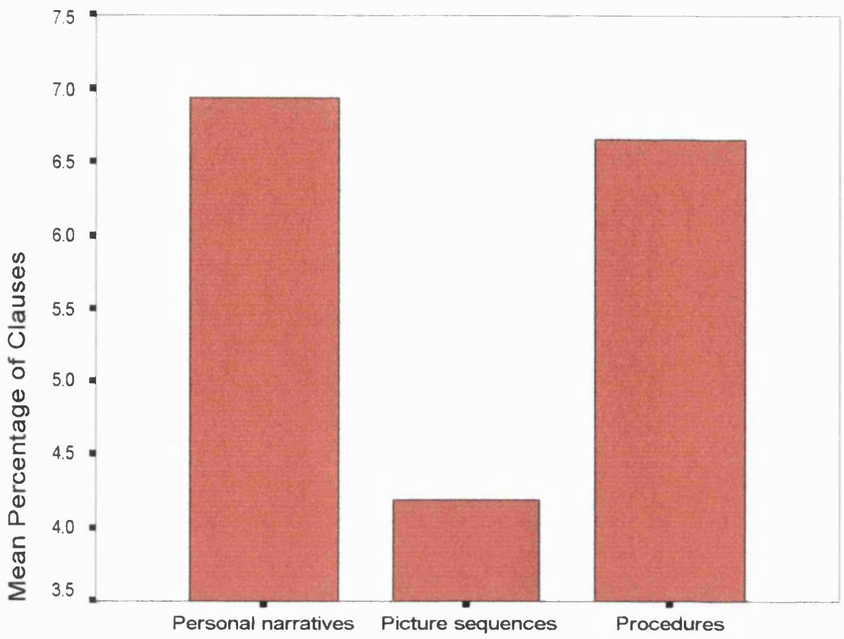
Graph A12.8: Task effect on clause length



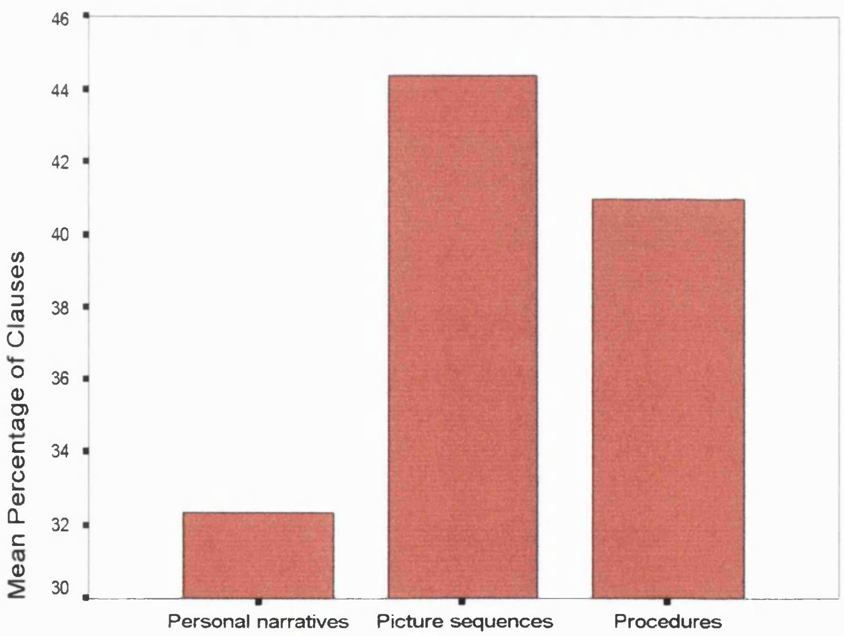
Graph A12.9: Task effect on clausal embedding



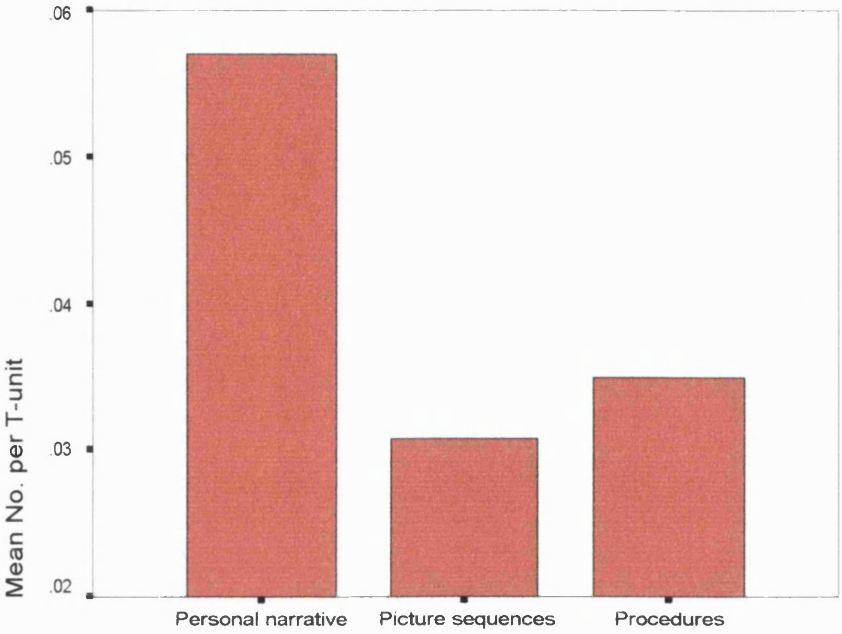
Graph A12.10: Task effect on main clauses



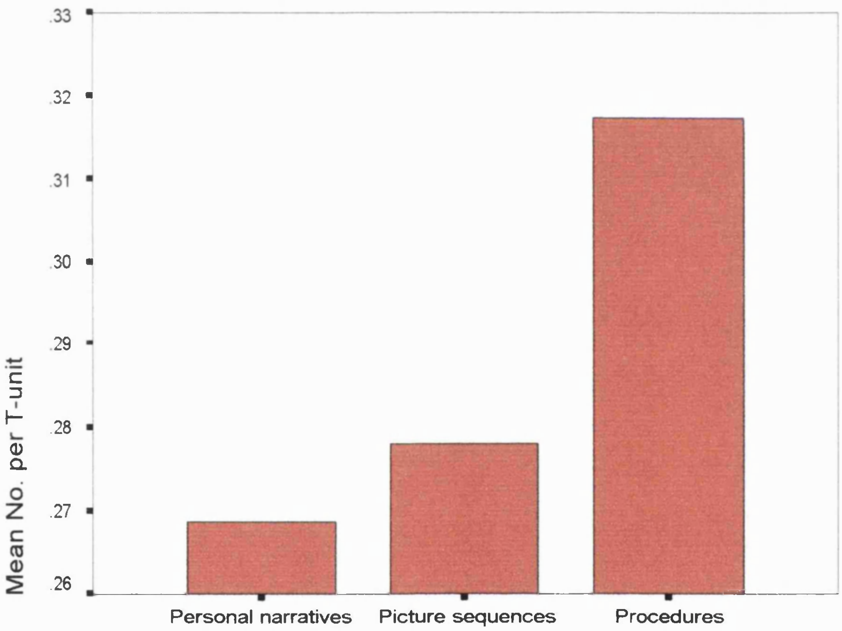
Graph A12.11: Task effect on left-branching clauses



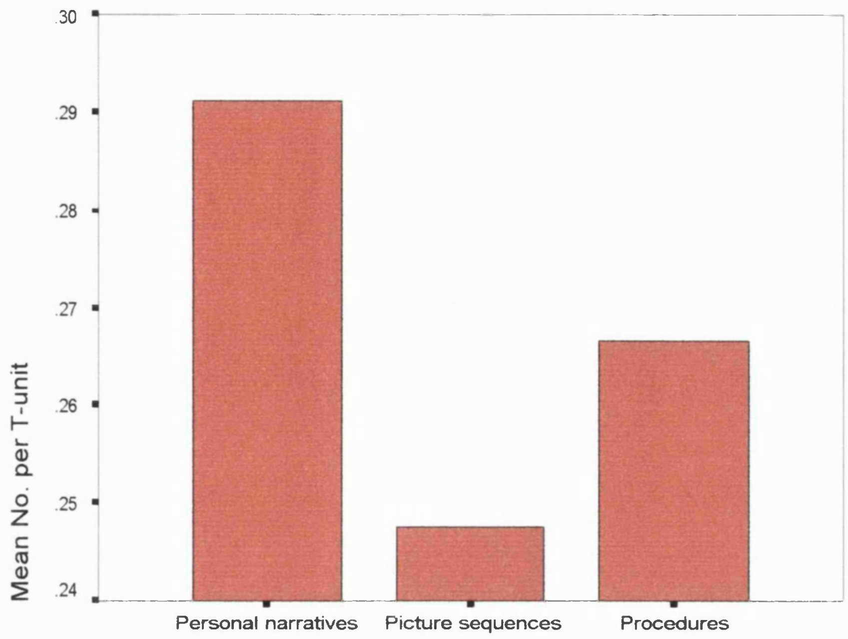
Graph A12.12: Task effect on right-branching clauses



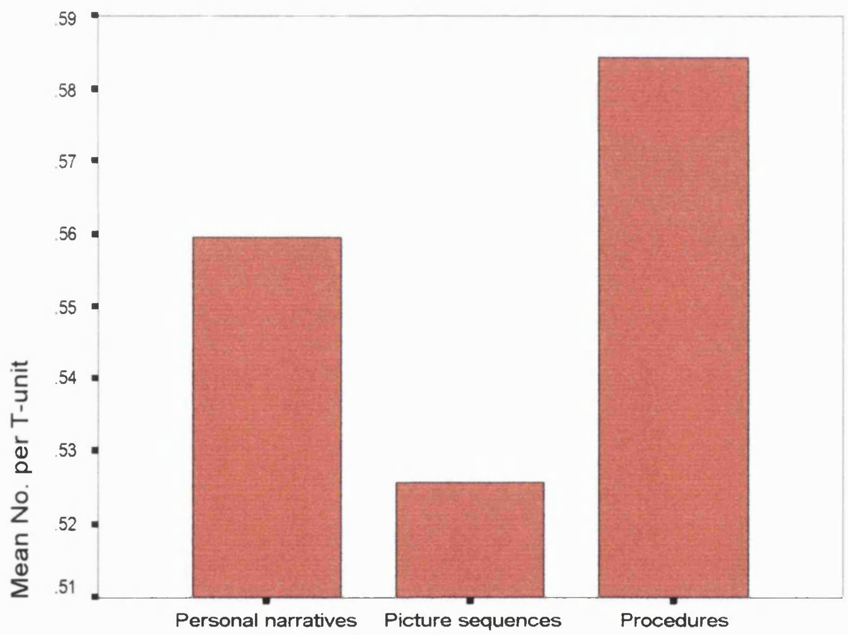
Graph A12.13: Task effect on ellipsis



Graph A12.14: Task effect on conjunctions

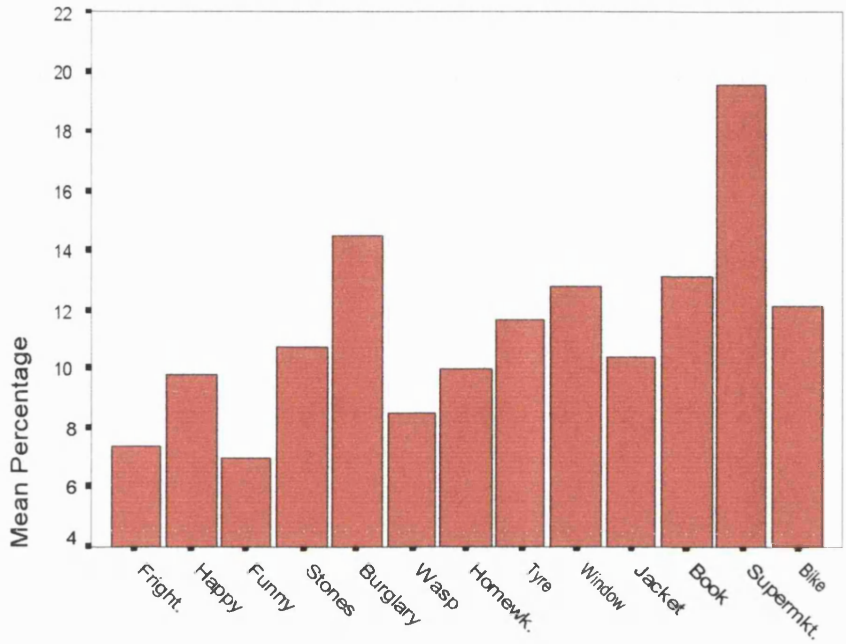


Graph A12.15: Task effect on "and"

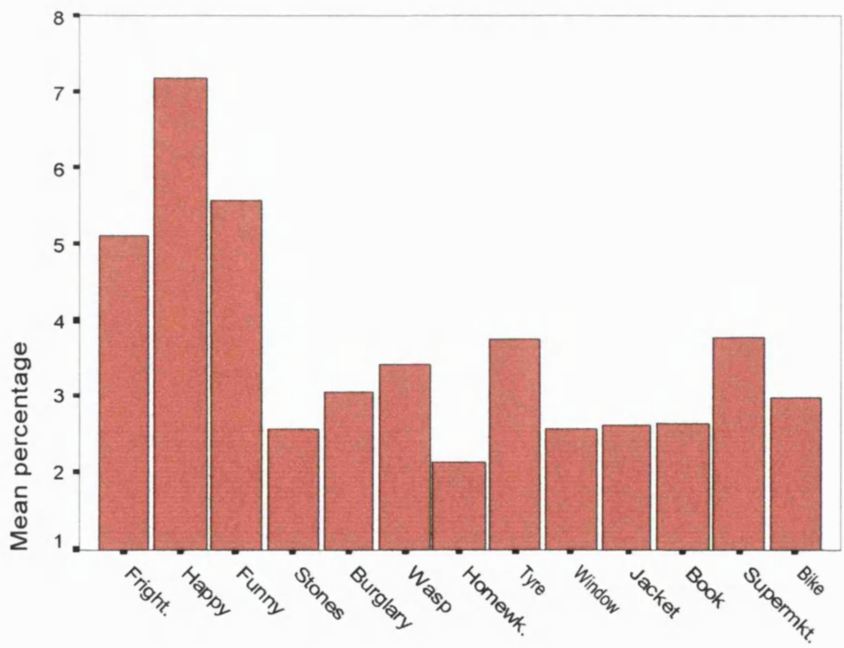


Graph A12.16: Task effect on connectives

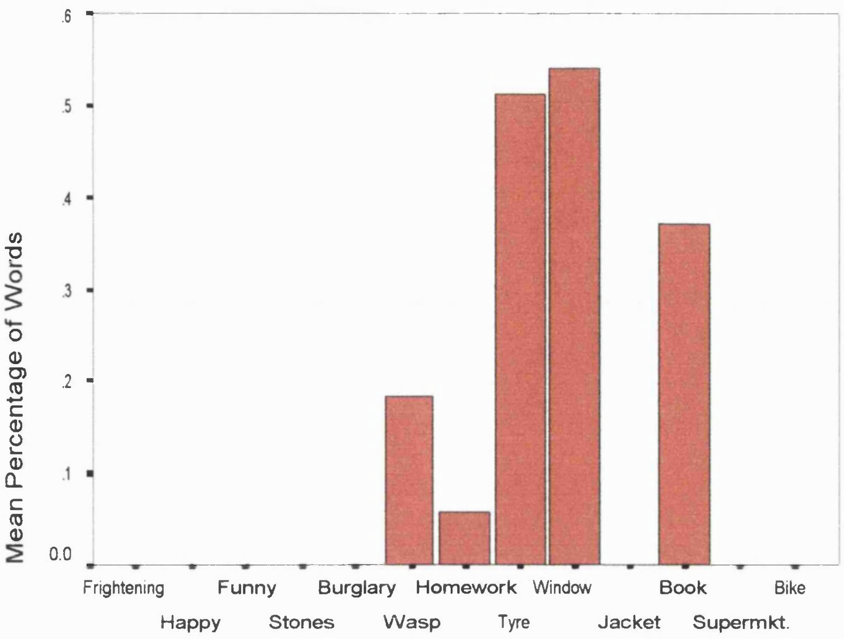
Appendix A13
Topic Effects on Combined Samples



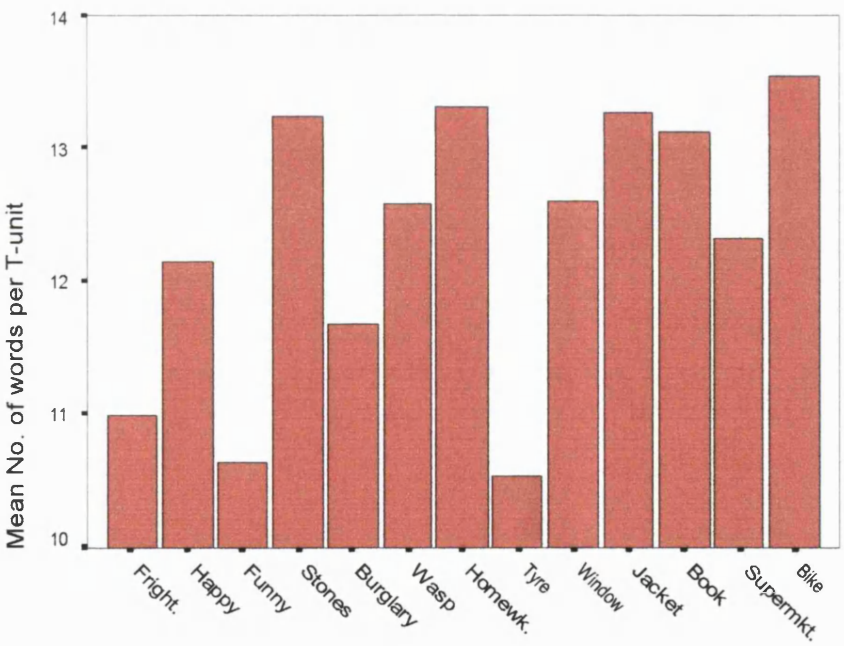
Graph A13.1: Topic effect on total clarity disruptors for all subjects



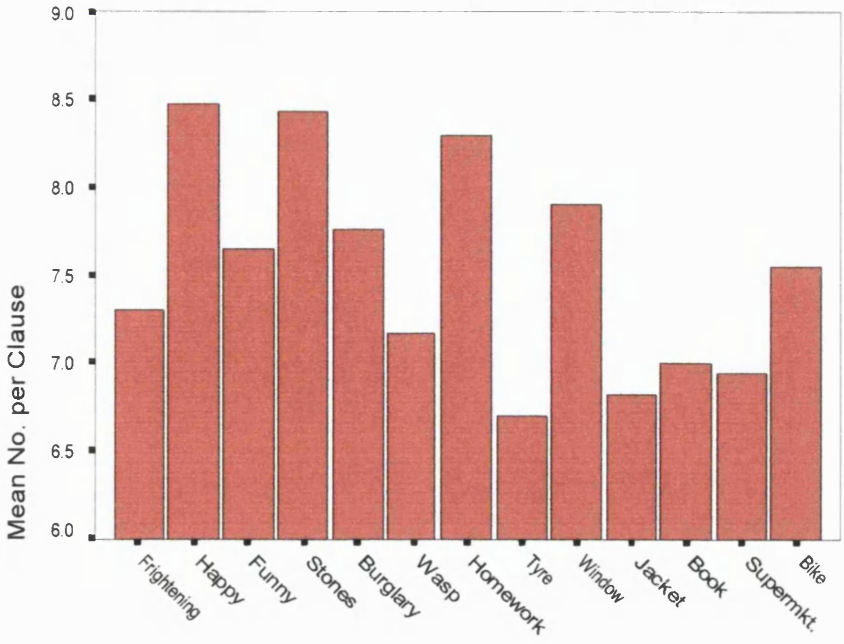
Graph A13.2: Topic effect on non-specific elements for all subjects



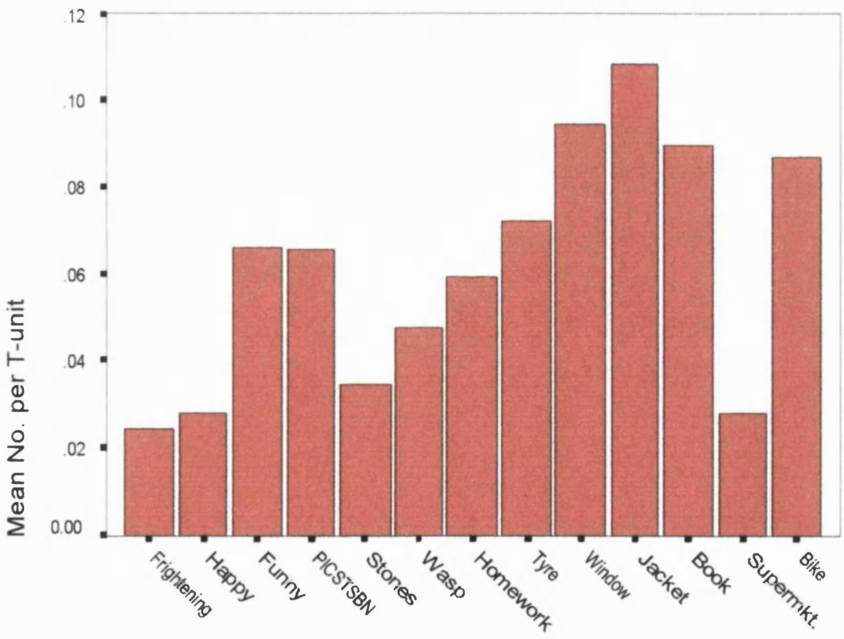
Graph A13.3: Topic effect on word substitutions for all subjects



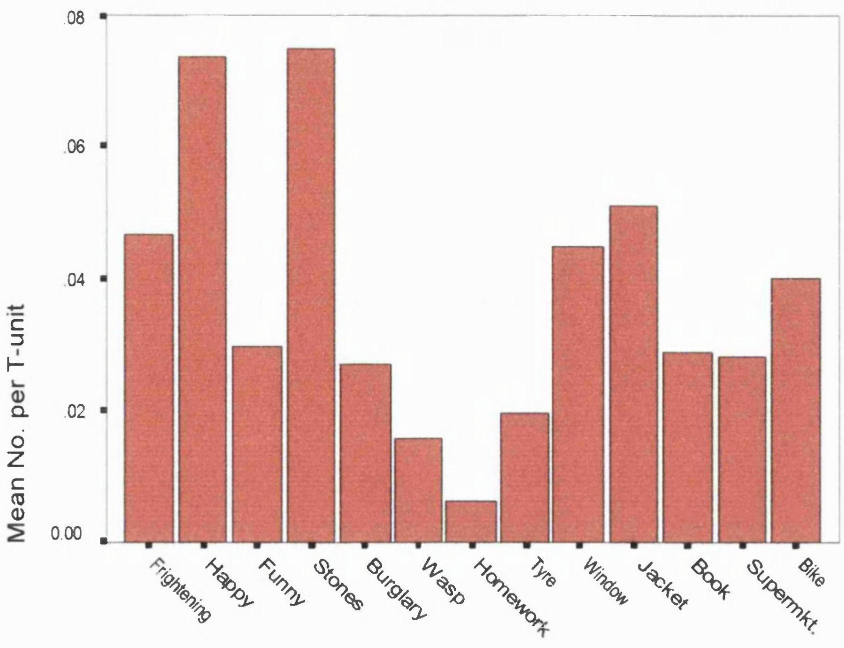
Graph A13.4: Topic effect on T-unit length for all subjects



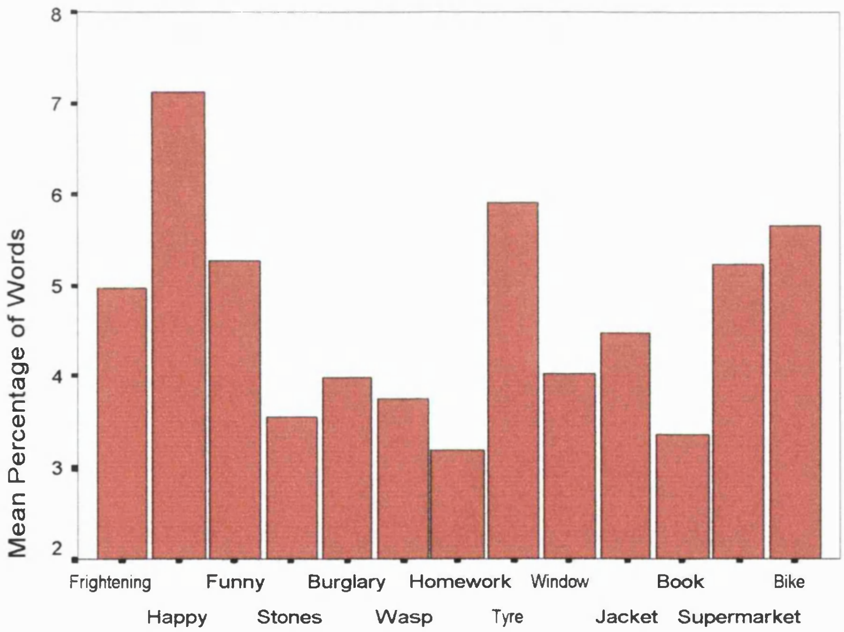
Graph A13.5: Topic effect on clause length for all subjects



Graph A13.6: Topic effect on substitution cohesion for all subjects



Graph A13.7: Topic effect on ellipsis for all subjects



Graph A13.8: Topic effect on dysfluencies

Appendix A14

Effects of Ageing on Topic Measures

This appendix provides the exact significance levels of the effect of ageing on topic measures. The effect of age was determined using the Kruskal-Wallis test with the significance of 0.05. The significance of the comparisons between age groups was determined by the Mann-Whitney Test (significance set at 0.0083).

Topic	Relevance	Discourse Grammar	Total Clarity Disruptors	Non-Specific Elements	Word Substitutions
Fright	H = 3.823 p = .281	H = 4.125 p = .248	H = 2.945 p = .400	H = 5.029 p = .170	None
Happy	H = 4.929 p = .177	H = 3.063 p = .382	H = .574 p = .902	H = 1.921 p = .589	None
Funny	H = 2.706 p = .439	H = 1.029 p = .794	H = 2.699 p = .440	H = 2.990 p = .393	None
Stones	H = 4.243 p = .236	H = 7.846 p = .049*	H = 1.156 p = .764	H = .328 p = .955	None
Burglary	H = 1.215 p = .749	H = 5.322 p = .150	H = 3.806 p = .283	H = 7.672 p = .053	None
Wasp	H = 6.346 p = .096	H = 4.287 p = .232	H = 8.733 p = .033*	H = 7.461 p = .059	H = 2.069 p = .558
Homework	H = 11.957 p = .008*	H = 5.470 p = .140	H = 1.448 p = .694	H = 3.262 p = .353	H = 3.000 p = .392
Tyre	H = 2.821 p = .420	H = 7.832 p = .050*	H = .696 p = .874	H = 4.223 p = .238	H = 3.751 p = .290
Window	H = 4.483 p = .214	H = 2.674 p = .445	H = 2.730 p = .435	H = 6.905 p = .075	H = 1.169 p = .760
Jacket	H = .144 p = .986	H = 3.129 p = .372	H = 6.238 p = .101	H = 4.897 p = .179	None
Book	H = 1.790 p = .617	H = 1.817 p = .611	H = .418 p = .936	H = 2.289 p = .515	H = 2.433 p = .487
Supermarket	H = 5.346 p = .148	H = 6.911 p = .075	H = 1.048 p = .790	H = .603 p = .896	None
Bike	H = 1.748 p = .626	H = 7.390 p = .060	H = .232 p = .972	H = 2.179 p = .536	None

Topic	Content and Fluency	Length	Words per T-unit	Words per Clause	Clausal embedding
Fright	H = 3.699 p = .296	H = .804 p = .848	H = .584 p = .900	H = 3.777 p = .287	H = .368 p = .947
Happy	H = 3.760 p = .269	H = 3.137 p = .371	H = 6.454 p = .091	H = 4.811 p = .186	H = 2.637 p = .451
Funny	H = 2.478 p = .479	H = 1.124 p = .771	H = 2.533 p = 469	H = 2.132 p = .545	H = 1.234 p = .745
Stones	H = 2.089 p = .554	H = 2.838 p = .417	H = 6.157 p = .104	H = 4.562 p = .207	H = 6.936 p = .077
Burglary	H = 6.054 p = .109	H = 3.045 p = .385	H = .480 p = .923	H = 1.817 p = .611	H = 1.310 p = .727
Wasp	H = .4505 p = .212	H = 5.031 p = .170	H = 2.504 p = .475	H = 1.348 p = .718	H = 4.02 p = .252
Homework	H = .673 p = .880	H = 1.384 p = .709	H = 1.323 p = .724	H = 1.782 p = .619	H = 3.828 p = .281
Tyre	H = .853 p = .837	H = .362 p = .948	H = 1.742 p = .626	H = .371 p = .946	H = 4.596 p = .204
Window	H = 1.304 p = .728	H = .290 p = .962	H = 1.152 p = .765	H = .057 p = .996	H = .607 p = .895
Jacket	H = 4.116 p=.249	H = 3.867 p = .276	H = .455 p = .929	H = 4.549 p = .208	H = .580 p = .901
Book	H = .439 p = .932	H = 4.497 p = .213	H = 1.160 p = .763	H = .352 p = .950	H = 1.125 p = .771
Supermarket	H = 1.674 p = .643	H = 1.780 p = .619	H = 4.900 p = .179	H = 4.060 p = .255	H = 4.640 p = .200
Bike	H = .540 p = .910	H = 7.646 p = .054	H = 3.196 p = .362	H = .747 p = .862	H = 7.287 p = .063

Topic	Main Clauses	Right-branch. Clauses	Left-branching Clauses	Total Cohesion	Reference
Fright	H = .168 p = .983	H = .213 p = .975	H = 1.873 p = .599	H = .540 p = .910	H = 4.016 p = .260
Happy	H = 3.116 p = .374	H = 3.706 p = .295	H = .407 p = .939	H = 4.107 p = .250	H = .390 p = .942
Funny	H = 3.477 p = .324	H = 4.796 p = .187	H = 3.790 p = .285	H = 3.942 p = .268	H = 5.544 p = .136
Stones	H = 4.883 p = .181	H = 5.953 p = .114	H = 2.147 p = .542	H = 3.565 p = .312	H = 2.365 p = .500
Burglary	H = 3.838 p = .279	H = 1.961 p = .581	H = 3.373 p = .338	H = 3.743 p = .291	H = 8.575 p = .036* *60>70(.005)
Wasp	H = 5.190 p = .158	H = 6.127 p = .106	H = 2.714 p = .438	H = 8.832 p = .032*	H = 10.203 p = .017* *60>80 (.007)
Homework	H = .459 p = .926	H = 1.339 p = .720	H = 1.150 p = .765	H = 5.968 p = .113	H = 6.004 p = .111
Tyre	H = 2.031 p = .566	H = 2.086 p = .555	H = 3.564 p = .313	H = 4.721 p = .193	H = .556 p = .906
Window	H = .521 p = .914	H = 1.375 p = .711	H = .322 p = .956	H = 1.335 p = .721	H = .753 p = .861
Jacket	H = .311 p = .958	H = .482 p = .923	H = 4.824 p = .185	H = 4.903 p = .179	H = 1.396 p = .706
Book	H = 2.493 p = .477	H = 4.785 p = .188	H = 6.686 p = .083	H = 1.089 p = .780	H = 1.253 p = .740
Supermarket	H = 3.985 p = .263	H = 5.474 p = .140	H = 3.164 p = .367	H = .456 p = .928	H = 4.561 p = .207
Bike	H = 1.817 p = .611	H = 1.935 p = .586	H = .511 p = .917	H = 1.873 p = .599	H = 4.312 p = .230

Topic	Substitution Cohesion	Ellipsis	Conjunction	Lexical	"And"
Fright	H = 6.418 p = .093	H = 1.502 p = .682	H = .9200 p = .027*	H = 3.093 p = .378	H = 6.682 p = .083
Happy	H = 3.835 p = .380	H = .792 p = .851	H = 4.224 p = .238	H = 5.326 p = .149	H = 3.556 p = .092
Funny	H = 6.418 p = .093	H = 3.121 p = .373	H = 1.335 p = .721	H = 3.160 p = .368	H = 3.486 p= .323
Stones	H = 6.475 p = .091	H = 3.989 p = .263	H = 2.170 p = .538	H = 5.768 p = .123	H = 3.694 p = .296
Burglary	H = 1.123 p = .772	H = 3.875 p = .275	H = 1.432 p = .698	H = 2.393 p = .495	H = 4.046 p = .257
Wasp	H = 2.435 p = .487	H = 2.526 p = .471	H = .538 p = .911	H = 7.146 p = .067	H = 7.324 p = .062
Homework	H = 5.279 p = .152	H = 6.200 p = .102	H = 1.573 p = .666	H = 4.238 p = .237	H = 1.098 p = .778
Tyre	H = 8.366 p = .039*	H = 1.544 p = .672	H = 2.163 p = .539	H = 11.584 p = .009* *50>80 (.004) *60>80 (.004)	H = 6.439 p = .092
Window	H = .129 p = .988	H = 3.259 p = .353	H = 4.568 p = .206	H = 1596 p = .660	H = 11.325 p = .010* *50>60 (.005) *50>80 (.005)
Jacket	H = 4.564 p = .207	H = 3.510 p = .319	H = 3.270 p = .352	H = 5.483 p = .140	H = 4.285 p = .232
Book	H = .779 p = .855	H = 2.311 p = .510	H = 1.789 p = .617	H = .977 p = .807	H = .778 p = .855
Supermarket	H = .839 p = .840	H = 1.714 p = .634	H = 1.649 p = .648	H = 3.817 p = .282	H = 2.973 p = .396
Bike	H = 6.233 p = .101	H = 3.813 p = .282	H = 9.630 p = .022* *70>80 (.008)	H = .786 p = .853	H = 4.030 p = .258

Topic	Connectives	Attempted Cohesion	Dysfluency
Fright	H = 7.980 p = .046* *50<70 (.007)	H = 4.165 p = .244	H = 3.386 p = .336
Happy	H = 6.502 p = .090	H = 6.010 p = .111	H = 1.729 p = .631
Funny	H = 4.301 p = .231	H = 1.327 p = .723	H = 1.358 p = .715
Stones	H = 5.028 p = .170	H = 3.247 p = .355	H = .722 p = .868
Burglary	H = 1.011 p = .799	H = 5.644 p = .130	H = .342 p = .952
Wasp	H = 3.609 p = .307	H = 14.835 p = .002*	H = .446 p = .931
Homework	H = 2.557 p = .465	H = .550 p = .908	H = .160 p = .984
Tyre	H = 4.472 p = .215	H = 1.755 p = .625	H = 3.528 p = .317
Window	H = 9.665 p = .022* *50<70 (.006)	H = .066 p = .996	H = 3.874 p = .275
Jacket	H = 5.444 p = .142	H = 3.755 p = .289	H = .805 p = .848
Book	H = .677 p = .879	H = 1.485 p = .686	H = 1.859 p = .602
Supermarket	H = 3.203 p = .361	H = 2.040 p = .564	H = 2.724 p = .436
Bike	H = .774 p = .856	H = .531 p = .912	H = 2.296 p = .513

Appendix A15

SES Effects on Topic Measures

This appendix provides the exact significance levels of the effect of SES on topic measures. The effect of SES was determined using the Kruskal-Wallis test with the significance of 0.05. The significance of the comparisons between SES groups was determined by the Mann-Whitney Test (significance set at 0.0083).

Topic	Relevance	Discourse Grammar	Total Clarity Disruptors	Non-Specific Elements	Word Substitutions
Fright	H = 1.545 p = .672	H = 2.057 p = .561	H = 6.269 p = .099	H = 6.788 p = .079	None
Happy	H = 7.737 p = .052	H = 5.014 p = .171	H = 3.702 p = .295	H = 1.925 p = .588	None
Funny	H = 2.975 p = .396	H = 1.075 p = .783	H = 3.616 p = .306	H = 1.725 p = .631	None
Stones	H = 3.825 p = .281	H = 1.503 p = .458	H = 1.442 p = .696	H = .870 p = .833	None
Burglary	H = 3.368 p = .338	H = 1.399 p = .706	H = 1.225 p = .747	H = 2.164 p = .539	None
Wasp	H = 1.541 p = .673	H = 1.399 p = .706	H = .585 p = .900	H = .933 p = .818	H = 2.069 p = .558
Homework	H = 2.656 p = .448	H = .183 p = .980	H = 1.901 p = .593	H = 2.830 p = .419	H = 3.000 p = .392
Tyre	H = 4.909 p = .179	H = 8.752 p = .033*	H = 3.072 p = .381	H = 4.713 p = .194	H = 4.266 p = .234
Window	H = 8.516 p = .036*	H = 1.987 p = .575	H = .298 p = .960	H = 5.000 p = .172	H = 4.724 p = .193
Jacket	H = 6.587 p = .086	H = 1.866 p = .601	H = 3.080 p = .379	H = 3.133 p = .372	None
Book	H = 1.563 p = .668	H = 5.364 p = .147	H = .629 p = .890	H = 2.391 p = .495	H = 5.646 p = .130
Supermarket	H = 5.112 p = .164	H = 3.236 p = .357	H = 1.818 p = .611	H = 5.991 p = .112	None
Bike	H = .895 p = .827	H = 2.381 p = .497	H = 4.836 p = .184	H = 3.556 p = .314	None

A = Professional B = Managerial C = Skilled Manual D = Unskilled

Topic	Content and Fluency	Length	Words per T-unit	Words per Clause	Clausal embedding
Fright	H = 2.840 p = .417	H = 3.922 p = .270	H = 10.081 p = .018* *A>D (.005) *B>D (.008)	H = 2.446 p = .485	H = 7.544 p = .056
Happy	H = 2.792 p = .425	H = 1.873 p = .599	H = 4.815 p = .186	H = 4.835 p = .184	H = .997 p = .802
Funny	H = 2.513 p = .473	H = 3.595 p = .309	H = 11.824 p = .008* *A>D (.006)	H = 2.240 p = .524	H = 4.988 p = .173
Stones	H = 1.018 p = .797	H = 5.379 p = .146	H = 1.100 p = .777	H = 3.015 p = .389	H = .941 p = .816
Burglary	H = 1.096 p = .778	H = 2.698 p = .441	H = 8.462 p = .037*	H = 11.288 p = .010* *B>C (.002)	H = 5.546 p = .136
Wasp	H = .530 p = .912	H = 1.990 p = .575	H = 3.640 p = .303	H = 3.397 p = .334	H = 4.464 p = .216
Homework	H = .833 p = .842	H = 1.159 p = .763	H = 2.507 p = .474	H = 6.300 p = .098	H = 2.660 p = .447
Tyre	H = 1.461 p = .691	H = 9.210 p = .027*	H = 3.888 p = .274	H = 10.560 p = .014*	H = 5.972 p = .113
Window	H = .246 p = .970	H = 7.474 p = .058	H = 7.594 p = .055	H= 7.825 p = .050*	H = 4.769 p = .190
Jacket	H = 5.538 p = .136	H = .851 p = .837	H = 7.076 p = .070	H = 3.295 p = .348	H = 10.315 p = .016* *B>D (.006)
Book	H = 1.458 p = .692	H = 5.565 p = .135	H = 4.600 p = .204	H = 5.182 p = .159	H = 4.075 p = .253
Supermarket	H = .305 p = .959	H = 2.456 p = .483	H = 4.256 p = .235	H = 5.825 p = .120	H = 4.484 p = .214
Bike	H = 1.954 p = .582	H = 3.862 p = .277	H = 7278 p = .064	H = 3.539 p = .316	H = 5.550 p = .136

A = Professional B = Managerial C = Skilled Manual D = Unskilled

Topic	Main Clauses	Right-branch. Clauses	Left-branching Clauses	Total Cohesion	Reference
Fright	H = 10.500 p = .015* *A<D (.007) *B<D (.005)	H = 10.474 p = .015* *A>D (.004) *B>D (.005)	H = 3.804 p = .283	H = 11.538 p = .009* *A>D (.001)	H = 3.242 p = .356
Happy	H = 4.472 p = .215	H = .3663 p = .300	H = 3.652 p = .302	H = .3663 p = .300	H = 1.431 p = .698
Funny	H = 3.286 p = .350	H = 4.404 p = .221	H = 3.214 p = .360	H = 2.705 p = .439	H = 6.816 p = .078
Stones	H = 1.413 p = .703	H = 3.606 p = .307	H = 2.627 p = .453	H = 2.017 p = .569	H = 6.201 p = .102
Burglary	H = 6.371 p = .095	H = 2.989 p = .393	H = 3.868 p = .276	H = 1.339 p = .720	H = 2.004 p = .572
Wasp	H = 3.830 p = .280	H = 1.719 p = .633	H = 5.007 p = .171	H = 4.014 p = .260	H = .211 p = .976
Homework	H = 3.145 p = .370	H = .607 p = .895	H = .741 p = .864	H = 4.071 p = .254	H = 1.081 p = .782
Tyre	H = 11.846 p = .008* *A<D (.003)	H = 8.146 p = .043* *A>D (.003)	H = 4.515 p = .211	H = 10.197 p = .017* *A>D (.004)	H = 4.804 p = .187
Window	H = 7.272 p = .064	H = 7.123 p = .068	H = 8.177 p = .042*	H = 4.166 p = .244	H = 4.311 p = .230
Jacket	H = 10.116 p = .018* *B<D (.006)	H = 11.550 p = .009* *A>D (.003) *B>D (.003)	H = 1.059 p = .787	H = 5.873 p = .118	H = 2.593 p = .459
Book	H = 2.836 p = .418	H = 3.072 p = .381	H = .567 p = .904	H = 6.136 p = .105	H = 4.848 p = .183
Supermarket	H = 3.358 p = .340	H = 1.340 p = .720	H = 1.100 p = .777	H = 3.893 p = .273	H = 2.996 p = .392
Bike	H = 2.228 p = .526	H = 3.163 p = .367	H = 1.695 p = .638	H = 2.613 p = .455	H = 4.312 p = .230

A = Professional B = Managerial C = Skilled Manual D = Unskilled

Topic	Substitution Cohesion	Ellipsis	Conjunction	Lexical	"And"
Fright	H = 2.632 p = .452	H = 2.700 p = .440	H = 1.317 p = .725	H = 4.600 p = .204	H = 5.235 p = .155
Happy	H = 7.606 p = .055	H = 4.706 p = .195	H = 8.167 p = .043* *A>B (.005)	H = 2.683 p = .443	H = 4.234 p = .237
Funny	H = 3.944 p = .268	H = 1.987 p = .575	H = 2.630 p = .452	H = .765 p = .858	H = 2.464 p = .482
Stones	H = 1.224 p = .747	H = 1.536 p = .788	H = 1.310 p = .727	H = 5.619 p = .132	H = .883 p = .829
Burglary	H = 9.886 p = .020*	H = 1.054 p = .788	H = 6.036 p = .110	H = 6.260 p = .100	H = 1.652 p = .648
Wasp	H = .959 p = .811	H = .689 p = .876	H = 3.060 p = .383	H = 9.057 p = .029* *A>D (.003)	H = .134 p = .987
Homework	H = 3.9965 p = .265	H = 2.067 p = .559	H = 1.373 p = .712	H = 8.025 p = .045* *A>D (.007)	H = 2.974 p = .396
Tyre	H = 1.374 p = .712	H = 6.521 p = .089	H = 6.034 p = .110	H = 6.700 p = .082	H = 2.011 p = .570
Window	H = 11.441 p = .010* *A>D (.000)	H = 6.190 p = .103	H = 3.310 p = .346	H = 3.743 p = .291	H = 1.686 p = .640
Jacket	H = .635 p = .888	H = 1.163 p = .762	H = 5.947 p = .114	H = .979 p = .806	H = 2.456 p = .483
Book	H = 1.909 p = .591	H = 4.618 p = .202	H = 3.839 p = .279	H = 4.543 p = .208	H = .727 p = .867
Supermarket	H = 2.900 p = .407	H = 3.705 p = .295	H = 11.946 p = .008* *A>D (.006)	H = 3.605 p = .307	H = .765 p = .858
Bike	H = 4.484 p = .214	H = 1.160 p = .763	H = 4.935 p = .177	H = 1.792 p = .617	H = 1.314 p = .726

A = Professional B = Managerial C = Skilled Manual D = Unskilled

Topic	Connectives	Attempted Cohesion	Dysfluency
Fright	H = 4.488 p = .213	H = /936 p = .817	H = 4.222 p = .238
Happy	H = 9.488 p = .023* *A>C (.003)	H = .220 p = .974	H = 1.403 p = .705
Funny	H = 4.412 p = .220	H = 4.069 p = .254	H = 2.523 p = .471
Stones	H = .891 p = .826	H = 13.134 p = .004* *B<D (.003)	H = 2.300 p = .512
Burglary	H = 1.504 p = .681	H = 6.314 p = .097	H = .729 p = .866
Wasp	H = 4.092 p = .252	H = .858 p = .836	H = 3.409 p = .333
Homework	H = 3.496 p = .321	H = 8.419 p = .038*	H = 3.366 p = .339
Tyre	H = 8.812 p = .032*	H = 4.602 p = .187	H = 1.035 p = .793
Window	H = 3.709 p = .295	H = 6.286 p = .099	H = 3.533 p = .317
Jacket	H = 4/116 p = .249	H = .751 p = .861	H = 3.125 p = .373
Book	H = 3.761 p = .288	H = 3.866 p = .276	H = 6.161 p = .104
Supermarket	H = 5.467 p = .141	H = 1.891 p = .595	H = 2.549 p = .467
Bike	H = 2.712 p = .438	H = .531 p = .912	H = 1.810 p = .613

A = Professional B = Managerial C = Skilled Manual D = Unskilled

Appendix A16

Effect of Topic on Discourse Measures

This appendix presents the exact significance levels of the effect of topic on the discourse measures. The Friedman Test with $p = 0.05$ was used to determine the topic effect on each measure. The Wilcoxon Signed Ranks Test was used to compare the topics in each task. Due to the large number of topics used and therefore the number of potential comparisons (and increased possibility of false positives), the samples elicited by each topic were only compared to those within the same task. Using the Bonferroni correction, the significance levels were set as follows: 3 personal narrative topics = 0.05 divided by 3 comparisons = 0.016; 4 picture sequences: 0.05 divided by 6 comparisons = 0.0083; procedural topics: 6 topics: 0.05 divided by 15 comparisons = .0033.

	Personal Narratives	Picture Sequences	Procedures
Relevance	H = 6.982 p = .030* *HA<FR (.006)	H = 5.513 p = .138	H = 14.793 p = .011* *TY>JA (.001) *TY>SU (.002) *WI>SU (.002)
Discourse Grammar	H = 16.848 p = .000 *HA<FR (.002)	H = 4.703 p = .195	H = 9.131 p = .104
Total Clarity	H = 3.130 p = .209	H = 3.707 p = .295	H = 8.531 p = .129
Non-specific	H = 3.391 p = .183	H = 3.372 p = .338	H = 5.249 p = .386
Word substitutions	None	H = 3.667 p = .300	H = 7.368 p = .195
Content & Fluency	H = 1.885 p = .380	H = 7.099 p = .069	H = 11.925 p = .036*
Length	H = 2.696 p = .260	H = 10.514 p = .015* *HO<BU (.005)	H = 4.115 p = .533
T-unit length	H = .348 p = .840	H = .748 p = .862	H = 10.953 p = .052
Clause length	H = 3.089 p = .213	H = 2.953 p = .399=	H = 9.274 p = .099
Embedding	H = 1.747 p = .417	H = 2.223 p = .528	H = 19.321 p = .002*
Main Clauses	H = 1.867 p = .393	H = 2.252 p = .522	H = 18.085 p = .003* *TY>SU (.002)
Right-branching clauses	H = 1.489 p = .475	H = 3.909 p = .272	H = 11.425 p = .044*
Left-branching clauses	H = 7.655 p = .022*	H = 2.403 p = .493	H = 8.270 p = .142
Total Cohesion	H = 1.103 p = .576	H = 10.471 p = .015* *WA>BU (.001)	H = 17.089 p = .004* *SU<TY (.000) *SU<WI (.003) *SU<BI (.001)
Reference	H = .929 p = .629	H = 7.718 p = .052	H = 15.394 p = .009* *BI>TY (.001) *BI>WI (.001) *BI>SU (.000) *BI>BO (.001) *JA>SU (.003)
Substitution	H = 3.100 p = .212	H = 2.354 p = .502	H = 3.821 p = .575
Ellipsis	H = .603 p = .740	H = 10.882 p = .012* *HO<ST (.006)	H = 2.954 p = .707
Conjunction	H = .588 p = .764	H = 13.410 p = .004* *BU<ST (.001)	H = 4.642 p = .461
Lexical	H = 13.927 p = .001* *FR>HA (.014) *FR>FU (.012)	H = 2.921 p = .404	H = 27.574 p = .000* *TY>JA (.000) *TY>BO (.001) *TY>SU (.001) *TY>BI (.000) *TY>WI (.001) *WI>JA (.000)
"And"	H = 6.727 p = .035* *HA<FR (.014)	H = 2.336 p = .506	H = 11.096 p = .050*
Connectives	H = 4.840 p = .089	H = 8.527 p = .036*	H = 12.439 p = .029*
Attempted Cohesion	H = 6.686 p = .035*	H = .235 p = .972	H = 21.103 p = .001*
Dysfluency		H = 1.146 p = .766	H = 3.738 p = .588

HA=Happy personal narrative
FR=Frightening personal narrative
FU=Funny personal narrative

BU=Burglary Sequence
HO=Homework Sequence
ST=Stones Sequence
WA=Wasp Sequence

BI=Bike Procedure
BO=Book Procedure
JA=Jacket Procedure
SU=Supermarket Procedure
TY=Tyre Procedure
WI=Window Procedure

Appendix A17

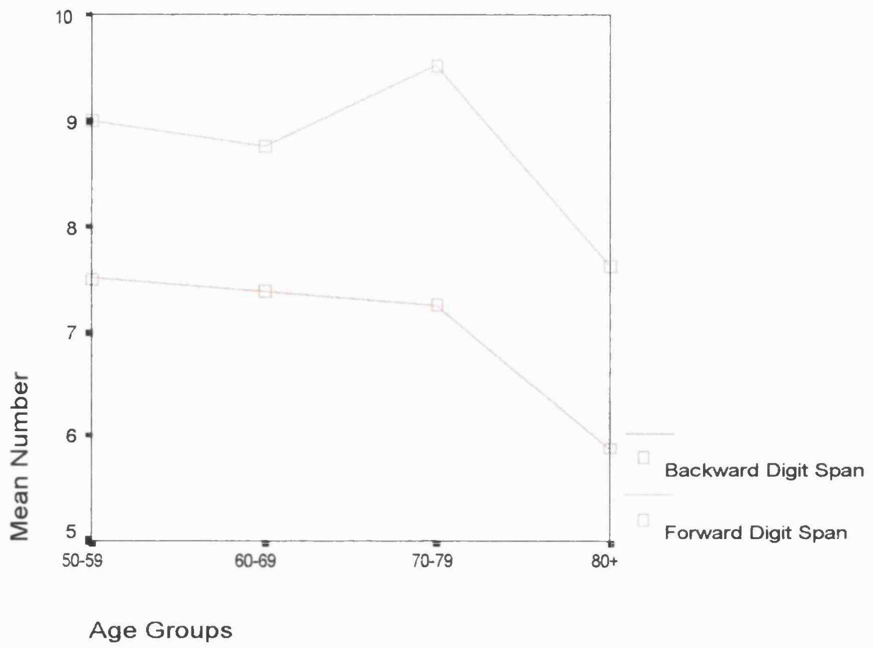
Hierarchy of incidence of selected discourse measures by topics

Rel Most	D.G. Most	Clarity Least	N.Sp least	Cont least	Length Least	Cl. emb Least	Main Least	Right Least	Tot Coh Least	Ref Least	Conj Least	Lex Least	Att Least	Dysfl Least
Wasp	Tyre	Funny	Homewk Stones	Funny	Homewk	Funny	Bike	Funny	Supermk	Supermk	Burglary	Happy	Fright	Book
Tyre	Fright	Fright	Window	Fright	Stones	Happy	Wasp	Happy	Funny	Book	Happy	Funny	Window Tyre	Homewk
Fright	Window	Wasp	Jacket Book	Happy	Wasp	Fright	Homewk	Tyre	Happy Fright	Tyre Window Fright	Fright. Funny	Jacket	Book	Jacket
Homewk	Bike	Happy	Bike	Wasp	Burglary	Burglary	Jacket	Fright	Jacket	Funny	Homewk	Fright	Funny	Burglary
Window	Book	Homewk	Burglary	Jacket Tyre	Jacket Bike	Tyre	Supermk	Window	Book	Jacket	Supermk	Bike Supermk	Supermk	Wasp
Burglary	Homewk Wasp	Jacket	Wasp	Homewk	Book	Window	Burglary	Stones	Window	Happy	Wasp	Book	Happy	Stones
Book	Burglary	Stones	Tyre Supermk	Stones	Supermk Tyre	Homewk	Book	Book	Tyre	Bike	Bike	Window	Jacket	Window
Funny Stones	Stones	Tyre	Fright	Bike	Window Happy	Wasp	Stones	Burglary	Bike Burglary	Stones	Jacket	Burglary	Burglary	Bike
Bike	Jacket	Bike	Funny	Window	Funny	Book Bike	Window	Supermk	Stones	Burglary	Book	Stones	Wasp	Fright
Happy	Supermk Funny	Window	Happy	Book	Fright	Supermk	Fright	Jacket	Homewk	Homewk	Tyre	Wasp	Homewk	Supermk
Jacket	Happy	Book		Burglary		Jacket	Tyre	Homewk	Wasp	Wasp	Window	Homewk	Stones	Funny
Supermk		Burglary		Supermk		Stones	Funny	Bike			Stones	Tyre	Bike	Tyre
		Supermk					Happy	Wasp						Happy

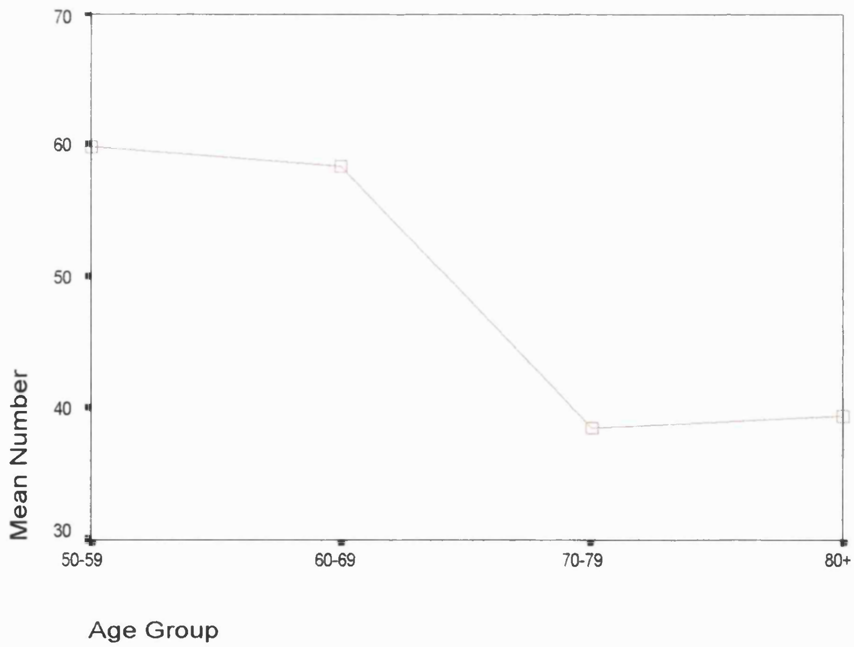
Rel=Relevance DG=Discourse Grammar NsP=Non-specific elements Cont=Content and Fluency Disruptors Cl-emb=Clausal embedding Main=Main clauses Right=Right-branching clauses Tot Coh=Total Cohesive Ties Ref=Reference Conj=Conunctions Lex=Lexicalisation Att=Attemped cohesion Dysfl=Dysfluencies

Appendix A18

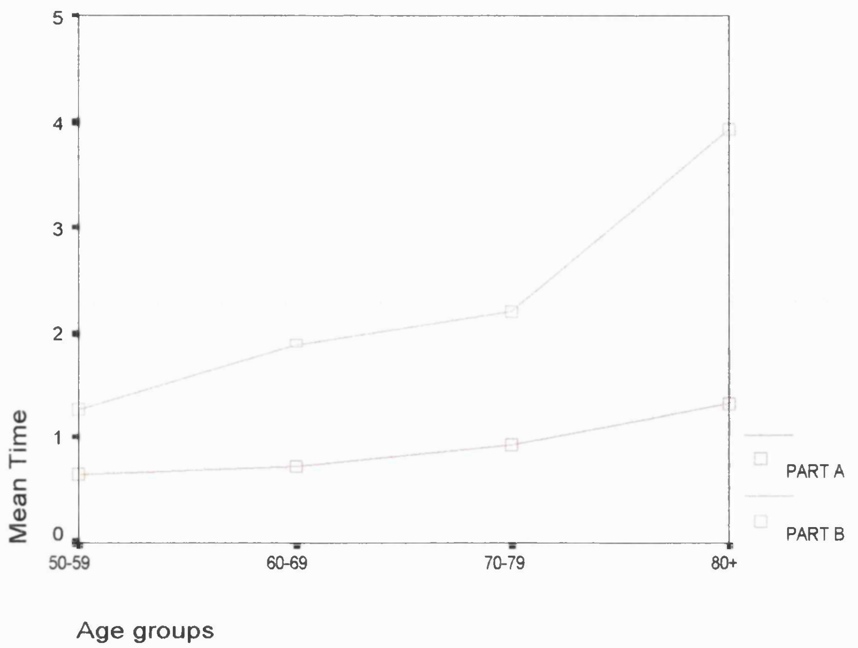
Age and SES Effects on Attention Tests



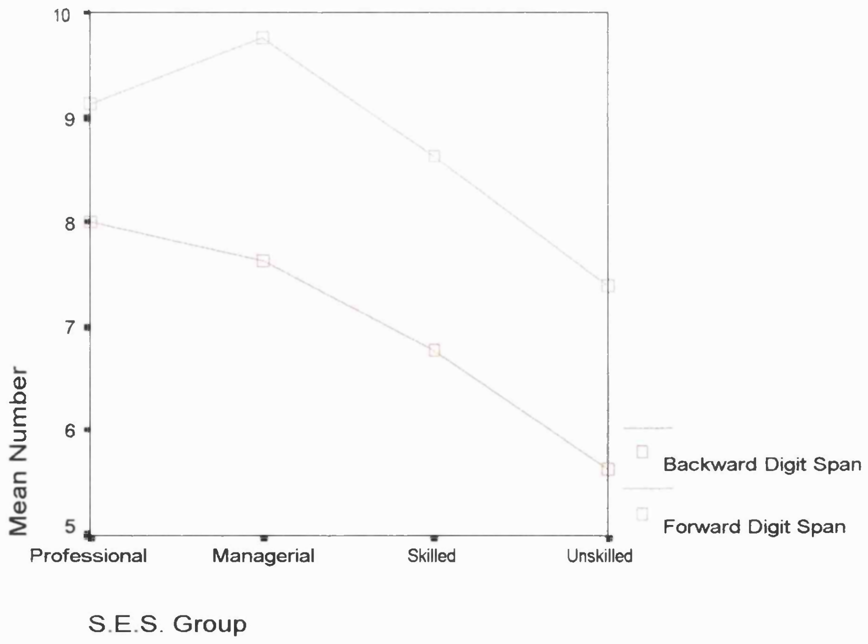
Graph A18.1: Age effect on the Digit Span test



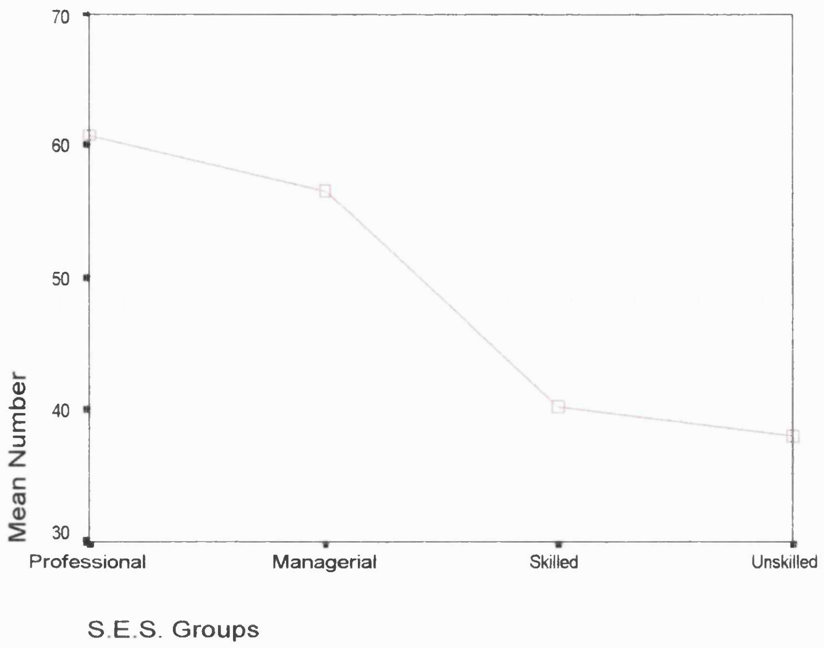
Graph A18.2: Age effect on the FAS word fluency test



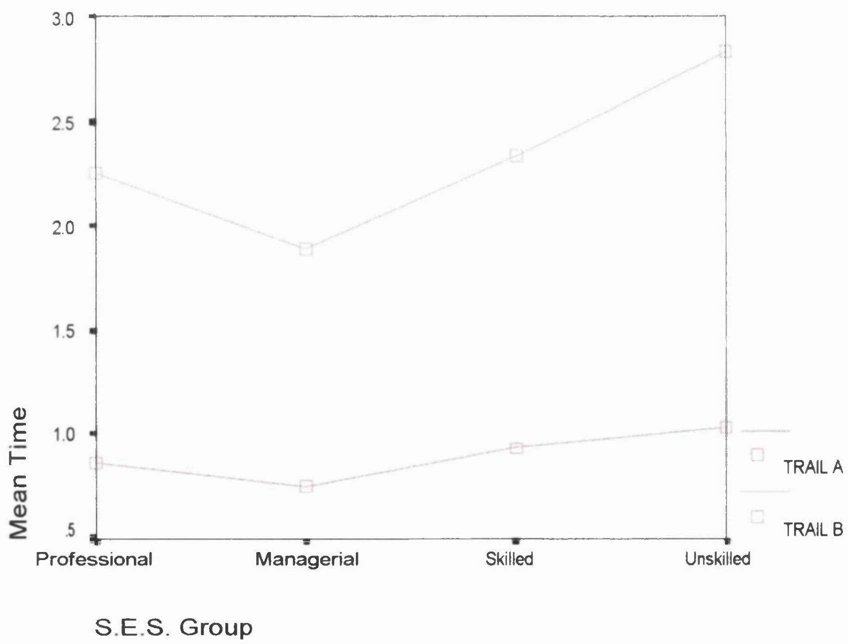
Graph A18.3: Age effect on the Trail-Making test



Graph A18.4: SES effect on the Digit Span test



Graph A18.5: SES effect on the FAS word fluency test



Graph A18.6: SES effect on the Trail-making test

APPENDIX A19

CORRELATIONS BETWEEN DISCOURSE AND ATTENTION MEASURES FOR NBD SUBJECTS

The non-parametric correlational test, Spearman's rho, was used to examine the relationships between discourse measures and attention.

	FORWARD	BACKWARD	DIGIT MEAN	FAS FLUENCY	TRAIL A	TRAIL B
Relevance - Total	-.372*	-.373*	-.388*	-.245	.158	.230
Personal	-.382*	-.401*	-.401*	-.278	.096	.055
Picture Sequence	-.032	-.094	-.063	-.150	-.012	-.012
Procedure	-.206	-.141	-.194	-.040	.103	.260
Discourse Gr.-Total	-.189	-.257	-.250	-.534**	.263	.335 (p=0.061)
Personal	-.160	-.298	-.257	-.328 (p =0.067)	.034	-.074
Picture Sequence	-.004	-.110	-.064	-.409*	.171	.208
Procedure	-.231	-.245	-.257	-.466**	.437*	.599**

*p<.05 **p<.01

Correlations between Attention tests and relevance and discourse grammar

	FORWARD	BACKWARD	DIGIT MEAN	FAS FLUENCY	TRAIL A	TRAIL B
Clarity Disrupt-Total	.014	.093	.079	-.204	-.126	.073
Personal	-.115	-.051	-.069	-.266	.057	.021
Picture Sequence	.188	.253	.236	-.004	-.204	-.054
Procedure	.005	.071	.066	-.056	-.208	.014
Non-Specific - Total	-.286	-.335	-.311	-.635**	.467**	.526**
Personal	-.109	-.142	-.121	-.422*	.228	.133
Picture Sequence	-.134	-.232	-.215	-.557**	.379*	.472**
Procedure	-.209	-.181	-.181	-.410*	.322 p=.072)	.426*
Cont/Fluency-Total	.051	.153	.125	-.040	-.209	-.013
Personal	.020	.175	.098	.036	-.068	-.019
Picture Sequence	.298	.426*	.384*	.215	-.344 (p=.054)	-.215
Procedure	.025	.073	.066	-.009	-.211	-.028

*p<.05 **p<.01

Correlations between Attention tests and clarity disruptors

	FORWARD	BACKWARD	DIGIT MEAN	FAS FLUENCY	TRAIL A	TRAIL B
Sample length - Total	.050	.254	.171	.276	-.059	-.042
Personal	.000	.155	.093	.110	.011	.078
Picture sequence	.104	.285	.186	.418*	-.073	-.116
Procedure	.123	.334 (p = .062)	.255	.398*	-.179	-.151
Clausal embedding-Total	.176	.329 (p =.066)	.268	.482**	-.107	-.067
Personal	.048	.183	.129	.445*	-.124	-.058
Picture sequence	.171	.318 (p = - .076)	.259	.423*	-.021	.012
Procedure	.363*	.393*	.392*	.335 (p = .061)	-.196	-.065
Clause Length - Total	.271	.257	.264	.214	-.178	-.205
Personal	.313 (p = .081)	.290	.318 (p =.076)	.258	-.289	-.278
Picture Sequence	.055	.013	.022	.051	-.106	-.044
Procedure	.150	.280	.235	.330 (p = 0.065)	.008	-.065
T-unit length - Total	.215	.316 (p = .078)	.267	.432*	-.136	-.134
Personal	.103	.165	.143	.339 (p = 0.058)	-.179	-.110
Picture Sequence	.016	.093	.045	.315 (p= 0.079)	-.014	.023
Procedure	.316 (p= 0.078)	.405*	.383*	.442*	-.186	-.018

*p<.05 **p<.01

Correlations between Attention tests and productivity and syntactic complexity measures

	FOR WARD	BACK WARD	DIGIT MEAN	FAS FLUENCY	TRAIL A	TRAIL B
Right-branching-Total	.338 (p= 0.059)	.447	.421*	.561**	-.296	-.316 (p = 0.078)
Personal	.232	.416*	.353*	.499**	-.235	-.285
Picture	.110	.188	.157	.441*	-.189	-.199
Procedure	.429*	.454**	.472**	.339 (p = 0.058)	-.213	-.242
Left-branching - Total	.003	.112	.046	.309 (p = 0.085)	.215	.264
Personal	-.121	.009	-.074	.270	.272	.328
Picture sequence	.040	.123	.084	.117	.112	.218
Procedure	.125	.287	.213	.490**	-.209	-.077
Main clauses - Total	-.256	-.444*	-.363*	-.641**	.198	.220
Personal	-.165	-.332 (p = 0.064)	-.262	-.585**	.072	.084
Picture sequence	-.036	-.210	-.117	-.451**	.190	.172
Procedure	-.383*	-.467**	-.458**	-.477**	.231	.008

*p<.05 **p<.01

Correlations between attention tests and main, left- and right-branching clauses

	FOR WARD	BACK WARD	DIGIT MEAN	FAS FLUENCY	TRAIL A	TRAIL B
Cohesion - Total	.262	.427*	.356*	.488**	-.235	-.240
Personal	.233	.413*	.336 (p=.060)	.441*	-.241	-.207
Picture Sequence	.147	.262	.207	.345 (p=.053)	-.111	-.121
Procedure	.299 (p=.097)	.407*	.364*	.435*	-.303 (p=.091)	-.364*
Referential ties-Total	.076	.237	.159	.260	-.161	-.192
Personal	-.040	.106	.071	.283	-.103	-.149
Picture Sequence	.161	.282	.221	.226	-.151	-.176
Procedure	-.062	.108	.008	.180	-.138	-.153
Lexicalization - Total	.453**	.498**	.488**	.579**	-.370*	-.380*
Personal	.372*	.439*	.390*	.288	-.390*	-.295
Picture Sequence	.391*	.455**	.444*	.561**	-.283	-.246
Procedure	.259	.278	.287	.495**	-.352*	-.433*
Attempts - Total	-.413*	-.522**	-.481**	-.537**	.441*	.395*
Personal	.005	-.073	-.043	-.165	-.029	.078
Picture Sequence	-.603**	-.598**	-.616**	-.499**	.579**	.538**
Procedure	-.046	-.216	-.125	-.426*	.271	.223

*p<.05 **p<.01

Correlations between attention tests and cohesion measures

	FOR WARD	BACK WARD	DIGIT MEAN	FAS FLUENCY	TRAIL A	TRAIL B
Conjunctions - Total	.037	.240	.151	.159	.151	.150
Personal	.080	.245	.173	.001	.195	.111
Picture	-.323 (p=.072)	-.140	-.232	.104	.235	.284
Procedure	.312 (p=.082)	.415*	.383*	.142	.031	.024
"And"s - Total	-.046	-.073	-.075	.035	.082	.155
Personal	.297 (p=0.099)	.300 (p= .095)	.304 (p=.090)	.294	-.183	-.112
Picture	-.282	-.256	-.285	-.006	.104	.125
Procedure	-.138	-.209	-.196	-.062	.143	.288
Connectives - Total	.028	.131	.083	.104	.166	.209
Personal	.353*	.440*	.420*	.273	-.057	-.059
Picture Sequence	-.364*	-.232	-.306 (p = .088)	.029	.229	.270
Procedure	.114	.136	.129	.030	.141	.184

*p<.05

**p<.01

Correlations between Attention tests and cohesion analysis (cont'd)

	FOR WARD	BACK WARD	DIGIT MEAN	FAS FLUENCY	TRAIL A	TRAIL B
Dysfluency - Total	.113	.207	.157	.209	.083	.123
Personal	.098	.140	.127	.215	.017	.034
Picture Sequence	-.031	.145	.052	.127	.084	.149
Procedure	.158	.219	.183	.152	.154	.182

Correlations between Attention tests and dysfluencies

Appendix A20
Correlations Between Discourse Measures in NBD Subjects on Three Tasks

The non-parametric correlational test, Spearman's rho, was used to examine the relationships between the discourse measures.

TOTAL SAMPLES

	REL	D.G	NW	WT	WCL	CLT	MA	LEF	RGH	NS	SUB	CON	CLA	REF	SBN	ELL	COJ	AND	CNN	LEX	ATT	COH
REL	--------																					
DG	.570**	------																				
NW	-.023	-.354*	-----																			
WT	-.347	-.389*	.315	--------																		
WCL	-.282	-.418*	.272	.717**	-----																	
CLT	-.262	-.282	.327	.805**	.258	-----																
MA	.442*	.512**	-.371*	-.807**	-.427*	-.792**	-----															
LEF	-.150	.230	.385*	.507**	.211	.559**	-.545**	-----														
RGH	-.516**	-.546**	.405*	.784**	.464**	.759**	-.875**	.307	-----													
NS	.344	.389*	-.070	-.254	-.133	-.255	.391*	-.088	-.362*	-----												
SUB	-.070	-.421*	.375*	.271	.169	.266	-.337	.047	.390*	-.282	-----											
CON	.202	.044	.192	-.049	-.152	.172	.037	-.158	.133	.140	.281	-----										
CLA	.276	.146	.121	-.143	-.207	.075	.170	-.209	-.015	.------	.------	-------	-----									
REF	-.609**	-.658**	.273	.313	.323	.192	-.355*	.339	.329	-.134	.095	-.136	-.149	-----								
SBN	-.021	-.253	.041	-.009	.057	-.011	-.030	-.218	.040	-.263	.317	.079	.058	.003	-----							
ELL	-.283	-.303	-.080	.180	.148	.161	-.368*	.160	.229	-.451**	.123	-.150	-.295	.235	.126	-----						
COJ	-.221	-.249	.515**	.472**	.164	.579**	-.581**	.313	.567**	.132	.260	.191	.243	.265	-.206	-.191	-----					
AND	-.429*	-.260	.125	.112	.091	.041	-.140	.054	.223	-.181	.039	-.265	-.305	.282	-.194	.019	.268	-----				
CNN	-.380*	-.244	.339	.305	.118	.350*	-.435*	.217	.461**	-.019	.075	-.121	-.091	.295	-.247	-.025	.748**	.756**	-----			
LEX	-.648**	-.741**	.380*	.649**	.527**	.571**	-.643**	.323	.716**	-.560**	.244	-.105	-.264	.389*	.161	.347	.323	.389*	.323	-----		
ATT	.269	.269	-.170	-.439*	-.260	-.407*	.484**	-.172	-.410*	.314	-.323	.170	.209	-.076	-.236	-.260	-.176	-.076	-.176	-.464**	-----	
COH	-.651**	-.690**	.466**	.636**	.471**	.559**	-.666**	.403*	.701**	-.370*	.192	-.122	-.214	------	-------	------	-------	.437*	.503**	-------	-.329	-----
FLU	.057	.026	.294	.078	.001	.212	-.182	.449**	.105	.034	.128	.068	.031	.067	-.172	.159	.232	.146	.198	.087	.066	.139

REL=Relevance DG=Discourse grammar CLA=Total Clarity disruptors NSP=Non-specific CON=Content and fluency CLT=clausal embedding WCL=Clause length
WT=T-unit-length COH=Total cohesion REF=Reference COJ=Conjunction LEX=Lexicalisation ATT=Attempted cohesion DYSF=Dysfluencies
*p<.05(2-tailed)**p<.01 (2-tailed)

PERSONAL NARRATIVES

	REL	D.G	NW	WT	WCL	CLT	MA	LEF	RGH	NS	SUB	CON	CLA	REF	SBN	ELL	COJ	AND	CNN	LEX	ATT	COH
REL	-------																					
DG	.381*	------																				
NW	.136	-.446*	-----																			
WT	.064	.142	-.021	-----																		
WCL	.153	.028	-.037	.624**	-------																	
CLT	-.143	.028	.284	.533**	-.115	-----																
MA	.496**	.239	-.133	-.612**	-.150	-.760**	--------															
LEF	-.105	-.229	.393*	.213	-.098	.470**	-.534**	-------														
RGH	-.381*	-.147	.118	.472**	.121	.640**	-.801**	.089	--------													
NS	.348	.162	.140	.072	.127	-.118	.215	-.279	-.050	-------												
SUB	------	-------	-------	-------	-------	-------	-------	-------	--------	--------	-------											
CON	-.070	-.317	.245	-.174	-.128	-.007	.002	-.041	.038	-.046	-------	--------										
CLA	.239	.081	.076	.024	.055	-.083	.183	-.398*	.048	.------	--------	-------	---------									
REF	-.041	-.356*	.389*	-.014	-.054	.150	-.074	.127	.072	.052	--------	.127	.205	-------								
SBN	.003	-.050	.088	.168	.198	.240	-.305	.077	.413*	.016	--------	-.117	-.118	-.227	-------							
ELL	-.220	.033	-.010	.321	.246	.347	-.425*	.274	.319	-.166	--------	-.244	-.139	.213	-.139	--------						
COJ	.054	-.022	.384*	.021	-.060	.175	-.211	.187	.332	.285	--------	-.064	.129	.014	.356*	.034	-------					
AND	-.392*	-.500**	.374*	-.061	-.093	.188	-.248	.191	.272	-.358*	--------	-.159	-.483**	.061	.173	.034	.097	-------				
CNN	-.338	-.380*	.474**	.082	.039	.266	-.377*	.147	.493**	-.063	--------	-.123	-.193	.101	.421*	.111	-------	--------	-------			
LEX	-.372*	-.267	.336	.187	.012	.357*	-.354*	.123	.410*	-.049	--------	.219	.061	.243	.049	.225	-.034	.424*	.363*	--------		
ATT	.141	-.154	.398*	-.250	-.029	-.165	.246	.025	-.100	.072	--------	.267	.159	.036	-.097	-.039	-.121	-.026	-.121	.218	--------	
COH	-.236	-.380*	.490**	.282	.080	.472**	-.464**	.284	.514**	.050	--------	.053	.112	.628**	.147	.424*	.323	.314	.506**	.700**	.160	-------
FLU	-.137	.232	-.137	-.137	.073	.051	-.080	.157	-.088	.151	------	-.043	.039	.083	.113	.070	.181	.232	.302	.189	-.054	.120

REL=Relevance DG=Discourse grammar CLA=Total Clarity disruptors NSP=Non-specific CON=Content and fluency CLT=clausal embedding WCL=Clause length
WT=T-unit-length COH=Total cohesion REF=Reference COJ=Conjunction LEX=Lexicalisation ATT=Attempted cohesion DYSF=Dysfluencies
*p<.05(2-tailed)**p<.01 (2-tailed)

PICTURE SEQUENCES

	REL	D.G	NW	WT	WCL	CLT	MA	LEF	RGH	NS	SUB	CON	CLA	REF	SBN	ELL	COJ	AND	CNN	LEX	ATT	COH
REL	--------																					
DG	.568**	------																				
NW	-.349	-.588**	-----																			
WT	-.415*	-.352*	.522**	-----																		
WCL	-.413*	-.081	.143	.620**	--------																	
CLT	-.360*	-.375*	.654**	.781**	.178	-------																
MA	.389*	.341	-.436*	-.678*	-.363*	-.660**	--------															
LEF	-.305	-.173	.414*	.504**	.317	.499**	-.305	-------														
RGH	-.445*	-.428*	.561**	.683**	.193	.799**	-.732**	.196	--------													
NS	.396*	.433*	-.274	-.267	-.286	-.302	.350*	-.068	-.399*	-------												
SUB	-.101	.407*	.441*	.195	.151	.100	-.194	.188	.188	-.262	-------											
CON	.198	-.046	.385*	.018	-.089	.287	.046	.152	.152	-.199		-------										
CLA	.414*	.091	.241	-.146	-.218	.116	.253-	-.054	-.054	--------	--------	--------	--------									
REF	-.746**	-.520**	.463**	.347	.283	.372*	-.248	.523**	.335	-.437*	.090	.065	-.132	--------								
SBN	-.090	-.538**	.322	-.124	-.250	-.043	.047	.135	-.001	-.088	.458	.130	.145	.193	------							
ELL	-.122	-.242	.047	.214	-.082	-.229	-.095	-.236	-.076	.010	.242	-.244	-.221	.103	.032	-----						
COJ	-.235	-.349	.479**	.384*	.093	.439*	-.370*	.429*	.436*	-.062	.335	.125	.065	.233	.071	.090	--------					
AND	-.546**	-.382*	.199	.175	.159	.096	-.162	.207	.327	-.139	.273	-.404*	-.437*	.495**	.048	.371*	-------	-------				
CNN	-.439*	-.394*	.364*	.282	.117	.292	-.294	.367*	.392*	-.147	.364*	-.172	-.236	.407*	.046	.194	--------	--------	--------			
LEX	-.716**	-.615**	.484**	.581**	.413*	.572**	-.488**	.352*	.579**	-.610**	.150	.009	-.289	.623**	.160	.036	.173	.327	.820**	--------		
ATT	.321	.258	-.196	-.161	-.281	-.112	.326	-.036	-.203	.363*	-.006	.008	.205	-.365*	-.027	-.095	.199	.052	.205	-.533**	--------	
COH	-.789**	-.658**	.576**	.589**	.426*	.563**	-.490**	.556**	.545*	-.558**	.215	-.001	-.267	------	-------	-------	------	.546**	.564**	--------	-.298	-------
FLU	.129	.197	.086	.087	-.018	.156	-.048	.387*	-.126	.104	.223	.346	.304	.041	-.336	.053	.019	-.215	-.070	.019	.203	-.063

REL=Relevance DG=Discourse grammar CLA=Total Clarity disruptors NSP=Non-specific CON=Content and fluency CLT=clausal embedding WCL=Clause length
WT=T-unit-length COH=Total cohesion REF=Reference COJ=Conjunction LEX=Lexicalisation ATT=Attempted cohesion DYSF=Dysfluencies
*p<.05(2-tailed)**p<.01 (2-tailed)

PROCEDURES

	REL	D.G	NW	WT	WCL	CLT	MA	LEF	RGH	NS	SUB	CON	CLA	REF	SBN	ELL	COJ	AND	CNN	LEX	ATT	COH
REL	--------																					
DG	.620**	------																				
NW	.050	-.394*	-----																			
WT	-.287	-.619**	.573**	-----																		
WCL	-.174	-.503**	.629**	.794**	--------																	
CLT	-.213	-.418*	.306	.742**	.357*	--------																
MA	.279	.552**	-.524**	-.911**	-.672**	-.691**	--------															
LEF	.049	-.387*	.654**	.410*	.453**	.228	-.428*	--------														
RGH	-.351*	-.473**	.312	.860**	.574**	.718**	-.926**	.150	--------													
NS	.155	.350*	.089	-.242	.073	-.501**	.205	-.001	-.210	--------												
SUB	.096	-.392*	.417*	.562**	.380*	.470**	-.566**	.324	.529**	-.285	--------											
CON	.239	.060	-.057	-.034	-.181	.043	.024	-.139	.118	-.050	.125	--------										
CLA	.204	.020	.109	-.018	-.065	-.065	.008	-.077	.084	------	-------	-------	-------									
REF	-.099	-.274	.205	.291	.242	.163	-.222	.383*	.164	-.178	.269	-.002	-.007	---------								
SBN	-.126	-.120	-.074	.378*	.146	.356*	-.396*	-.039	.414*	-.328	.364*	-.305	-.332	.272	--------							
ELL	.126	-.180	.297	.140	.175	.095	-.241	.169	.133	-.138	.188	.162	.173	-.019	-.014	-------						
COJ	-.152	-.174	.452**	.520**	.533**	.397*	-.588**	.365*	.524**	-.050	.303	-.107	.017	.170	.202	-.074	--------					
AND	-.155	-.052	.013	-.027	.107	-.063	.048	.166	-.085	-.084	-.042	-.136	-.018	.207	-.069	-.041	.236	--------				
CNN	-.239	-.177	.302	.371*	.437*	.293	-.394*	.303	.346	-.043	.138	-.160	-.012	.184	.058	-.116	-------	--------	--------			
LEX	-.367*	-.743**	.378*	.690**	.526**	.612**	-.632**	.403*	.551**	-.534**	.393*	-.108	-.096	.349	.338	.134	.317	.317	.332	-------		
ATT	-.385*	.110	-.410*	-.311	-.353*	-.187	.181	-.366*	-.054	.111	-.352*	-.073	-.091	-.173	-.212	-.373*	.048	-.008	.057	-.282	--------	
COH	-.300	-.591**	.398*	.723**	.572**	.579**	-.697**	.404*	.626**	-.466**	.476**	-.116	-.072	-------	-------	--------	--------	.243	.492**	-------	-.214	-------
FLU	.138	.204	.323	.163	.196	.279	-.237	.379*	.144	-.039	.119	-.210	-.210	.042	.100	.141	.288	.161	.222	.074	-.204	.110

REL=Relevance DG=Discourse grammar CLA=Total Clarity disruptors NSP=Non-specific CON=Content and fluency CLT=clausal embedding WCL=Clause length WT=T-unit-length COH=Total cohesion REF=Reference COJ=Conjunction LEX=Lexicalisation ATT=Attempted cohesion DYSF=Dysfluencies
*p<.05(2-tailed)**p<.01 (2-tailed)

APPENDIX A21

PERMISSION, CONSENT AND INFORMATION FORMS

A21.1: Permission from GP to contact patient

Dear Dr.............

Re:...................... (patient)

I have obtained ethical permission from the Leicestershire Health Authority (Ref. No. 3672) to conduct research into the conversational difficulties experienced by patients who have suffered a right hemisphere stroke.

I am writing to request your permission to include one of your patients, named above, in my study. I will be contacting the patients myself to request their participation and will arrange to interview them in their own homes at their convenience.

Would you please notify me if you have any objections to this or require any further information about my study. If I have not heard from you by the................, I will assume that I may go ahead and make contact.

Yours sincerely

SUE SHERRATT
Speech-Language Therapist
Postgrad - University College London

A21.2: Request for medical information from GP

Dear Dr ....

Re:..................... (patient)

I wrote to you some time age regarding the abovementioned patient. I have obtained ethical permission from the Leicestershire Health Authority (Ref. No. 3672) to conduct research into the conversational difficulties experienced by patients who have suffered a right hemisphere stroke.

I would be very grateful if you could provide me with details of the CVA which he suffered. I enclose a copy of the consent form which he signed giving me consent "to obtain any medical information relevant to my stroke that she may need for her research". Please could you complete the brief form below and return it to me in the stamped self-addressed envelope enclosed.

Thank you very much for your time.

Yours sincerely

SUE SHERRATT
Speech-Language Therapist
Postgrad. Student - University College London

....

Re: ....

Hemisphere affected by lesion Right..................... Left........................

Type of CVA

....

Lobes affected:-

....

Cerebral artery/ies affected

....

Any other details/comments

....

....

A21.3: Request for participation and information letter for subject

Dear Mr ....

I am doing a study to find out how strokes affect people's ability to talk. I am especially interested in how people talk about what they have done during their lives and also how they would explain to someone else how they would do everyday tasks.

I would like to talk to you and to tape-record what you say. I would also ask you to do some other tasks e.g. naming pictures, repeating numbers, etc. I would do this at your convenience and in your own home. It would take about two to three hours, spread over as many visits as necessary. I have already seen a number of people and they have enjoyed it

I hope that the information which I get from you and others will lead to better treatment for people who have communication difficulties after a stroke.

I would be very grateful if you would complete the form below and send it back to me in the enclosed stamped addressed envelope. If you change your mind about helping, you could of course withdraw at any stage and this would not affect your future care or treatment.

Thank you very much for your time and effort.

Yours sincerely

SUE SHERRATT
Speech and Language Therapist

To Sue

|__| Yes, I am happy to help by talking to you. Please phone to arrange a time. I know I can stop at any time if I want to. I also give my consent to you to get the medical information you need about my stroke from my doctor or hospital.

Signed: ______________________________

|__| I am not sure whether to help or not. Can you phone me to give me more details?

|__| No, I do not feel able to help.

From: ....

Tel: .... I am right / left-handed

A21.4: Subject consent form

I ,..

living at

....

....

....

agree to take part in the study of communication skills following strokes being carried out by Sue Sherratt.

I understand that I will spend three to four sessions (one hour each) with Sue, doing a variety of talking and writing activities. I know that I can withdraw at any stage and this would not affect my future care or treatment.

I have also been told that part of our discussions will be audiotaped for analysis at a later time. All the data obtained will be completely confidential and no identifying information will be presented in any oral or written reports.

Furthermore, I give consent to Sue to obtain any medical information relevant to my stroke that she may need for her research.

Signature:

....

Date:

....

APPENDIX A22

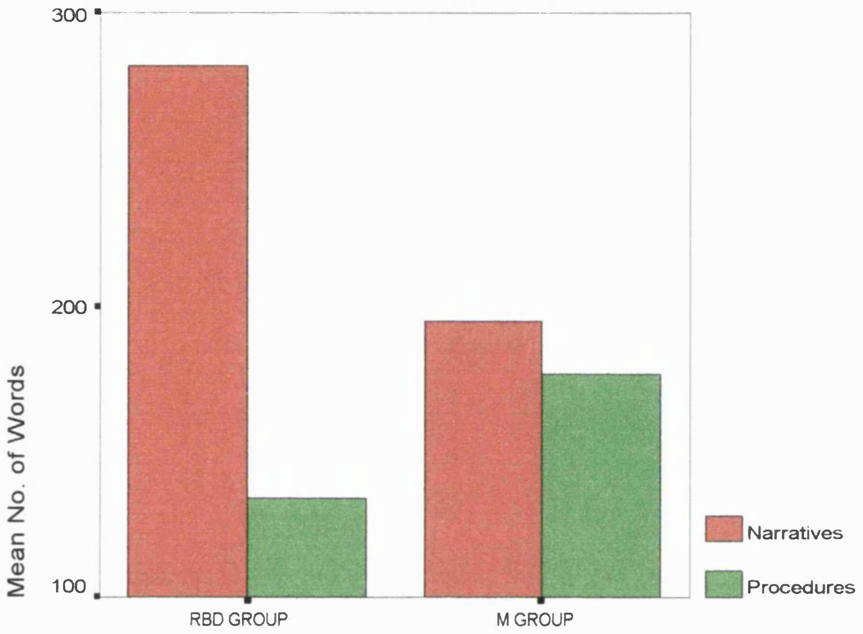
EFFECT OF GROUP (RBD AND MATCHED GROUP) ON TOPICS

The effect of group was determined using the Mann-Whitney Test with the significance of 0.05.

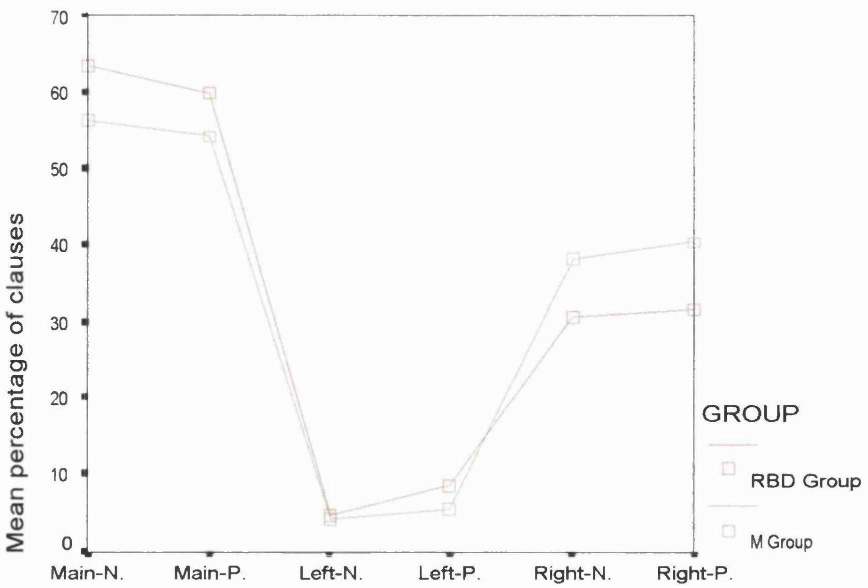
Measure	Fright	Funny	Stones	Wasp	Tyre	Window	Jacket	Bike
Relevance	.135	.629	.536	.834	.231	.908	.713	.148
DiscGrammar	.528	.256	.964	.926	.702	.954	.193	.167
Total Clarity	.205	.025*	.125	.022*	.002*	.221	.057	.011*
Non-specific	.435	.542	.235	.966	.610	.341	.497	.966
Word Sub	None	None	None	None	.751	.678	.190	None
Content & Flu	.039*	.002*	.274	.032*	.053	.678	.493	.006
Length	.626	.349	1.000	.800	1.000	.441	.375	.236
T-unit	.558	.132	.139	.069	.933	.221	.554	.398
Clause	.171	.158	.236	.611	.107	.717	.800	.832
Clausal embed	.844	.022*	.309	.061	.349	.437	1.000	.214
Main Clause	.770	.160	.253	.016*	.866	.298	.611	.076
Right branch.	.464	.399	.219	.013*	.397	.204	.352	.099
Left branch	.769	.067	.888	.493	.152	.393	.156	.898
Total Coh	.624	.239	.290	.641	.446	.819	.196	.421
Reference	.517	.849	.734	.932	.637	.408	.394	.218
Substitutive	.453	.487	.063	.303	.472	.846	.077	.695
Ellipsis	.566	.026*	.813	.266	.259	.727	.087	.722
Conjunction	.755	.633	.490	.795	.463	.613	.343	1.000
And	.148	.102	.569	.277	.966	.890	.483	.931
Connectives	.136	.087	.932	.701	.898	.680	.251	.966
Lexical	.961	.962	.117	.252	.309	.363	.522	.734
Attempts	.131	.670	.183	.442	.004*	.068	.594	1.000
Dysfluencies	.130	.049*	.069	.147	.288	.316	.203	.288

*= significant

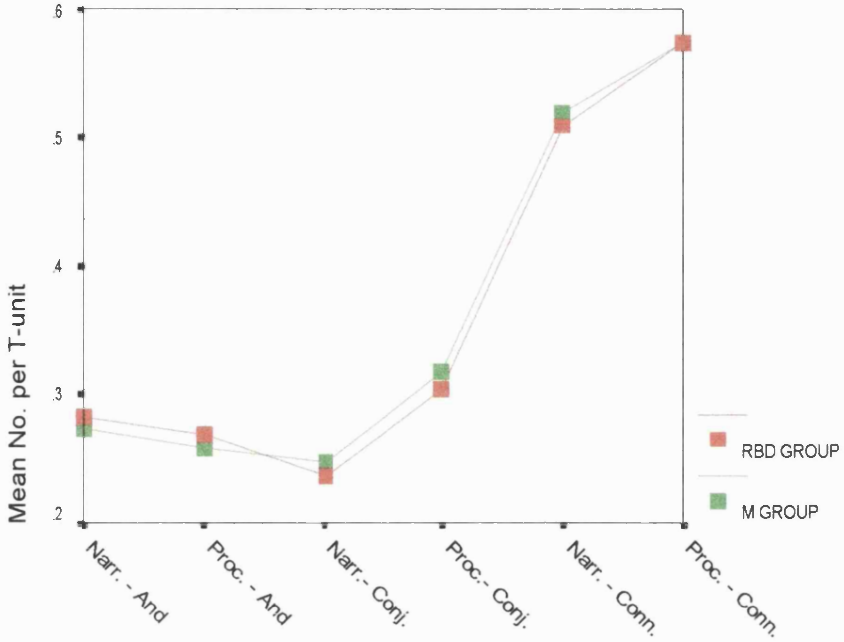
Appendix A23
Group Effects on Discourse Genre



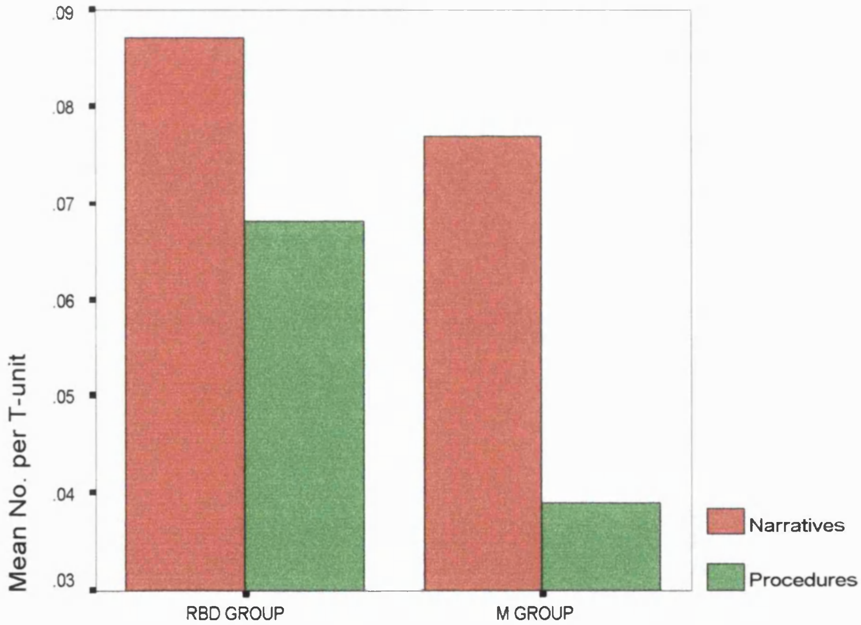
Graph A23.1: Group effect on sample length of two genres



Graph A23.2: Group effect on clausal structure in two genres

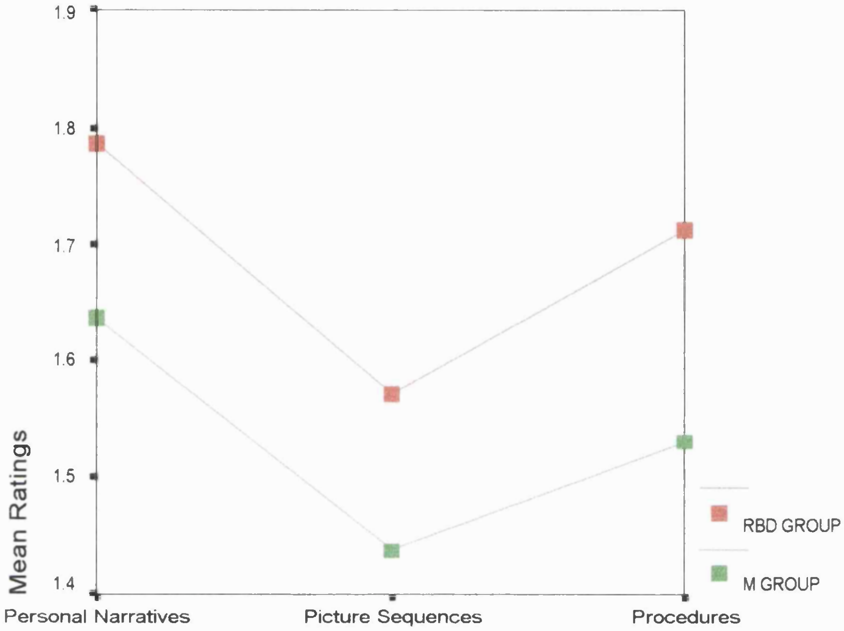


Graph A23.3: Group effect on "and", conjunctions and connectives in two genres

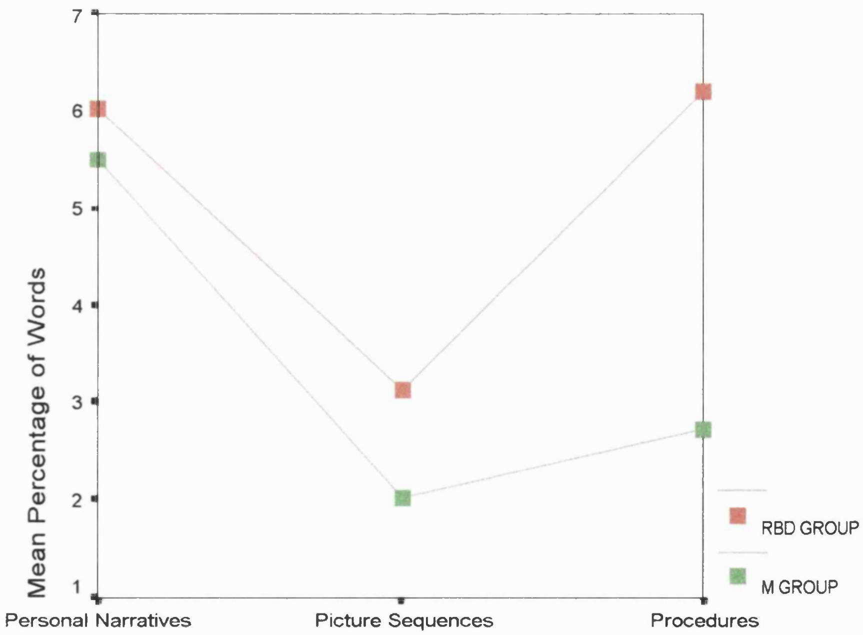


Graph A23.4: Group effect on attempted cohesion in two genres

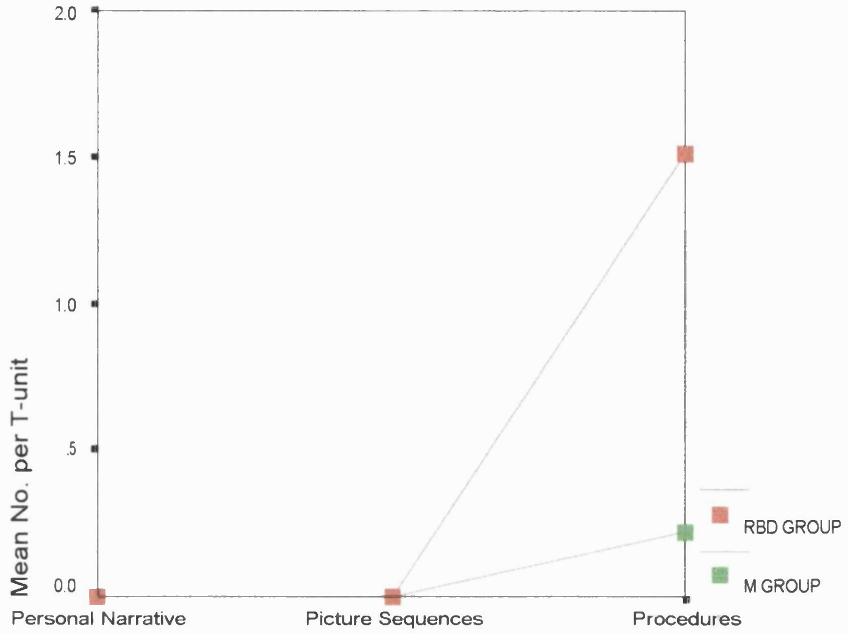
Appendix A24
Group Effects on Discourse Tasks



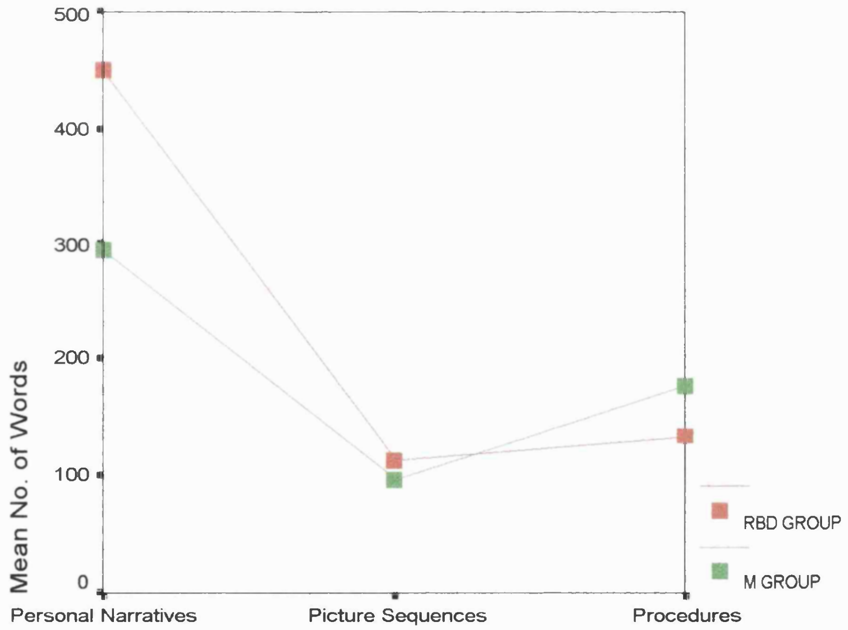
Graph A24.1: Relevance ratings of tasks by RBD and M groups



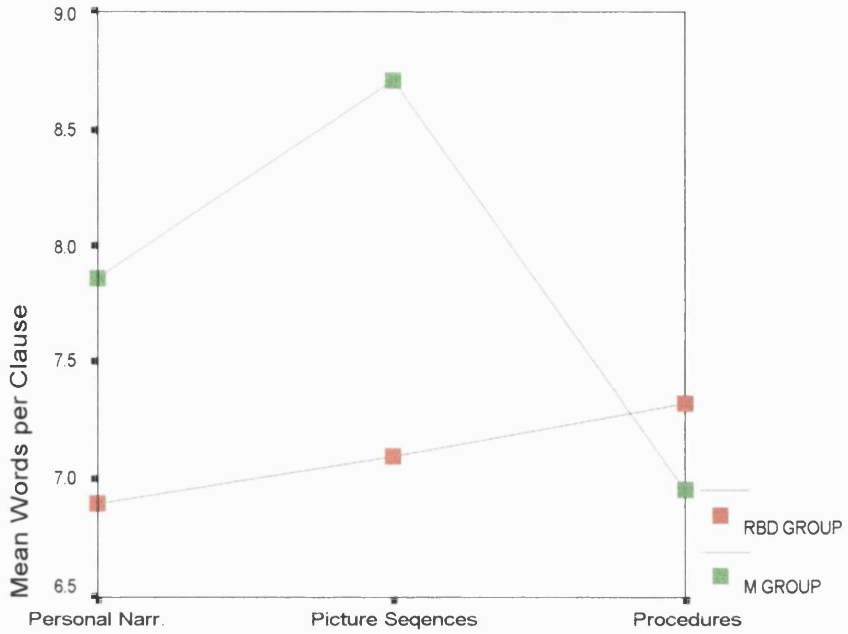
Graph A24.2: Non-specific elements of tasks by RBD and M groups



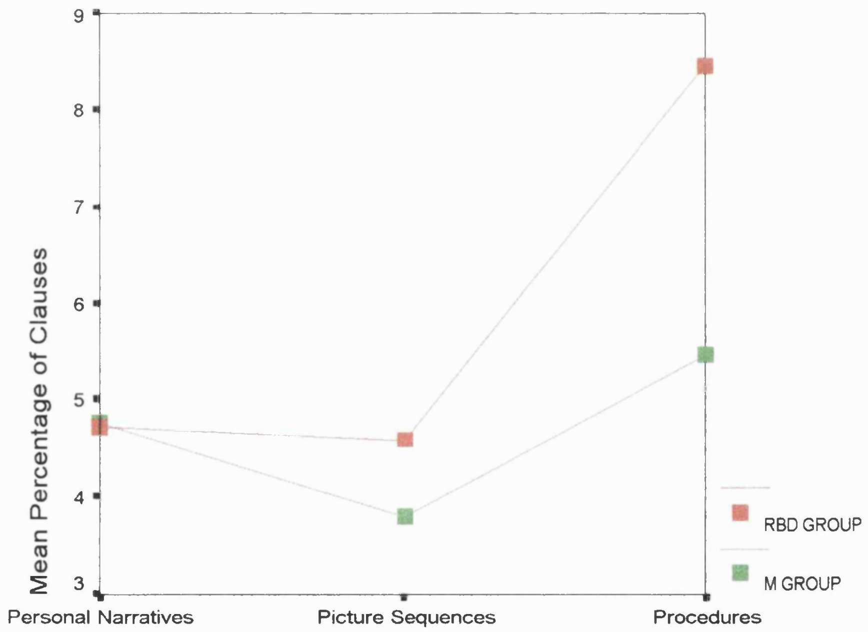
Graph A24.3: Word substitutions in tasks of RBD and M groups



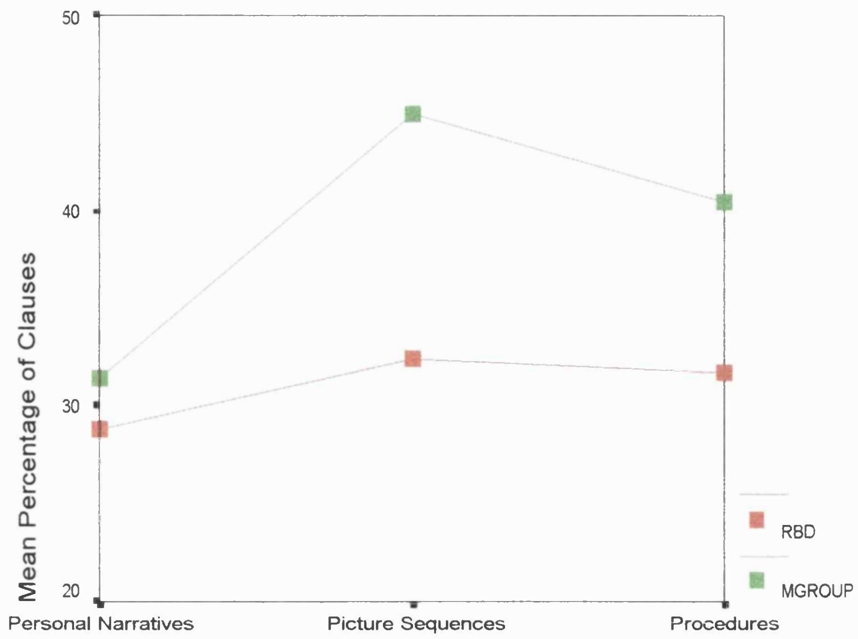
Graph A24.4: Sample lengths of tasks by RBD and M groups



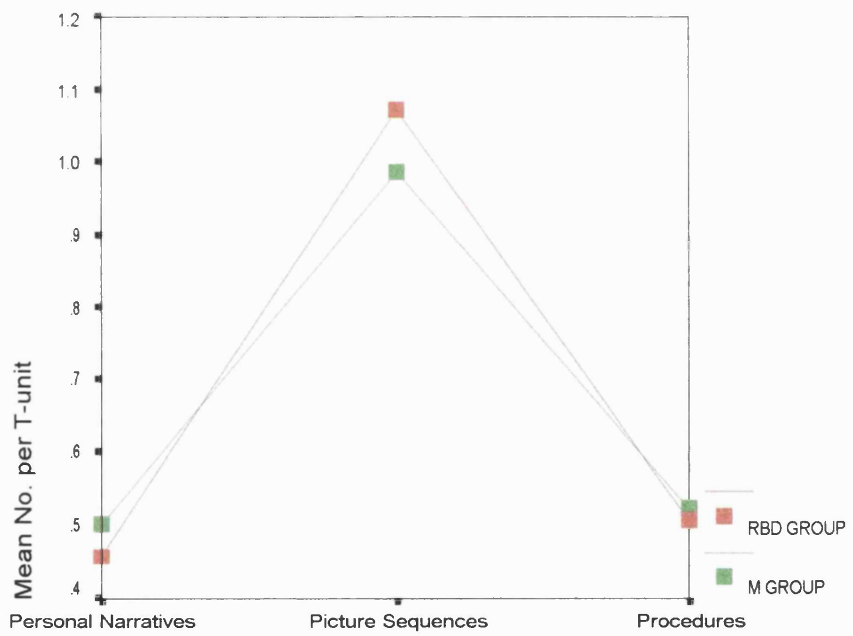
Graph A24.5: Clause length of tasks by RBD and M groups



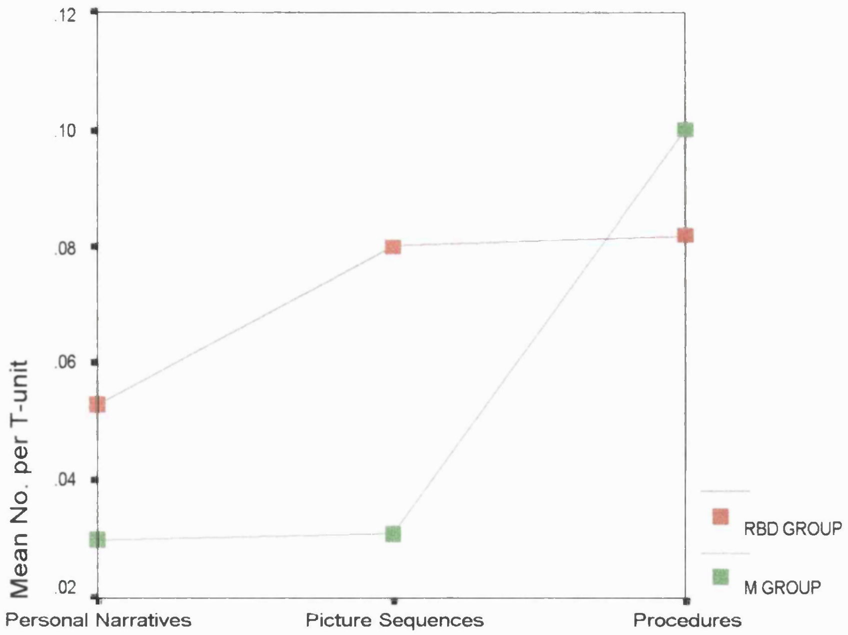
Graph A24.6: Left-branching clauses of tasks by RBD and M groups



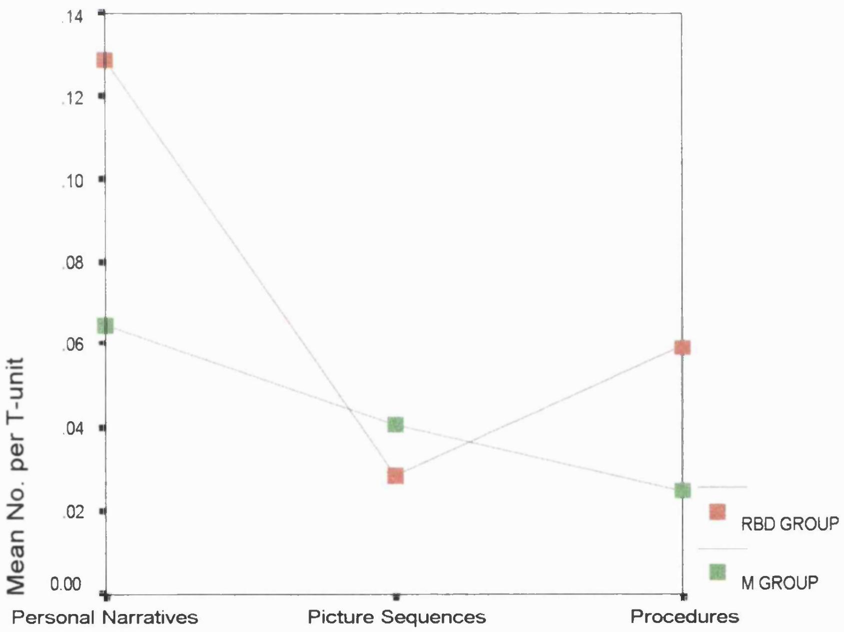
Graph A24.7: Right-branching clauses of tasks by RBD and M groups



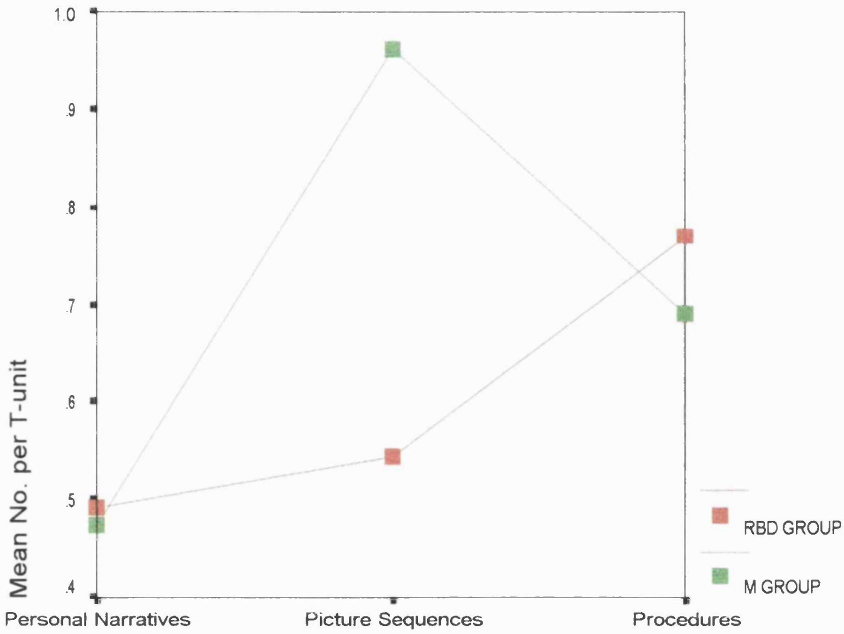
Graph A24.8: Reference in tasks by RBD and M groups



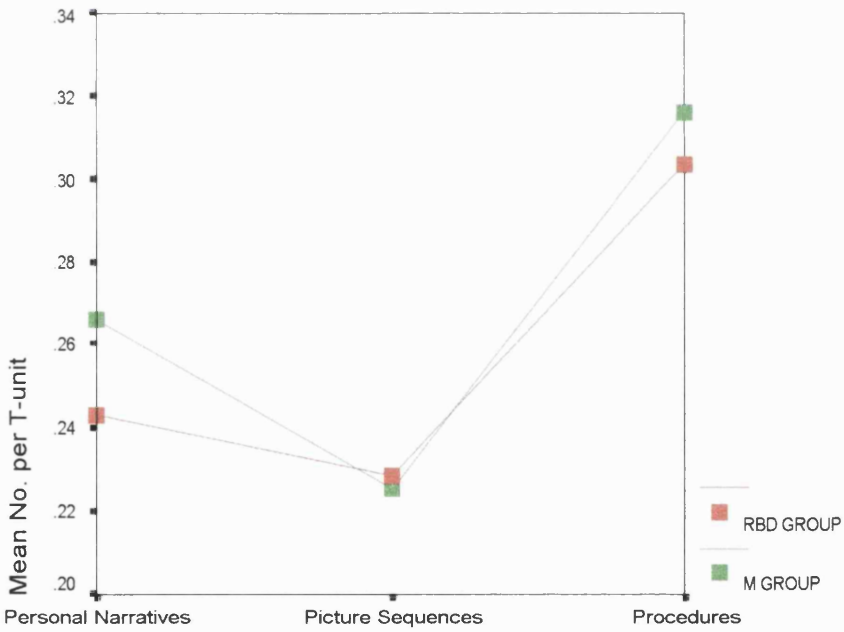
Graph A24.9: Substitution cohesion in tasks by RBD and M groups



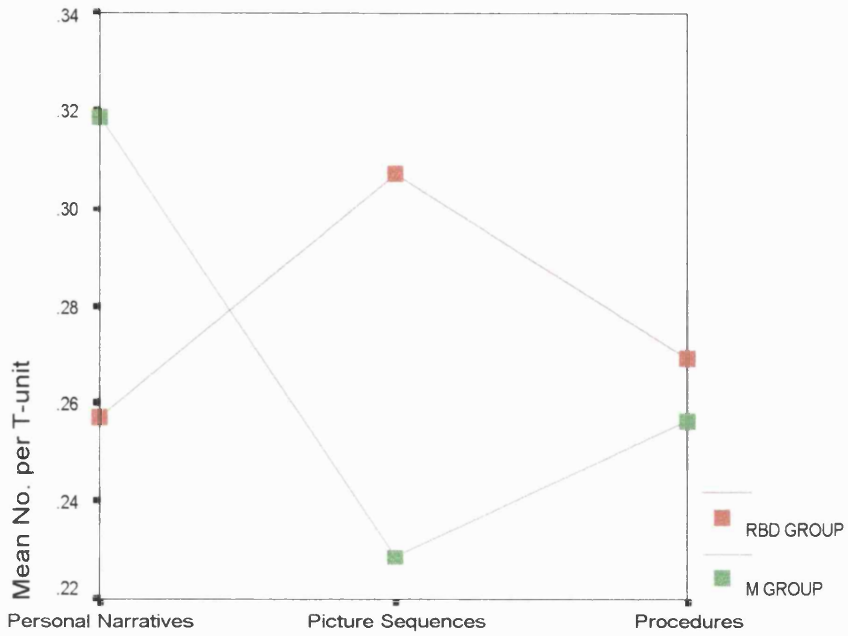
Graph A24.10: Ellipsis in tasks by RBD and M groups



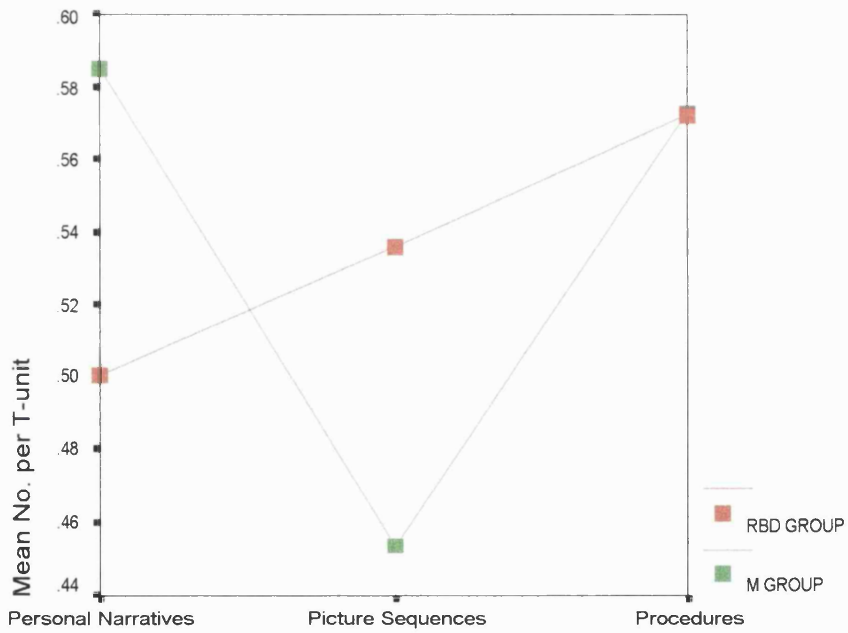
Graph A24.11: Lexicalisation in tasks by RBD and M groups



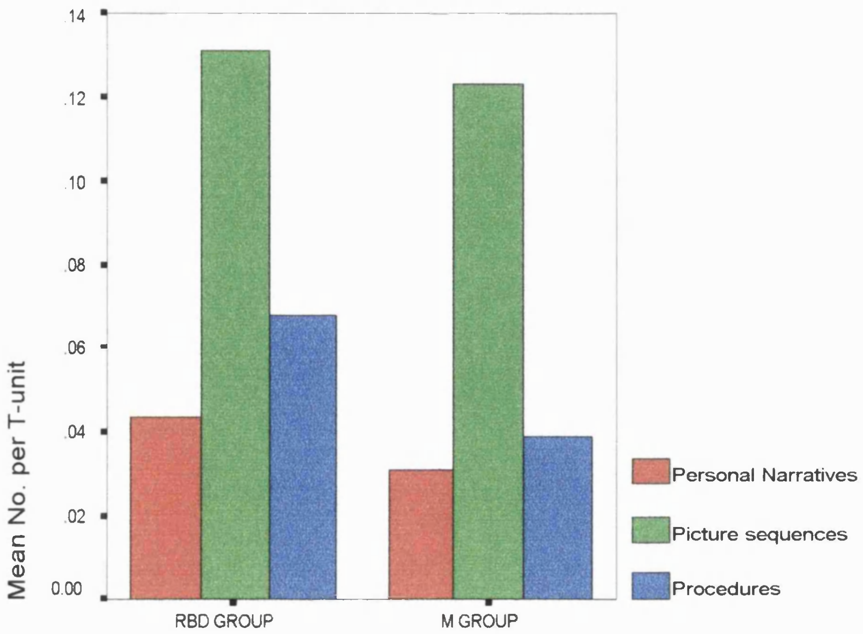
Graph A24.12: Conjunctions in tasks of RBD and M groups



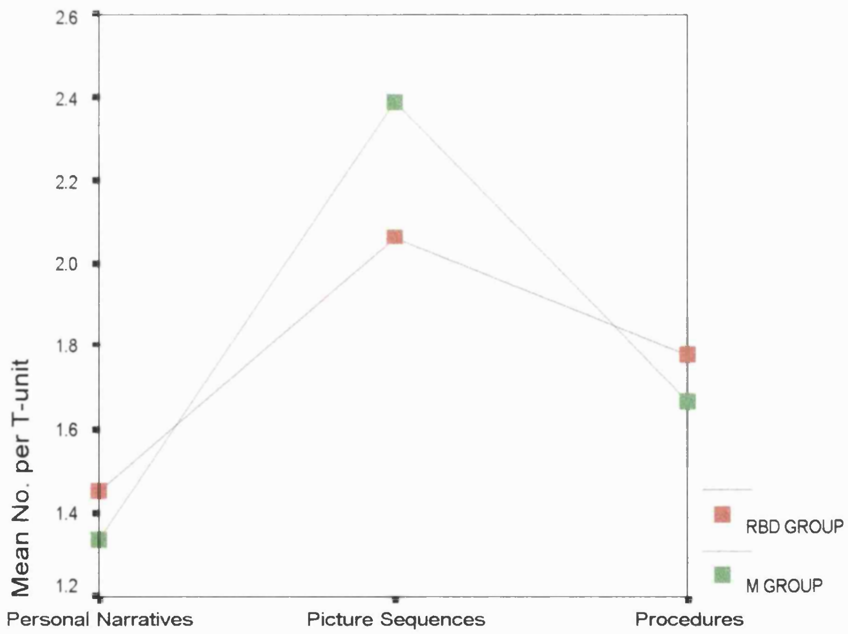
Graph A24.13: "And" in tasks in RBD and M groups



Graph A24.14: Connectives in tasks by RBD and M groups



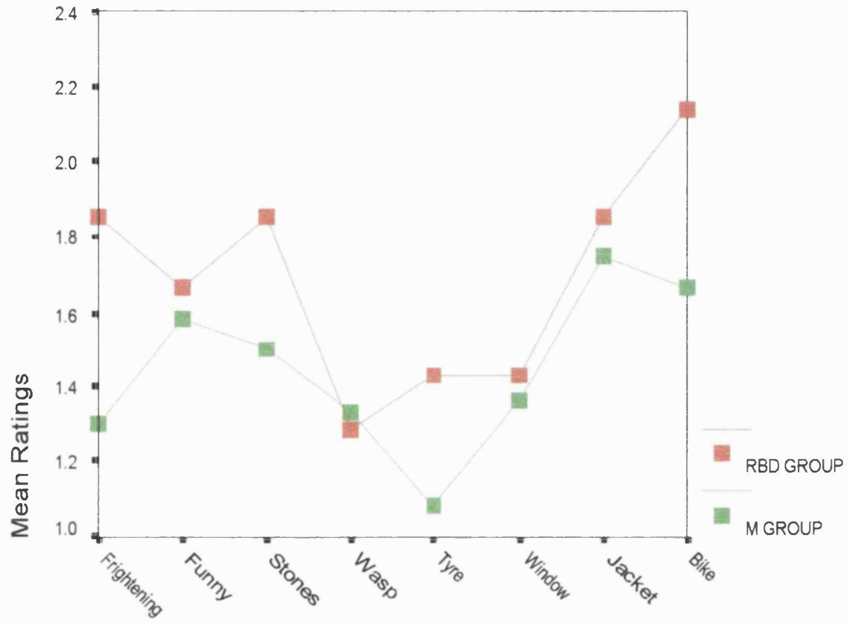
Graph A24.15: Attempted cohesion in tasks by RBD and M groups



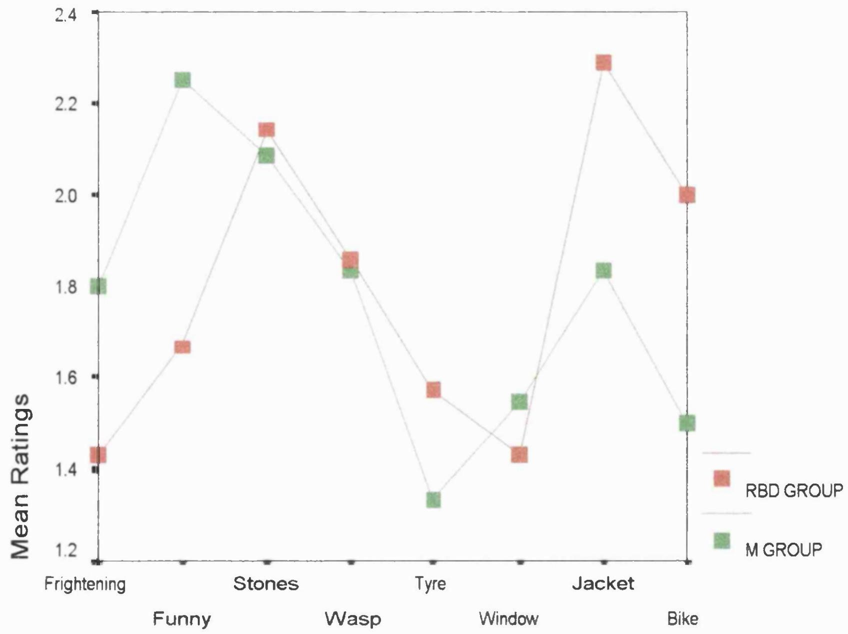
Graph A24.16: Total cohesive ties in tasks of RBD and M groups

Appendix A25

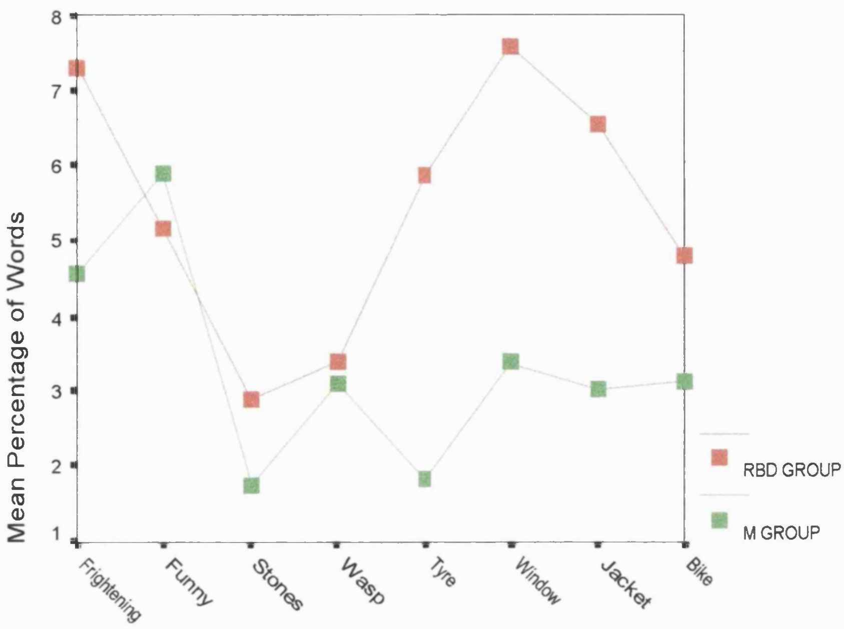
Group Effects on Discourse Topics



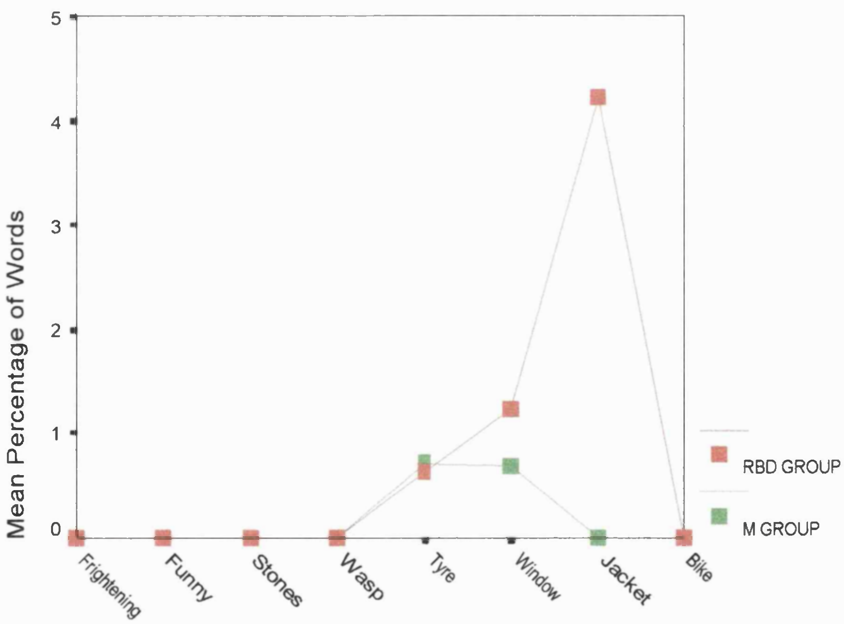
Graph A25.1: Relevance in topics of RBD and M groups



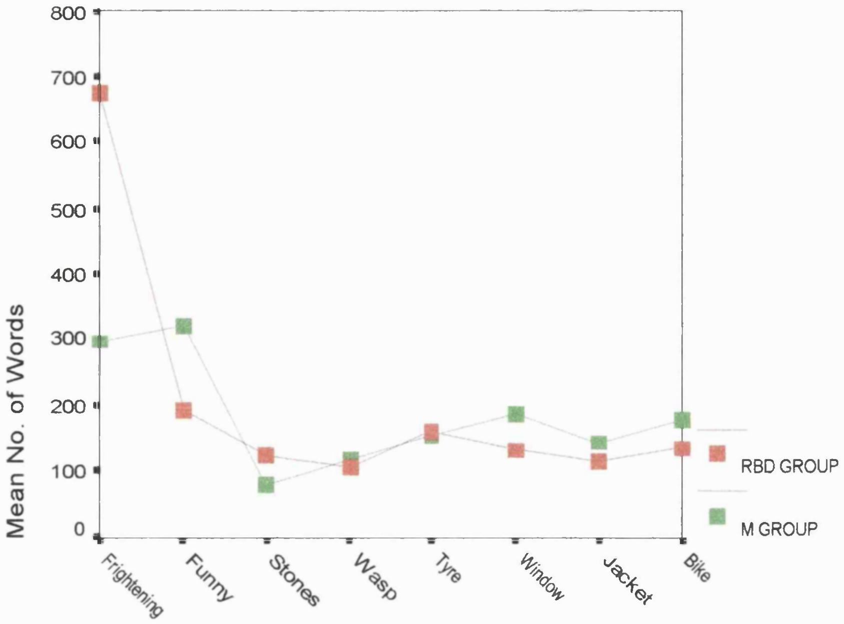
Graph A25.2: Discourse grammar in topics of RBD and M groups



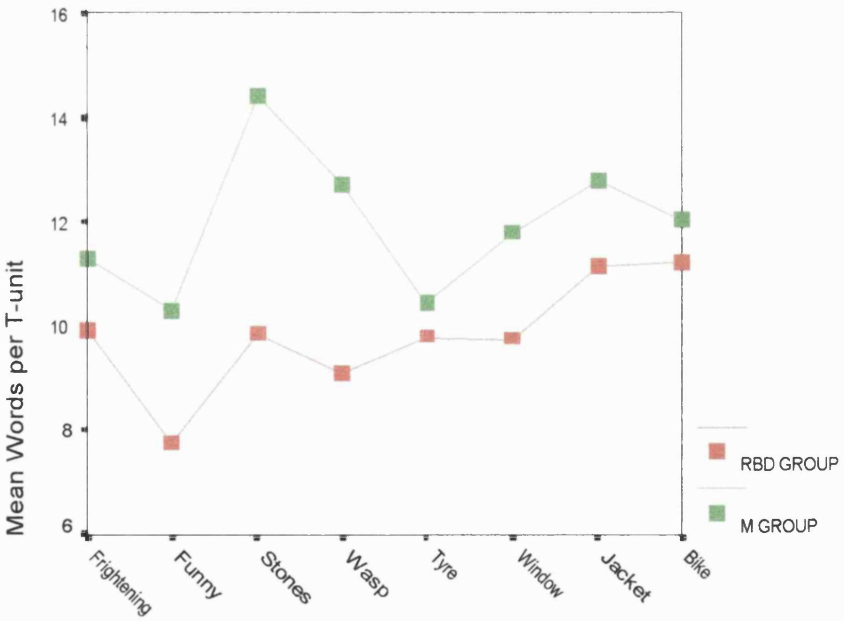
Graph A25.3: Non-specific elements in topics of RBD and M groups



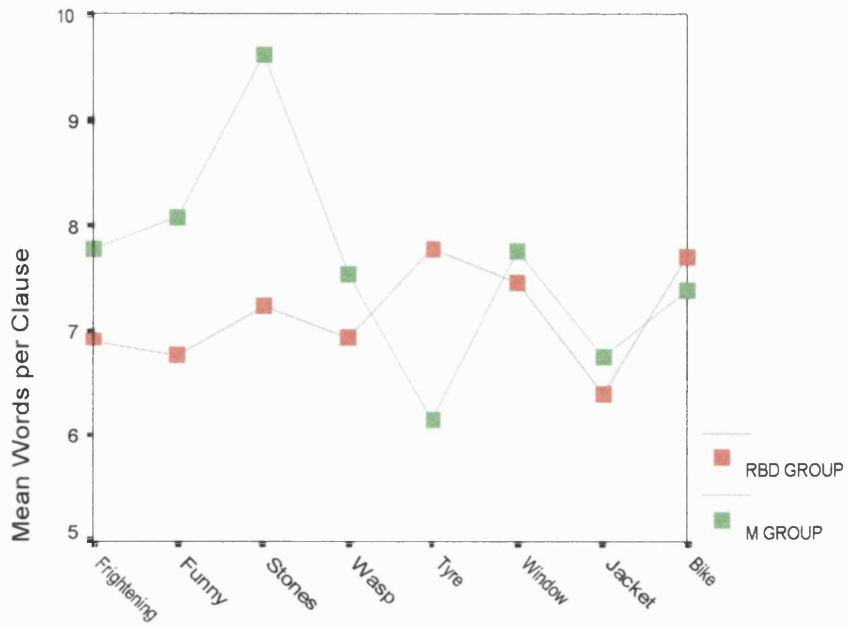
Graph A25.4: Word substitutions in topics of RBD and M groups



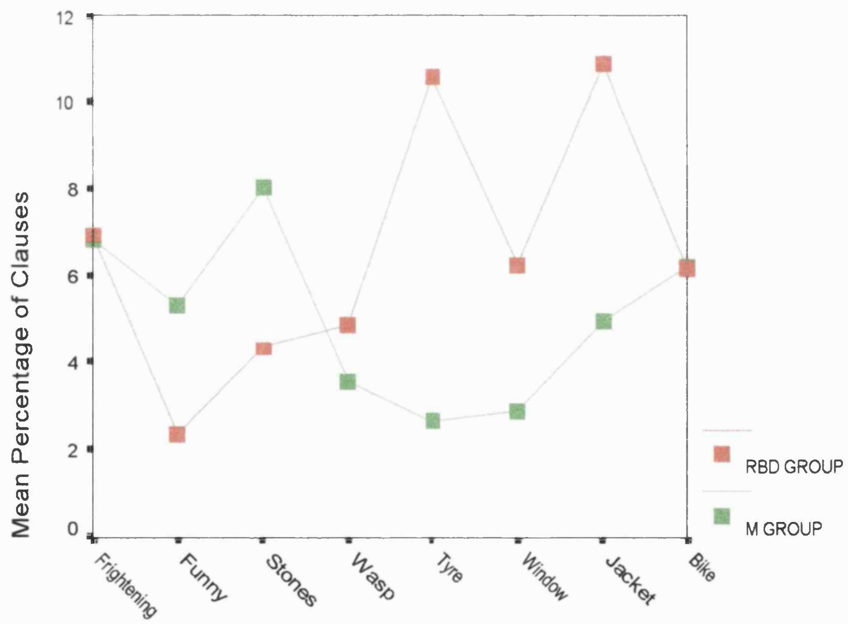
Graph A25.5: Length in topics of RBD and M groups



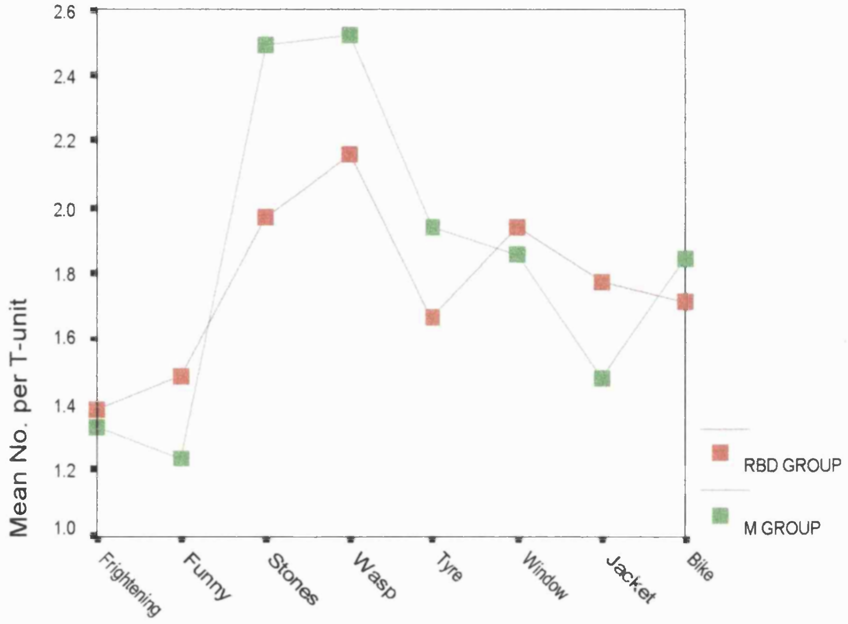
Graph A25.6: T-unit length in topics of RBD and M groups



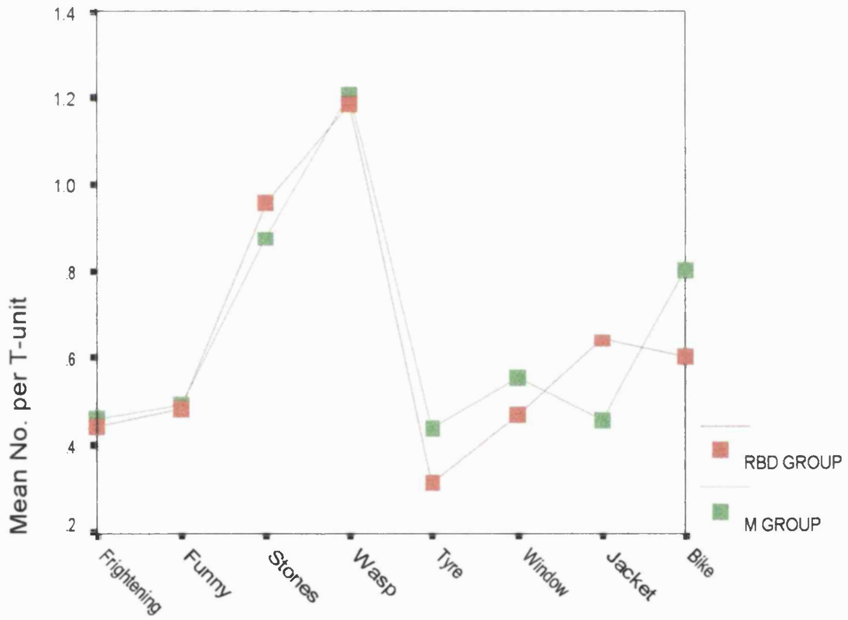
Graph A25.7: Clause length in topics of RBD and M groups



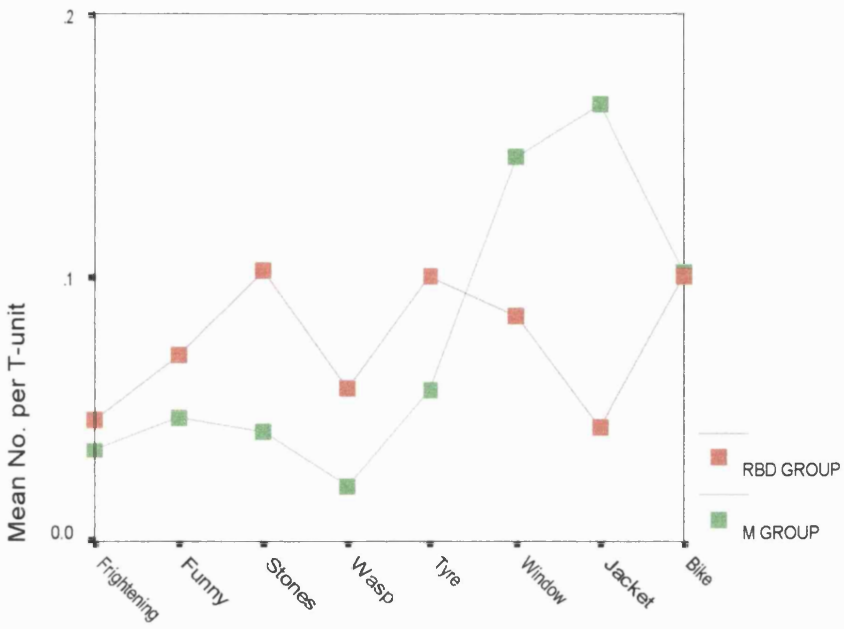
Graph A25.8: Left-branching clauses in topics of RBD and M groups



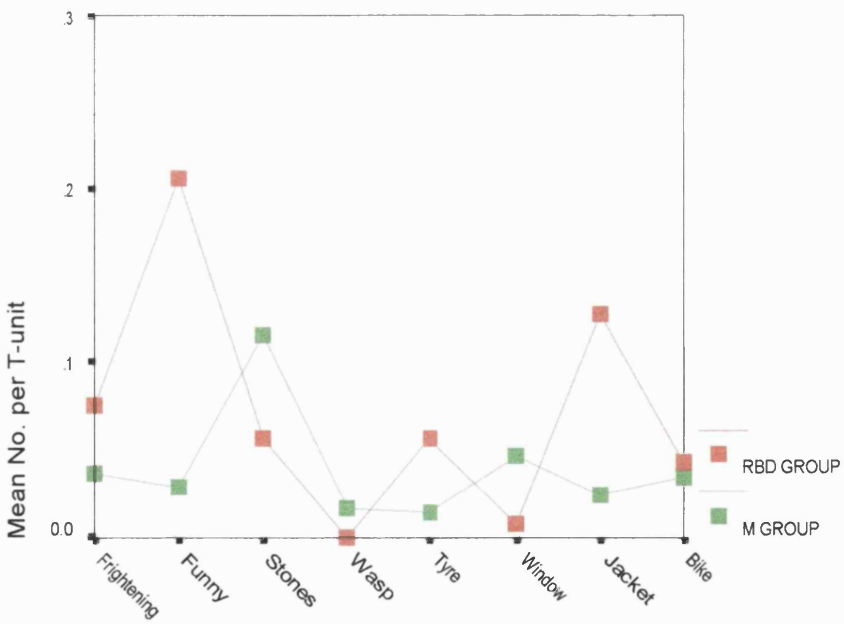
Graph A25.9: Total cohesive ties in topics of RBD and M groups



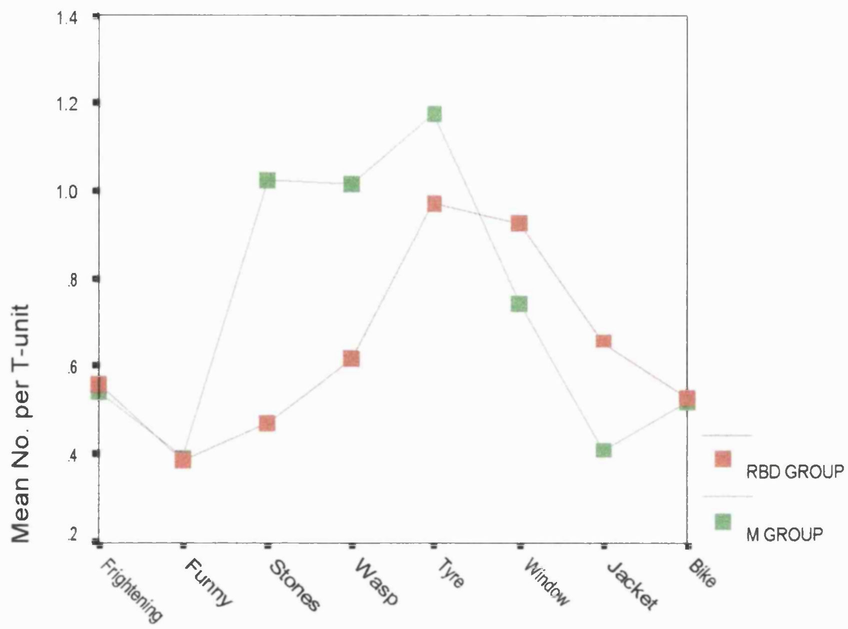
Graph A25.10: Reference in topics of RBD and M groups



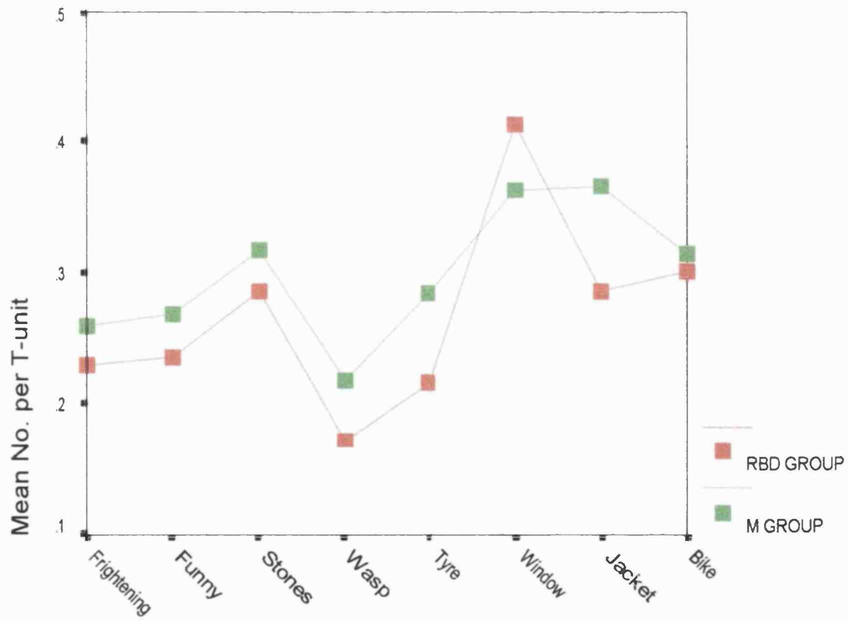
Graph A25.11: Substitutive cohesion in topics of RBD and M groups



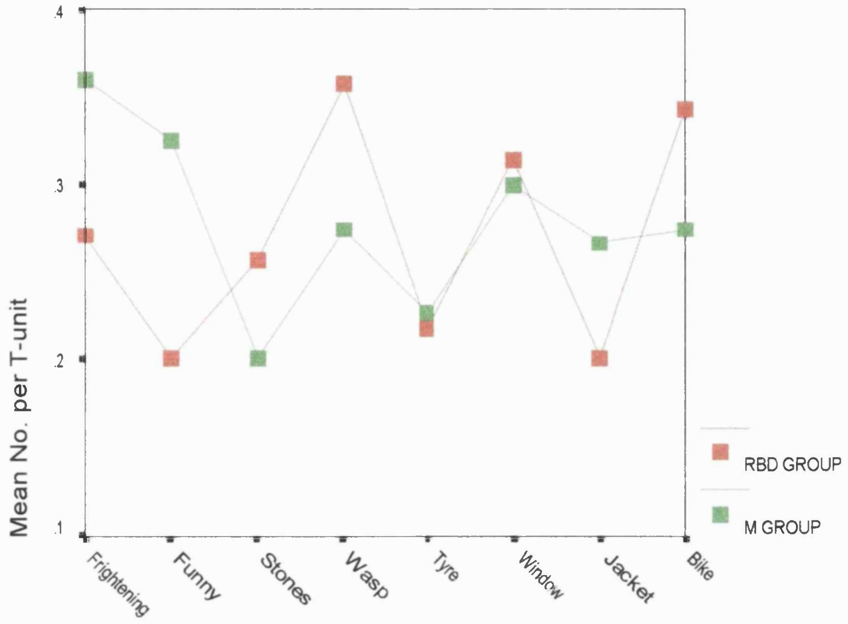
Graph A25.12: Ellipsis cohesion in topics of RBD and M groups



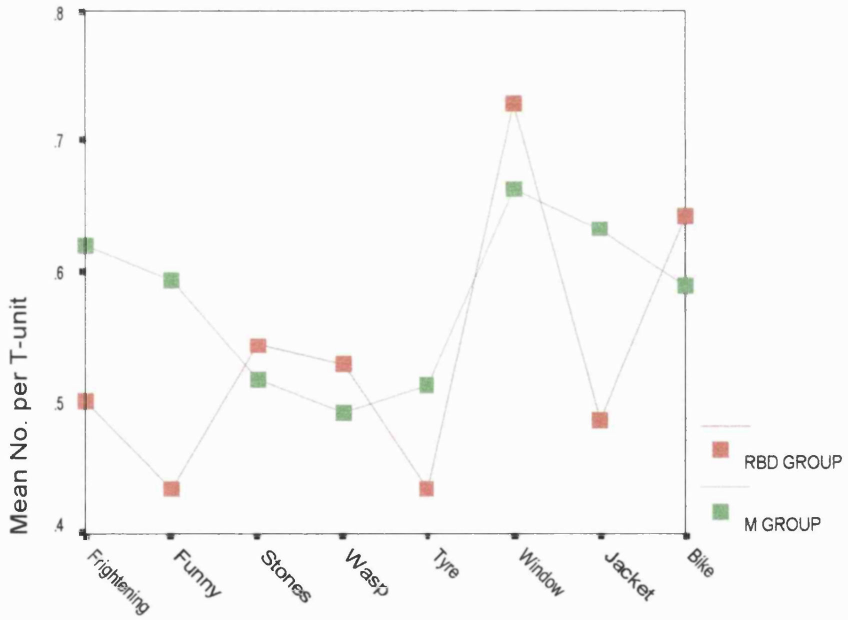
Graph A25.13: Lexical cohesion in topics of RBD and M groups



Graph A25.14: Conjunction cohesion in topics of RBD and M groups



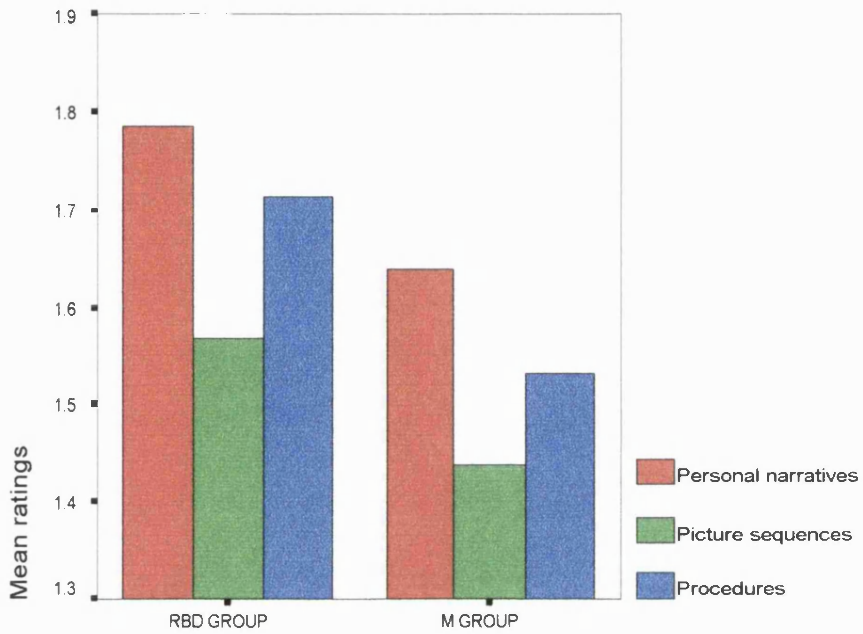
Graph A25.15: "And" in topics of RBD and M groups



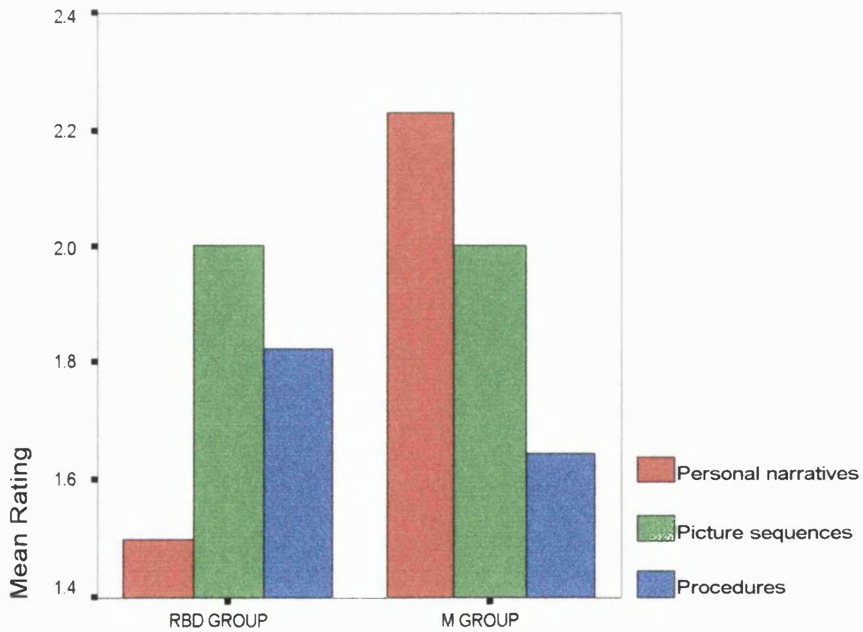
Graph A25.16: Connectives in topics of RBD and M groups

Appendix A26

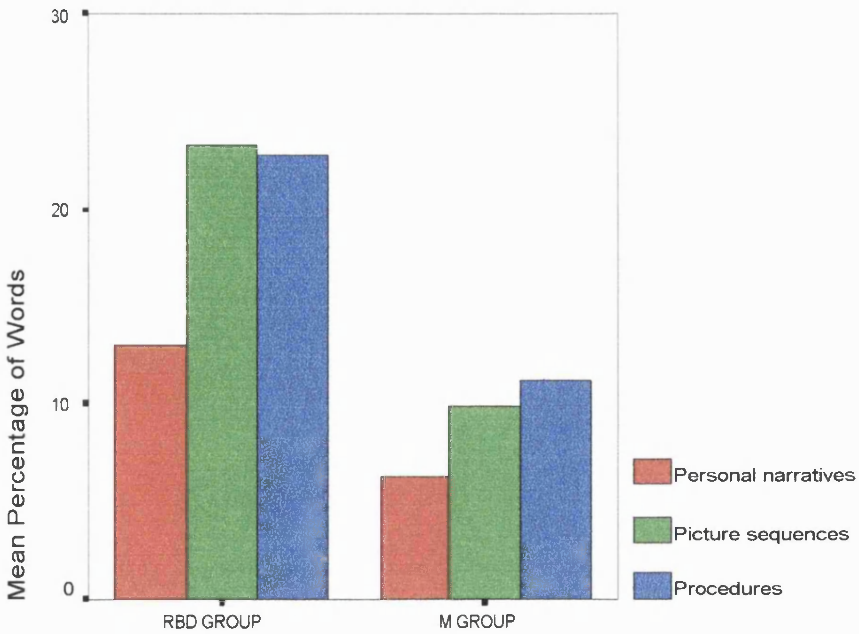
Task Effects on RBD and M Groups Discourse



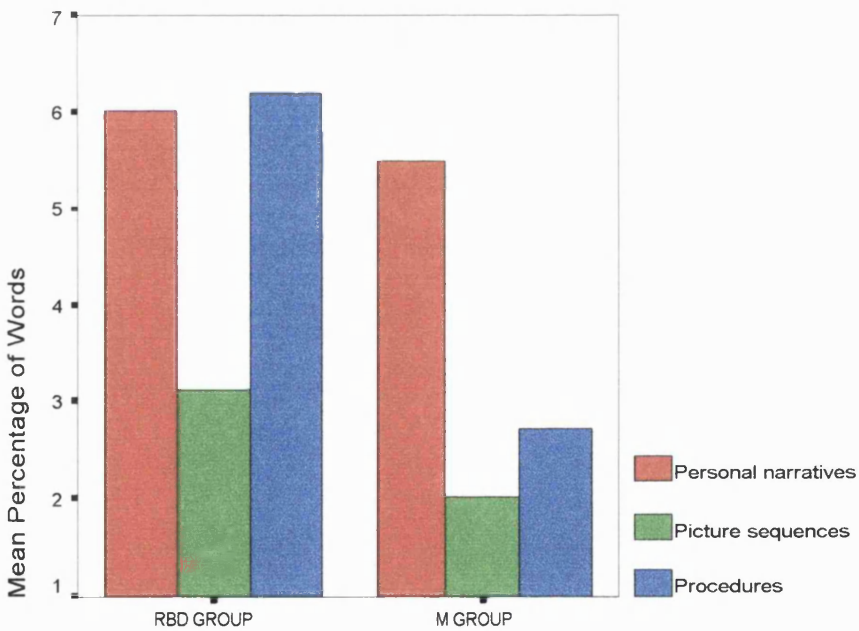
Graph A26.1: Task effect on relevance ratings of RBD and M groups



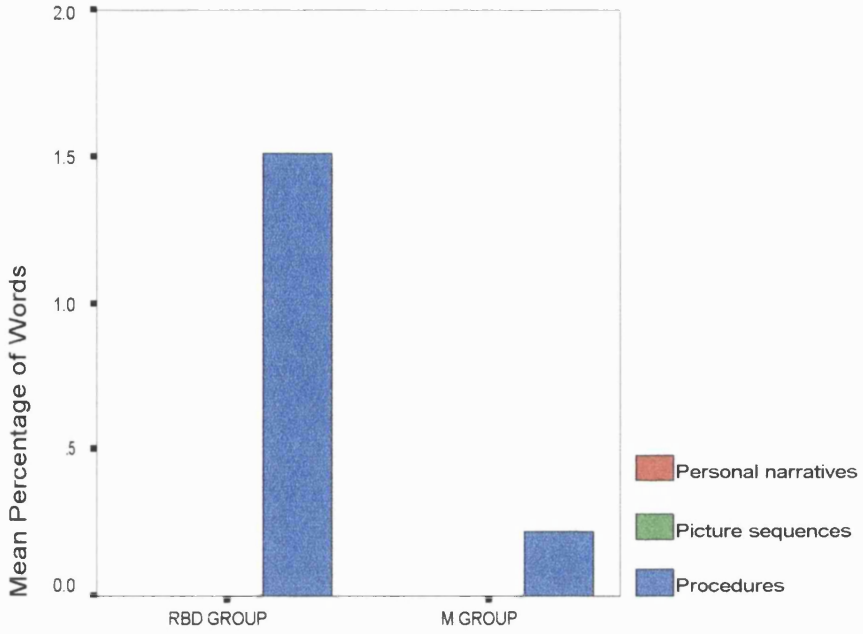
Graph A26.2: Task effect on discourse grammar of RBD and M groups



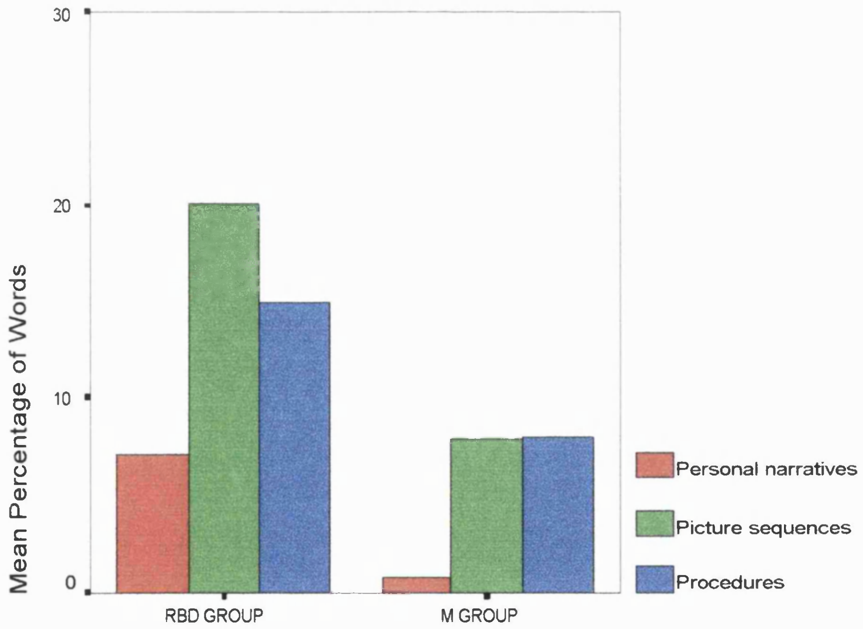
Graph A26.3: Task effect on total clarity disruptors in RBD and M groups



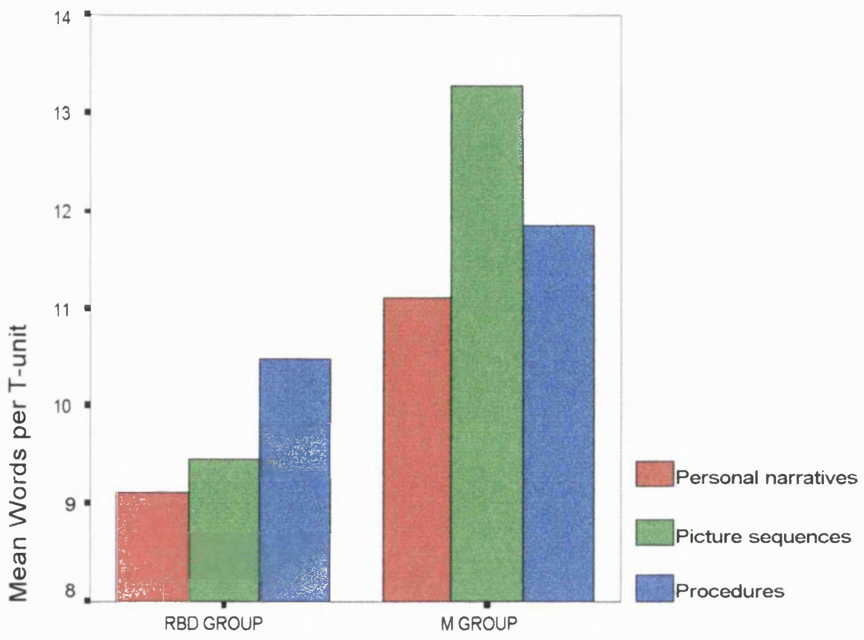
Graph A26.4: Task effect on non-specific elements in RBD and M groups



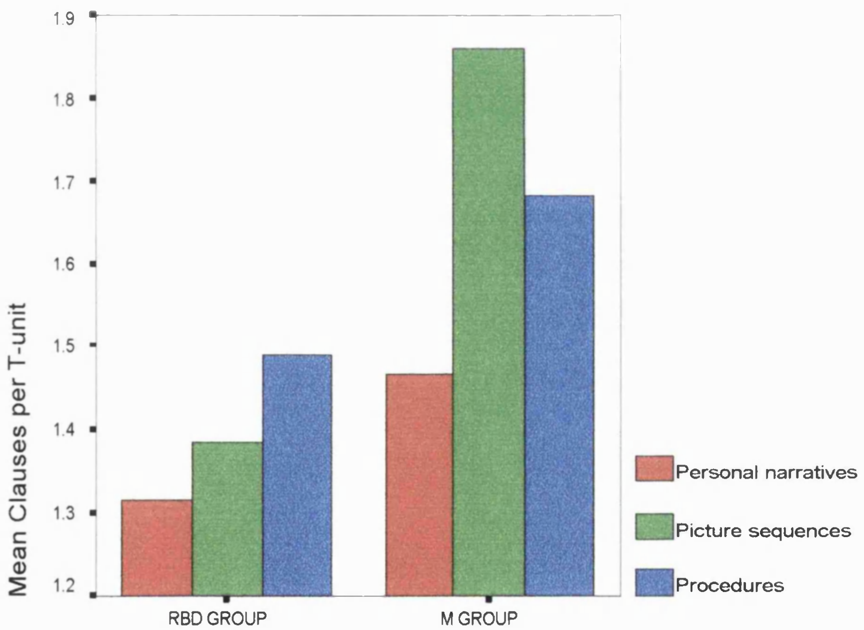
Graph A26.5: Task effect on word substitutions in RBD and M groups



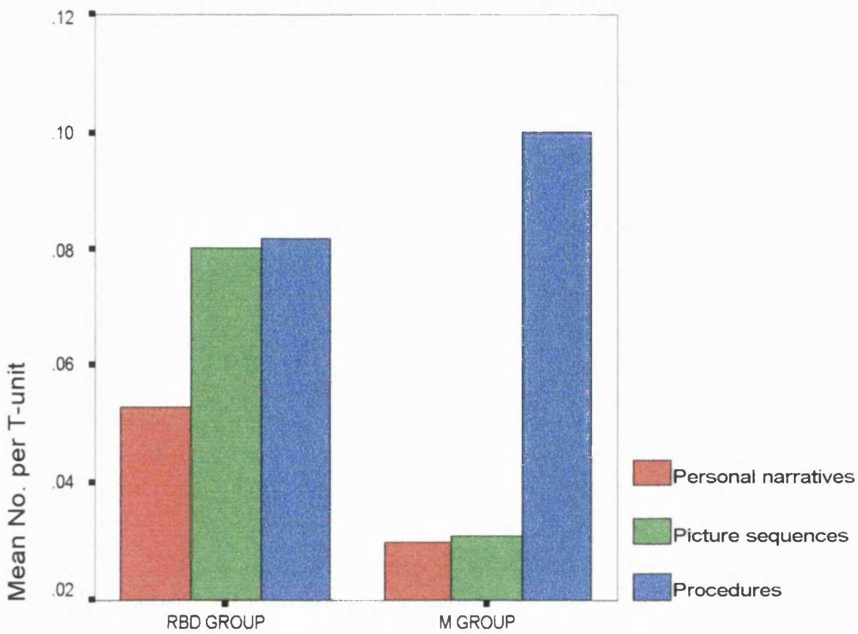
Graph A26.6: Task effect on content and fluency disruptors in RBD and M groups



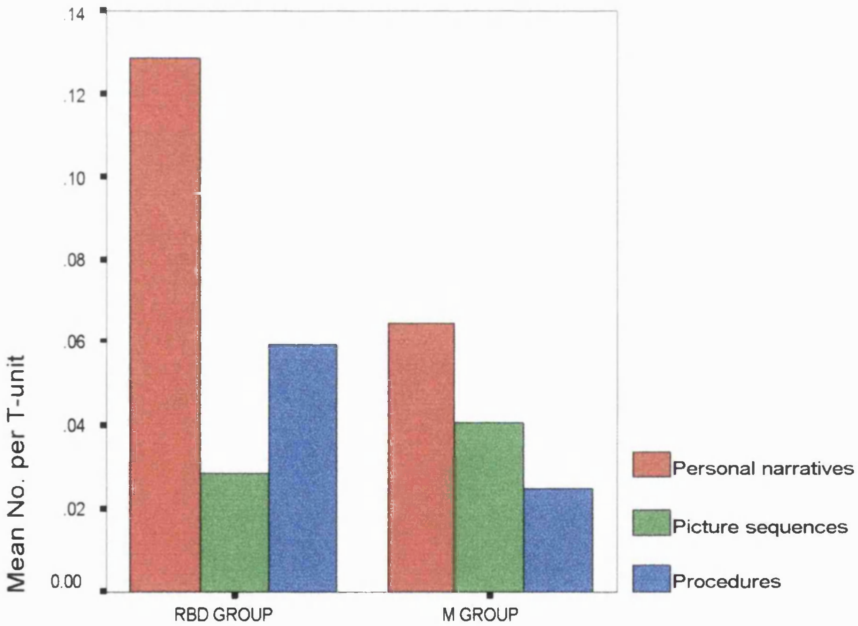
Graph A26.7: Task effect on T-unit length of RBD and M groups



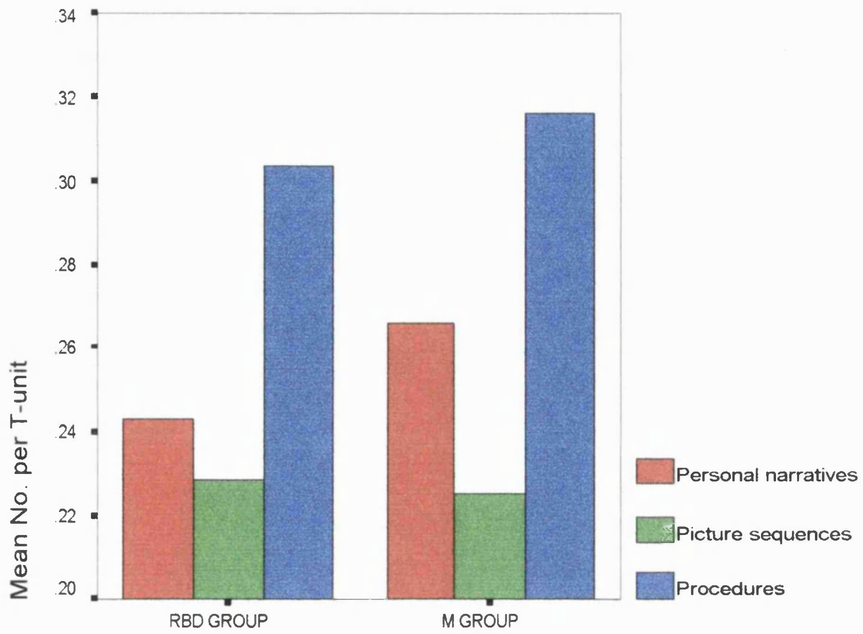
Graph A26.8: Task effect on clausal embedding in RBD and M groups



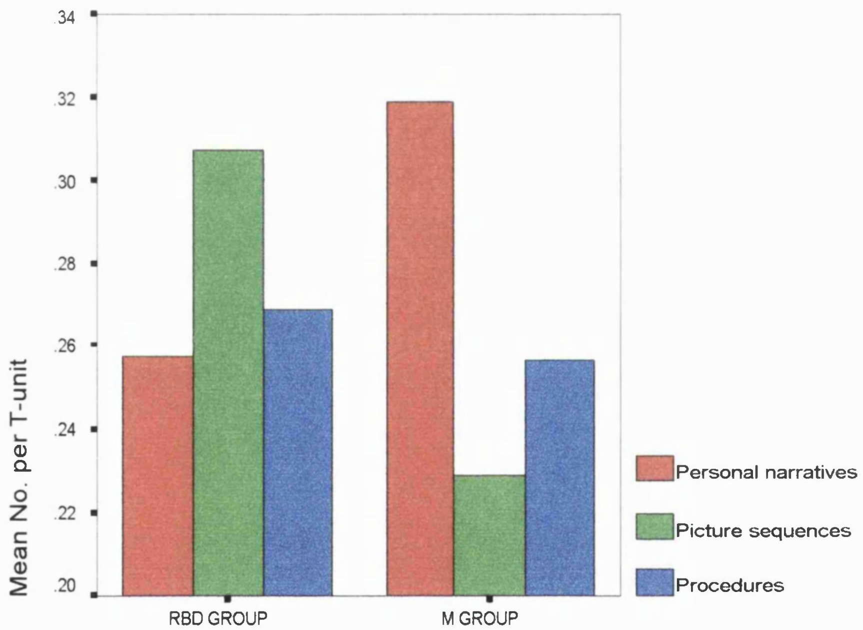
Graph A26.9: Task effect on substitution cohesion in RBD and M groups



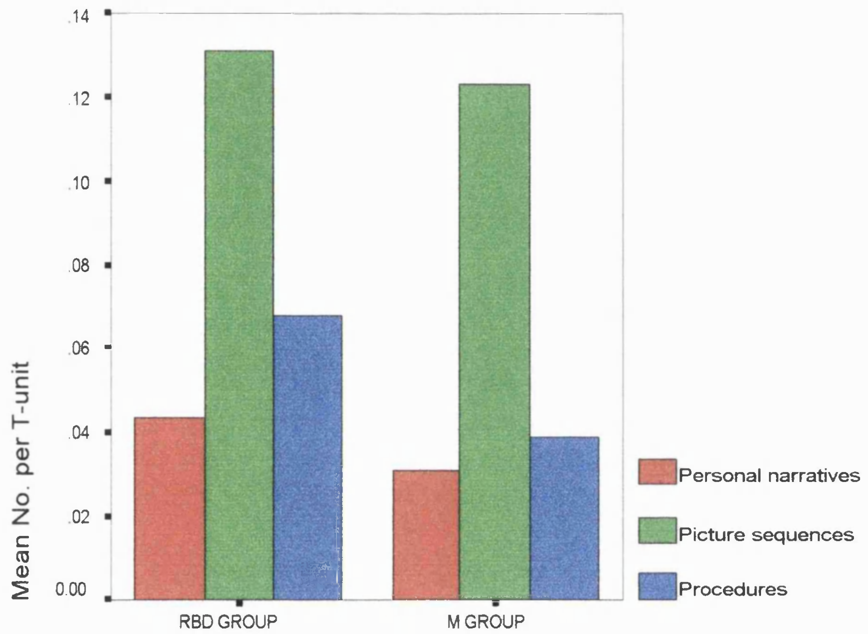
Graph A26.10: Task effect on ellipsis in RBD and M groups



Graph A26.11: Task effect on conjunctions in RBD and M groups



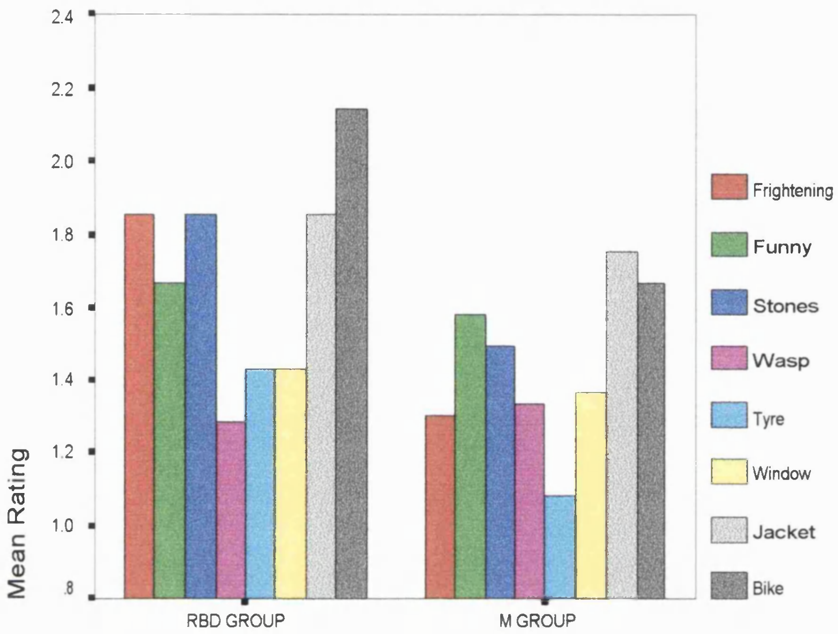
Graph A26.12: Task effect on "and" in RBD and M groups



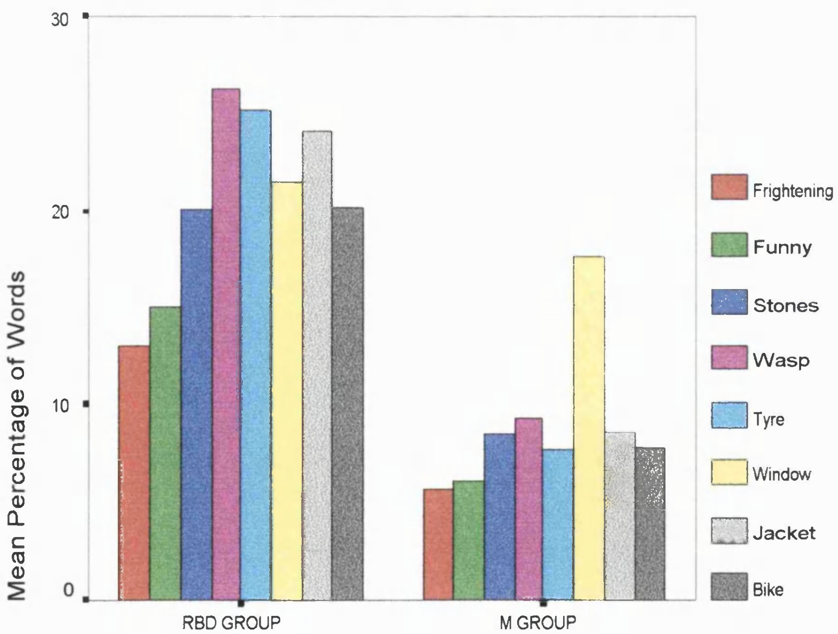
Graph A26.13: Task effect on attempted cohesion in RBD and M groups

Appendix A27

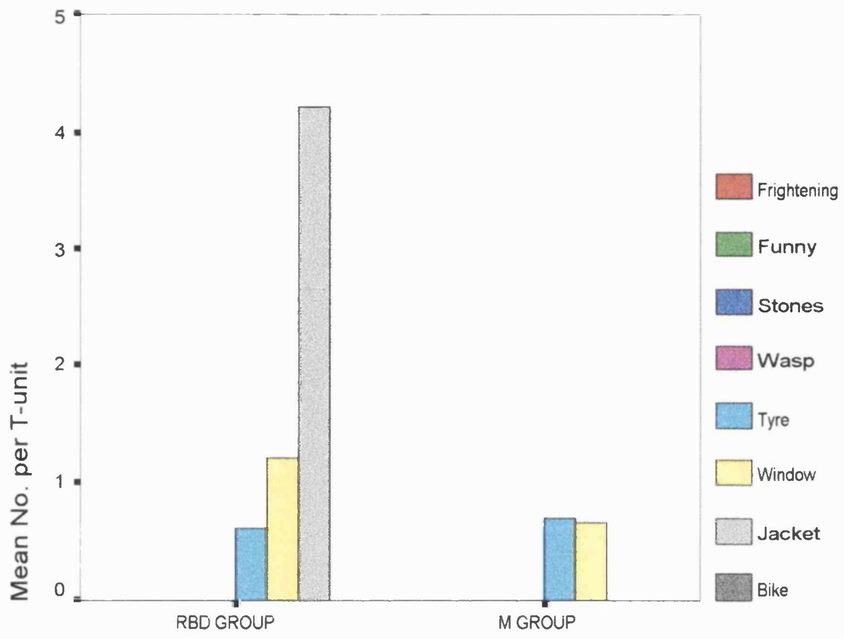
Topic Effects on RBD and M Groups Discourse



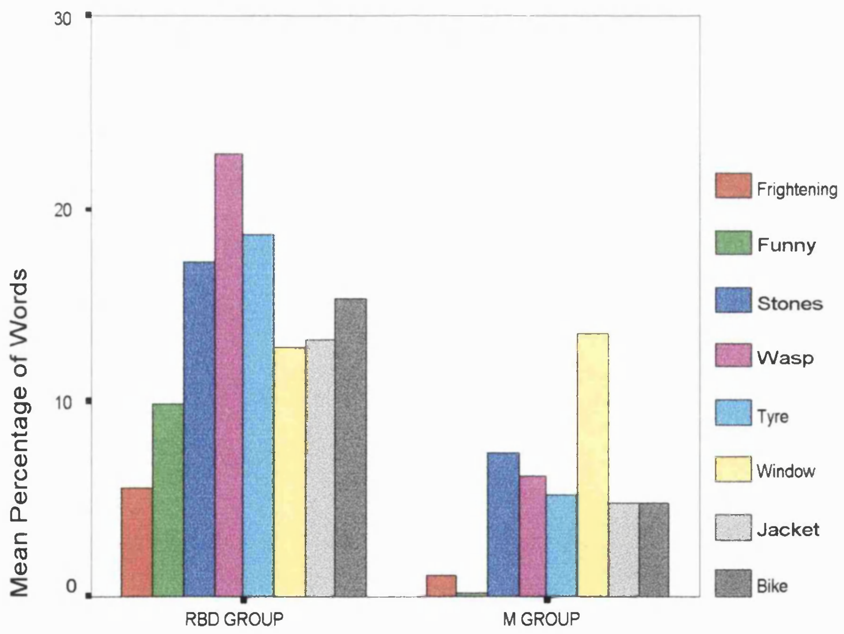
Graph A27.1: Topic effect on relevance of RBD and M groups



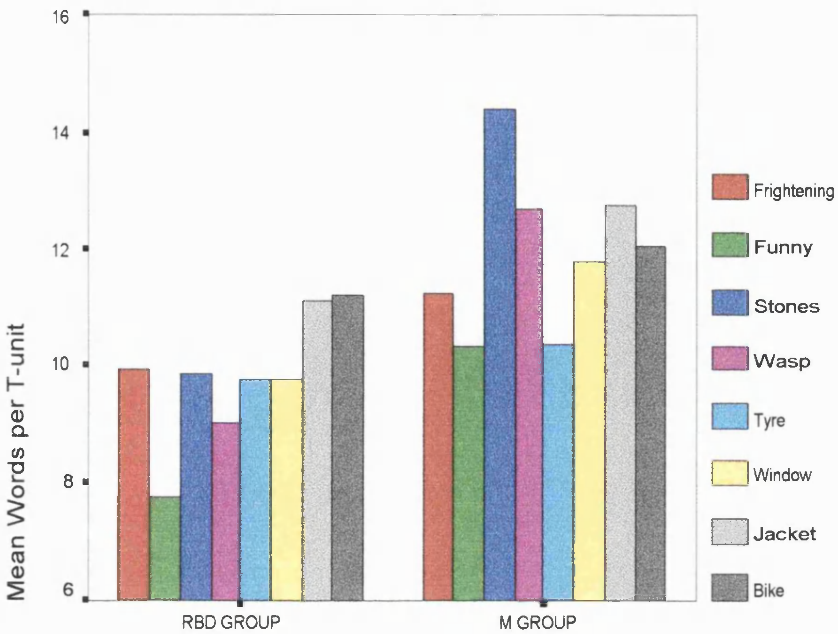
Graph A27.2: Topic effect on total clarity disruptors in RBD and M groups



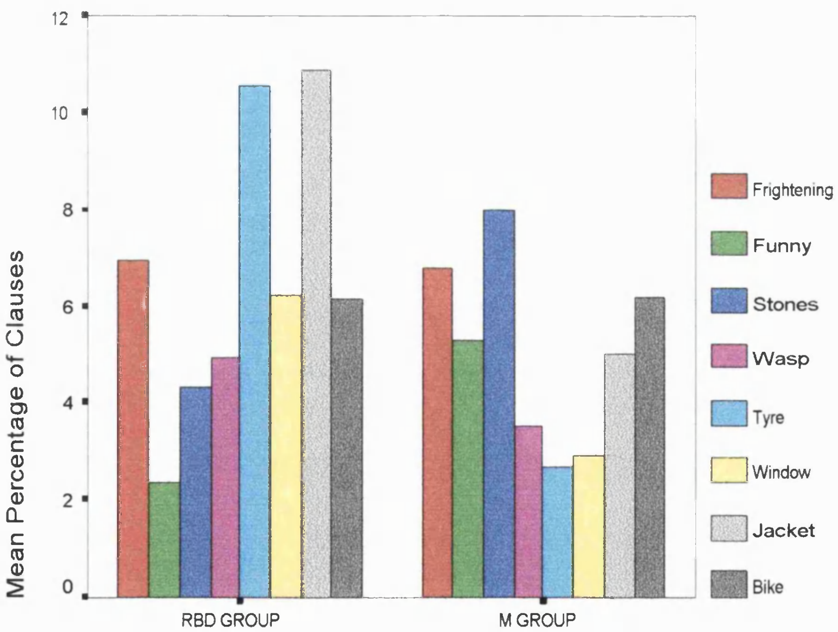
Graph A27.3: Topic effect on word substitutions in RBD and M groups



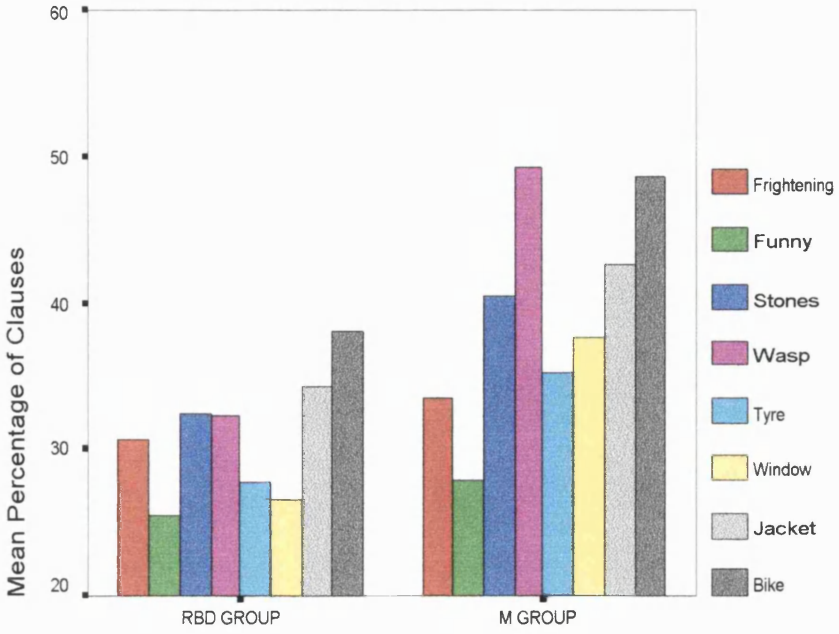
Graph A27.4: Topic effect on content and fluency disruptors in RBD and M groups



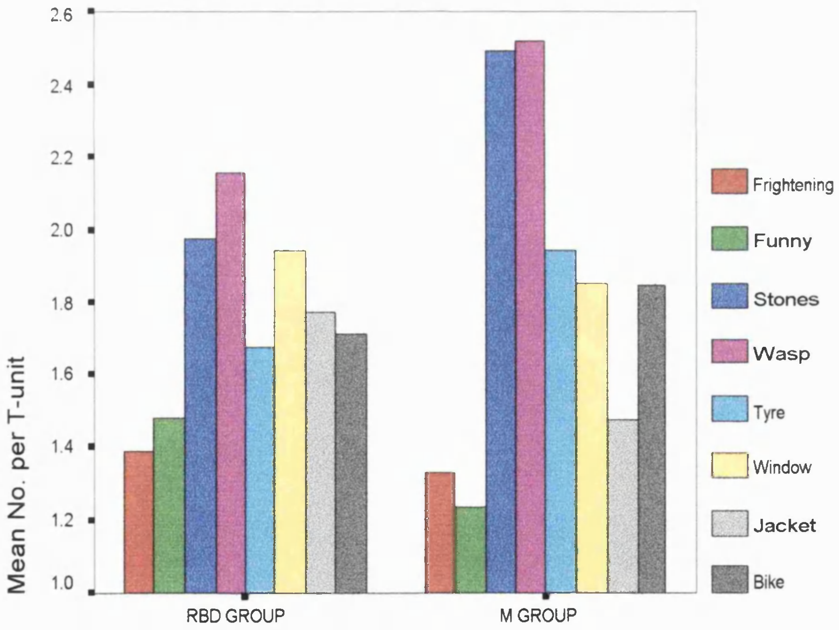
Graph A27.5: Topic effect on T-unit length in RBD and M groups



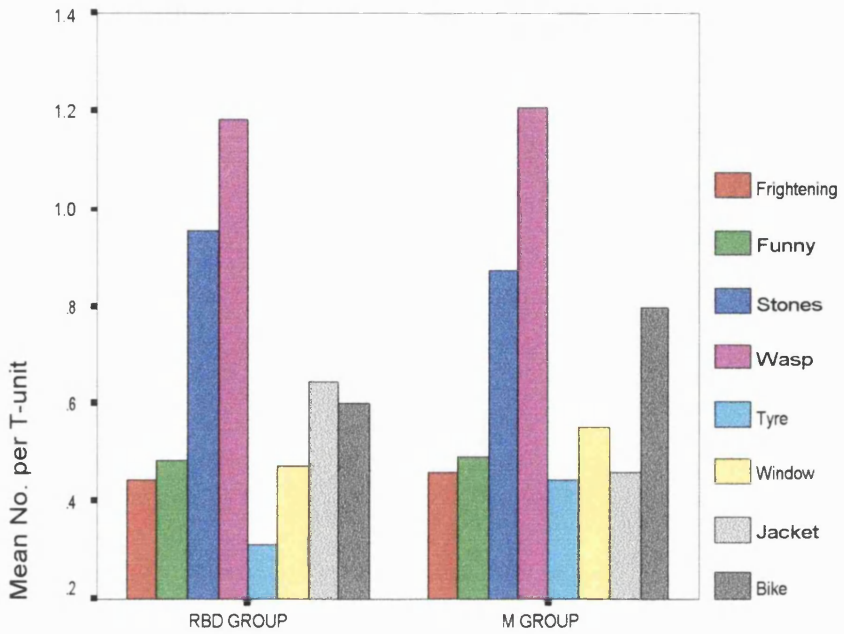
Graph A27.6: Topic effect on left-branching clauses in RBD and M groups



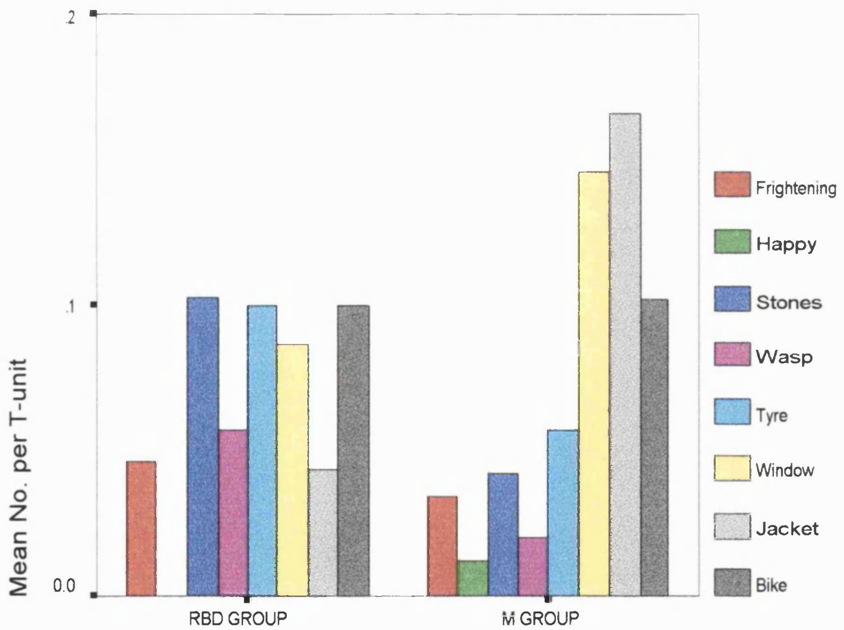
Graph A27.7: Topic effects on right-branching clauses in RBD and M groups



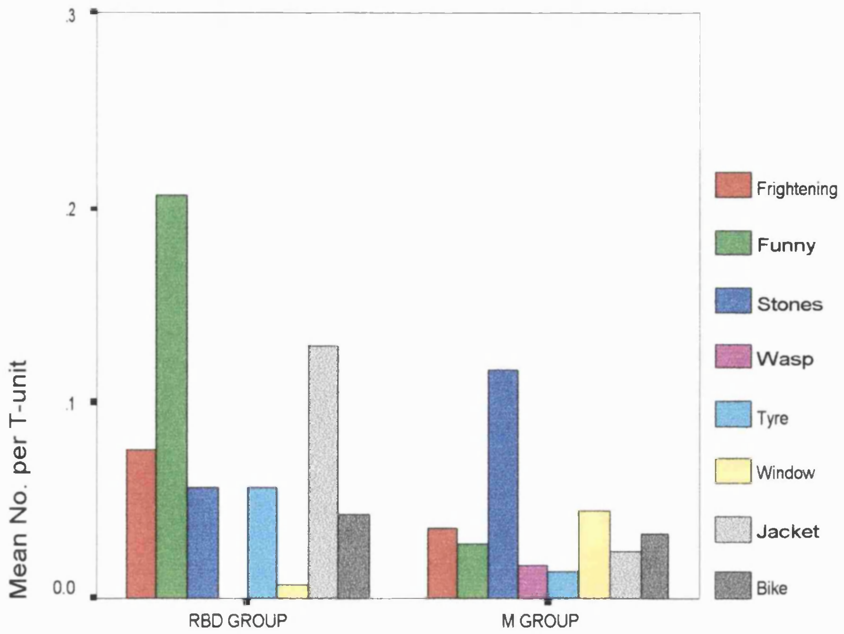
Graph A27.8: Topic effect on total cohesion in RBD and M groups



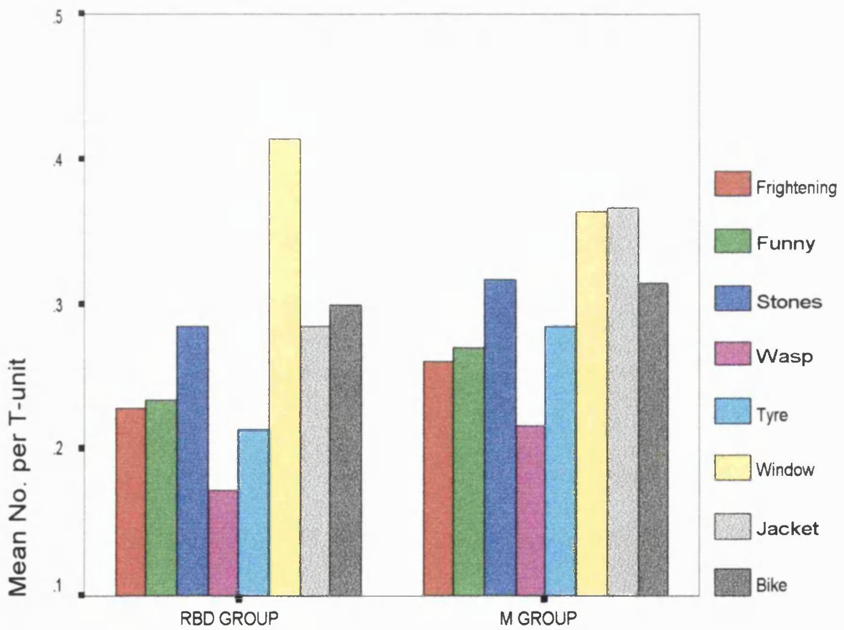
Graph A27.9: Topic effect on reference in RBD and M groups



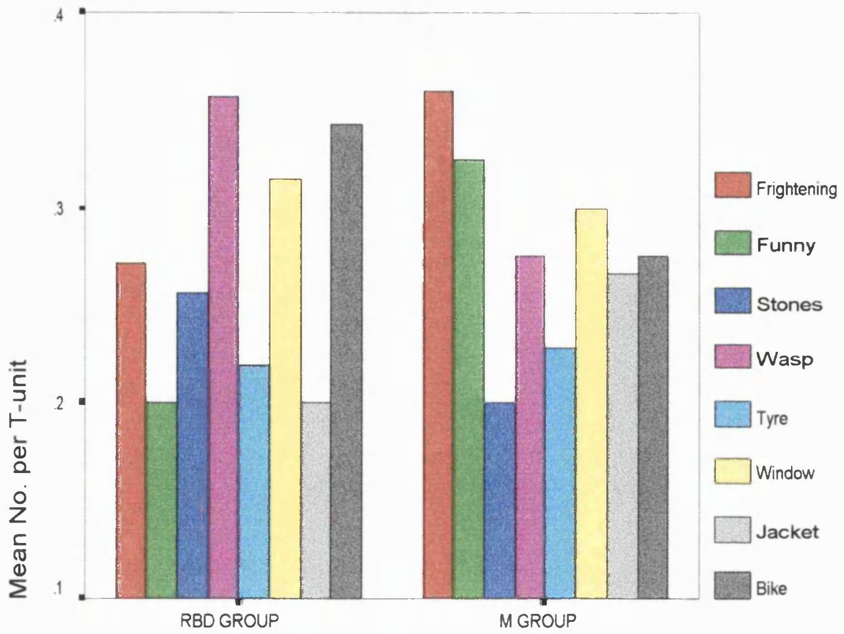
Graph A27.10: Topic effect on substitution cohesion in RBD and M groups



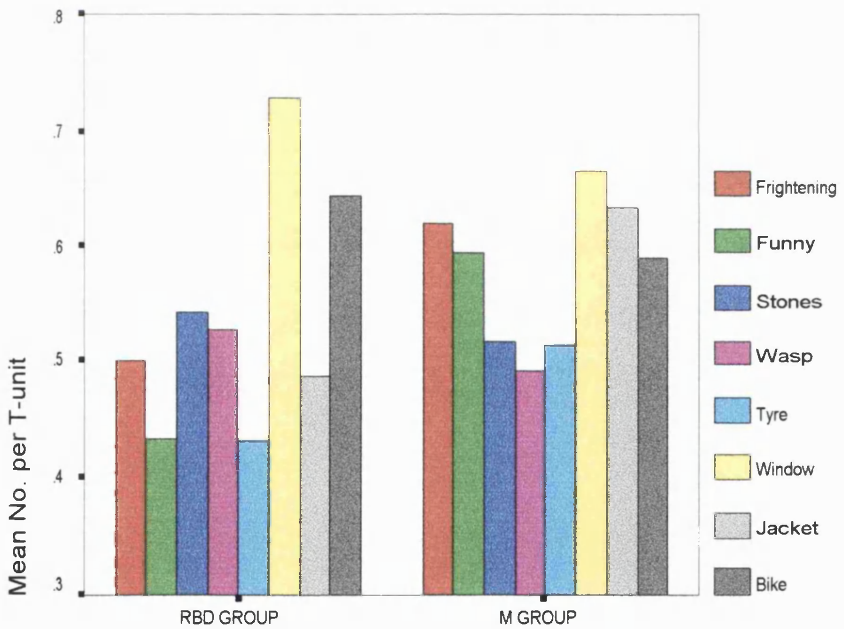
Graph A27.11: Topic effect on ellipsis in RBD and M groups



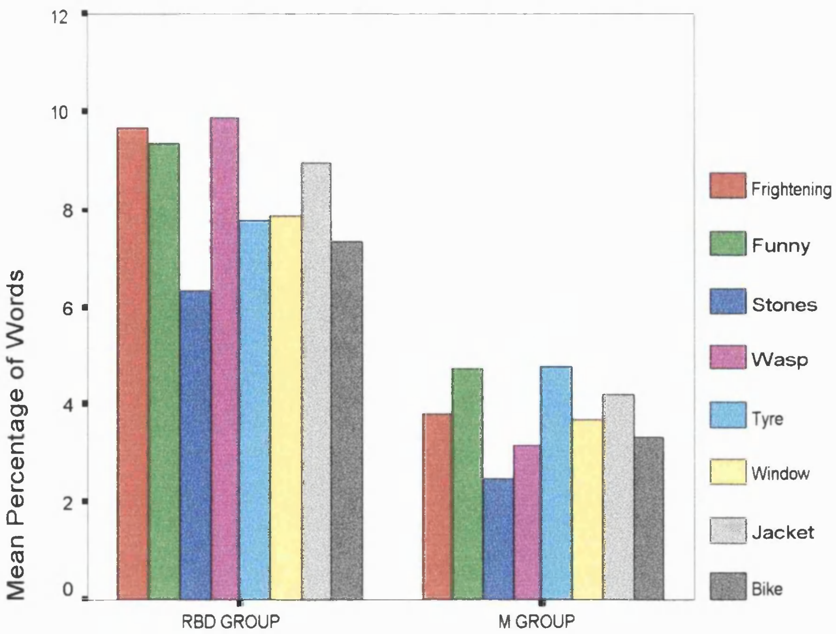
Graph A27.12: Topic effect on conjunctions in RBD and M groups



Graph A27.13: Topic effect on "and" in RBD and M groups



Graph A27.14: Topic effect on connectives in RBD and M groups



Graph A27.15: Topic effect on dysfluencies in RBD and M groups

APPENDIX A28

EFFECT OF GENRE, TASK AND TOPIC ON THE RBD AND M GROUPS

For each group, the effect of genre and narrative task topics (two personal narratives and two picture sequences) was determined using the Wilcoxon Signed Ranks Test (significance of 0.05). For the effect of task and procedural topic, the Friedman Test was used (P = .05). The Wilcoxon Pairs Signed-Ranks Test was used to make comparisons between the tasks with the significance level determined by the Bonferroni correction. For task (three), the significance level was set at 0.016 (three tasks: 0.05 divided by three comparisons = 0.016); for procedural topic, the level was 0.0083 (four topics: 0.05 divided by four comparisons).

A28.1 RBD GROUP

DISCOURSE MEASURE	GENRE	TASK	TOPIC
Relevance	.595	.618	PER: .655 PIC: .194 PRO: .027*
Discourse Grammar	.715	.311	PER: .655 PIC: .458 PRO: .010*
Total Clarity	.018	.066	PER: .917 PIC: .397 PRO: .241
Non-Specific	.612	.156	PER: .249 PIC: .686 PRO: .424
Word Substitutions	.180	.135	PER: None PIC: None PRO: .706
Content & Fluency	.176	.066	PER: .600 PIC: .463 PRO: .421
Length	.091	.022	PER: .046* PIC: .499 PRO: .086
T-unit length	.237	.368	PER: .173 PIC: .611 PRO: . 156
Clause Length	.310	.368	PER: .753 PIC: .398 PRO: .392
Clausal embedding	.351	.717	PER: .045* PIC: .498 PRO: .031*
Main clauses	.612	.651	PER: .345 PIC: .866 PRO: .098
Left-branching	.128	.540	PER: .080 PIC: .893 PRO: .399
Right-branching	.735	.368	PER: .344 PIC: .686 PRO: .512
Total Cohesion	1.00	.050	PER: .500 PIC: .345 PRO: .563
Reference	.091	.018	PER: .892 PIC: .138 PRO: 3.55
Substitution	.396	.607	PER: .581 PIC: .380 PRO: .514
Ellipsis	.674	.084	PER: .416 PIC: ..102 PRO: .179
Conjunction	.246	.846	PER: .581 PIC: .221 PRO: .147
"And"	.799	.565	PER: .739 PIC: .200 PRO: .632
Connectives		.867	PER: .891 PIC: . 832 PRO. 163
Lexicalisation	.051	.156	PER: .465 PIC: .279 PRO: .603
Attempted Cohesion	.933	.540	PER: .655 PIC: .892 PRO: .558
Dysfluencies	.735	.553	PER: .600 PIC: .917 PER: .849

PER=Personal narratives PIC=Picture sequences PRO=Procedures

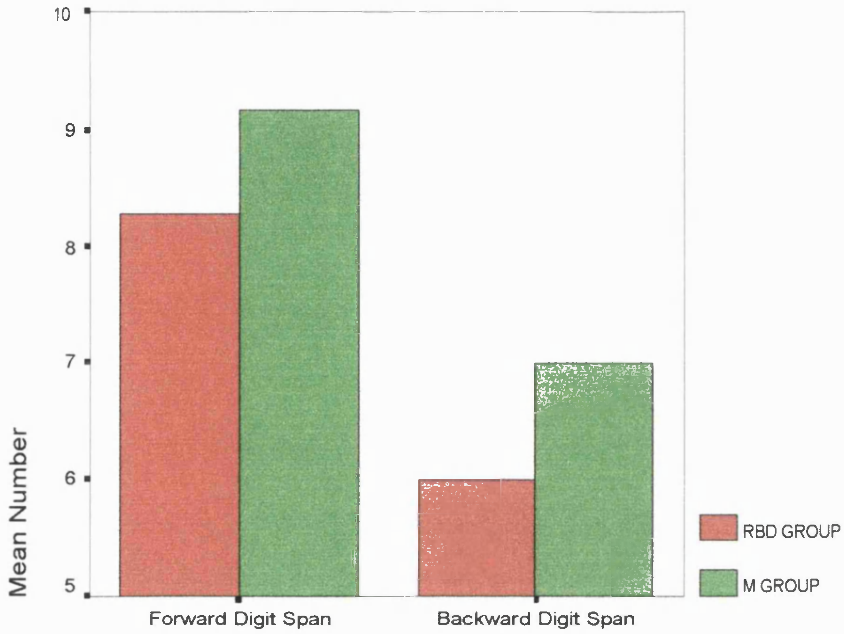
A28.2 M GROUP

DISCOURSE MEASURE	GENRE	TASK	TOPIC
Relevance	.969	.404	PER: .157 PIC: .317 PRO: .012*
Discourse Grammar	.016*	.218	PER: .414 PIC: .083 PRO: .114
Total Clarity	.136	.174	PER: .633 PIC: .624 PRO: .559
Non-Specific	.028*	.002* *PER>PIC (.012) *PER>PRO (.003)	PER: .284 PIC: .284 PRO: .175
Word Substitutions	.180	.135	PER: None PIC: None PRO: .571
Content & Fluency	.062	.003* *PER<PIC (.017) *PER<PRO (.003)	PER: .144 PIC: .463 PRO: .256
Length	.272	.009* *PIC<PER (.012) *PIC<PRO (.015)	PER: .285 PIC:.045* PRO: .689
T-unit length	.937	.264	PER: .445 PIC:.695 PRO: .474
Clause Length	.041*	.028*	PER:.386 PIC: .065 PRO: .011* *BI>TY (.008)
Clausal embedding	.308	.112	PER: .634 PIC:.798 PRO: .700
Main clauses	.583	.004* *PER>PIC (.008) *PER>PRO (.006)	PER: .260 PIC: .388 PRO: .023* *BI<TY (.008)
Left-branching	.136	.024*	PER: .515 PIC: .398 PRO: .115
Right-branching	.530	.005* *PIC>PER (.008) *PRO>PER (.010)	PER: .260 PIC: .099 PRO: .124
Total Cohesion	.209	.002*	PER: .726 PIC: .859 PRO: .097
Reference	.041*	.006* *PIC>PER (.005) *PIC>PRO (.015)	PER: .497 PIC: .130 PRO: .073
Substitution	.008*	.005* *PRO>PER (.007)	PER: .462 PIC: .680 PRO: .334
Ellipsis	.075	.135	PER: .340 PIC: .068 PRO: .910
Conjunction	.084	.172	PER: .904 PIC: .304 PRO: .531
"And"	.530	.076	PER: .558 PIC: .064 PRO: .940
Connectives	.367	.046*	PER: .944 PIC: .720 PRO: .474
Lexicalisation	.875	.024* *PER<PIC (.006) *PER<PRO (.016)	PER: .111 PIC: .969 PRO: .000* *TY>WI (.005) *TY>JA (.005) *TY>BI (.004)
Attempted Cohesion	.441	.682	PER: .066 PIC: .285 PRO: .023*
Dysfluencies	.695	.028*	PER: .445 PIC: .594 PRO: .791

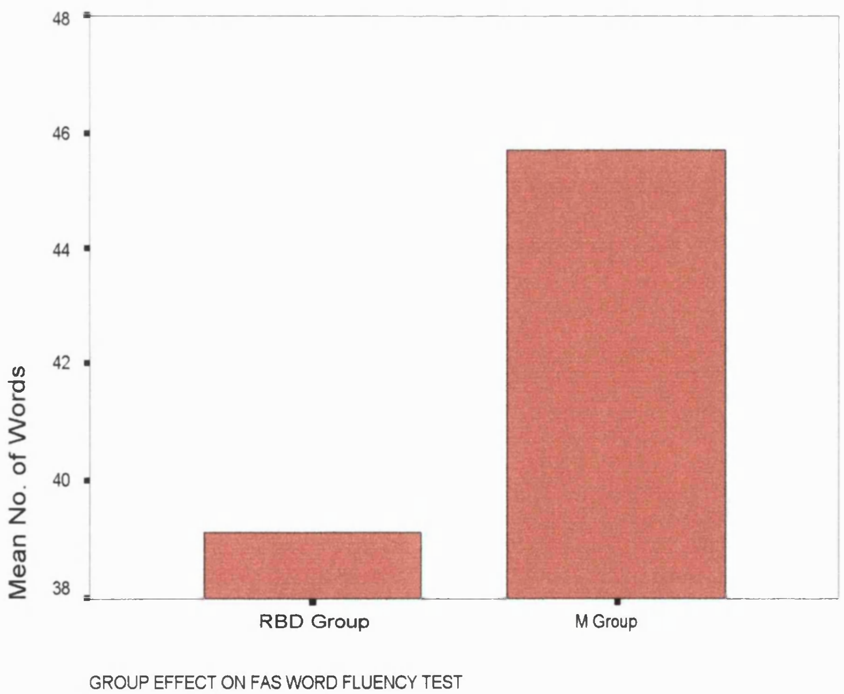
PER=Personal narratives PIC=Picture sequences PRO=Procedures

Appendix A29

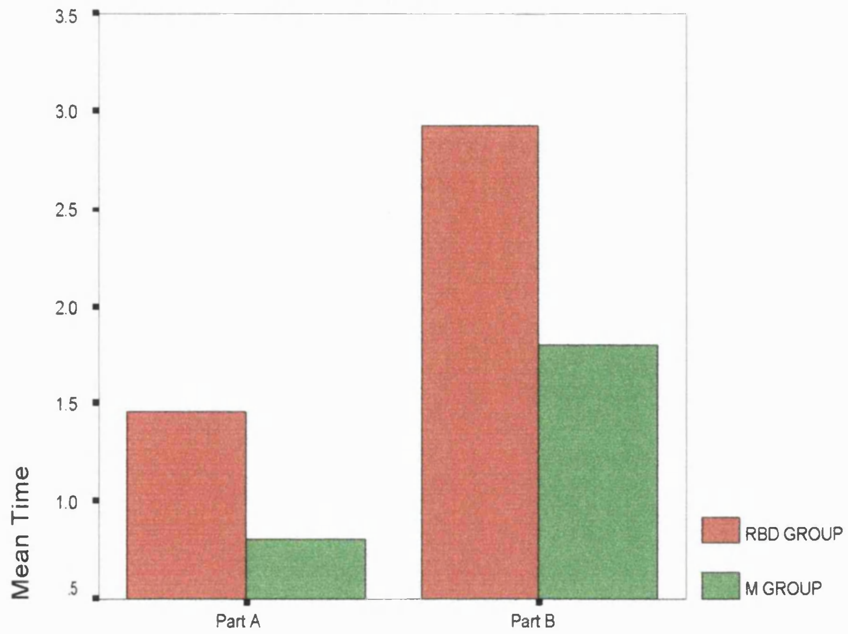
RBD and M Groups Performance on Attention Tests



Graph A29.1: Group effect on the Digit Span test



Graph A29.2: Group effect on FAS word fluency test



Graph A29.3: Group effect on the Trail-making test

APPENDIX A30

CORRELATIONS BETWEEN DISCOURSE AND ATTENTION MEASURES OF THE RBD AND M SUBJECTS

The non-parametric correlational test, Spearman's rho, was used to examine the relationships between discourse measures and attention.

	FORWD		BACKWD		D/MEAN		FAS Flu.		Trail A		Trail B	
	RBD	M	RBD	M	RBD	M	RBD	M	RBD	M	RBD	M
Relevance								-?*				
Personal		-**		-**		-**		-*		?*		
Pictures								-*				
Proced.												
D/Gramm.												
Personal												
Pictures												
Proced.	-**		?-*		-*							

*= p<.05 **= p<.01 ?* Approaching sig.

<u>Correlations between attention tests and relevance and discourse grammar</u>

	FORWD		BACKWD		D/MEAN		FAS Flu.		TRAIL A		TRAIL B	
	RBD	M	RBD	M	RBD	M	RBD	M	RBD	M	RBD	M
Clarity Dis												
Personal												
Pictures		*				?*						
Procedure				?*		?*						
Non-specific				-*		?-*	?-*	-**				
Personal												
Pictures				?-*				-*				
Procedure							?-*	-*		*	*	*
Content & Fluency		**		*		**				?-*		
Personal	*				?*							
Pictures		*				*						
Procedure		*		*		*				?*		

*= p<.05 **= p<.01 ?* Approaching sig.

<u>Correlations between attention tests and clarity disruptors</u>

	FORWD		BACKWD		D/MEAN		FAS Flu.		Trail A		Trail B	
	RBD	M	RBD	M	RBD	M	RBD	M	RBD	M	RBD	M
Length-all												
Personal			**		*				*			
Pictures												
Procedure		?*	*									
Cl/embed.				?*		*	?*					
Personal		?*		*		*	?*			-**		-*
Pictures												
Procedure			?*				*					
Cl. Length -									?*			
Personal												
Pictures									**			
Procedure												
T-unit length									?*			
Personal											*	
Pictures									*			
Procedure												

*= p<.05 **= p<.01 ?* Approaching sig.

Correlations between attention tests and productivity and syntactic complexity

	FORWD		BACKWD		DIGIT M		FAS FL.		TRAIL A		TRAIL B	
	RBD	M	RBD	M	RBD	M	RBD	M	RBD	M	RBD	M
Right-br.								?*				-*
Personal		?*		?*		*			*			-*
Pictures								?*				
Procedure												
Left-br.												
Personal												
Pictures	*				*							
Procedure												
Main cl								-**		?*	?*	**
Personal		-*		-**		-*		?-*		?*		*
Pictures								-*		?*		
Procedure			?-*				-**					

*p<.05 **p<.01 ?* = approaching significance

Correlations between attention tests and clausal structure

	FORWD		BACKWD		D/MEAN		FAS FLU.		TRAIL A		TRAIL B	
	RBD	M	RBD	M	RBD	M	RBD	M	RBD	M	RBD	M
Cohesion								*				
Personal												
Picture												
Procedure												
Ref. Cohesion												
Personal									?-*			
Pictures									*			
Procedure												
Connectives											*	
Personal												
Pictures		-*		?-*		?-*						
Procedure												
"And"											**	
Personal											?*	
Pictures												
Procedures											*	
Lexical Ties								**				
Personal												
Pictures								*				
Procedure												
Attempts	-?*	-*	-*	-**	-**	-**		-*	?-*	**		*
Personal												?*
Pictures	-*	-**	-**	-*	-*	-**		-*		*		
Procedure				?-*			-*			**		**
Dysfluencies												
Personal												
Pictures												
Procedures							?*					

*p<.05 **p<.01 ?* = approaching significance

<u>Correlations between attention tests and cohesion and dysfluency</u>

Appendix A31

Correlations between discourse measures for RBD subjects

The non-parametric correlational test, Spearman's rho, was used to examine the relationships between the discourse measures.

A31.1 Combined samples

	REL	D.G	NW	WT	WCL	CLT	MA	LEF	RGH	NS	SUB	CON	CLA	REF	SBN	ELL	COJ	AND	CNN	LEX	ATT	COH	FLU
REL	--------																						
DG	.556	------																					
NW	-.436	-.927**	------																				
WT	-.091	-.709	.571	-----																			
WCL	.364	-.327	.321	-------	-------																		
CLT	-.657	-.611	.309	--------	.000	----																	
MA	.564	.600	-.286	--------	-.143	--------	--------																
LEF	-.309	.218	-.250	--------	-.929**	--------	--------	--------															
RGH	-.727	-.764*	.571	--------	-.286	--------	--------	-.179	-------														
NS	.200	.000	.036	.143	.464	-.036	-.107	.464	.143	--------													
SUB	.204	-.408	.579	.267	.178	-.204	.267	-.045	-.134	-.445	--------												
CON	-.418	-.055	.214	-.571	-.679	-.273	.393	.464	-.250	-.393	.178	--------											
CLA	.000	.109	.214	-.464	-.214	-.709	.750	-.036	-.429	.036	.223	.750	--------										
REF	-.202	-.743	.847*	.414	.360	.018	-.054	-.414	.270	.252	.427	.324	.432	----									
SBN	-.873*	-.436	.357	-.107	-.536	.655	-.536	.607	.607	-.143	-.134	.357	-.071	.036	------								
ELL	.018	.655	-.607	-.464	-.214	-.182	.179	.143	-.107	.321	-.668	-.179	.036	-.667	.107	-----							
COJ	-.309	-.436	.286	.786*	.679	.418	.500	-.714	.714	.214	-.223	-.464	-.321	.180	-.036	.000	-------						
AND	-.236	-.436	.250	.536	.500	.509	-.643	-.500	.607	.714	-.490	-.393	-.321	.396	.071	-.071	.607	-------					
CNN	-.364	-.600	.429	.679	.571	.564	-.679	-.571	.750	.607	-.356	-.357	-.286	.487	.143	-.143	-------	--------	-------				
LEX	-.091	-.436	.393	.821*	.857*	.218	-.321	-.867*	.607	.393	-.045	-.536	-.179	.306	-.179	.000	.925**	.571	.714	-------			
ATT	-.327	.218	-.214	-.214	-.036	-.055	.000	-.214	.179	.536	-.802*	.107	.286	-.036	.143	.643	.357	.464	.429	.286	--------		
COH	-.091	-.382	.357	.714	.821*	.127	.250	-.893**	.536	.536	-.178	-.429	-.036	-------	------	------	-------	-------	-------	------	.464	-------	
FLU	.364	-.273	.429	.643	.857*	-.291	.214	-.821*	.107	.214	.490	-.393	-.286	.378	-.500	-.179	.500	.071	-.143	-.143	-.143	.679	-------

REL=Relevance DG=Discourse grammar CLA=Total Clarity disruptors NSP=Non-specific CON=Content and fluency CLT=clausal embedding WCL=Clause length
WT=T-unit-length COH=Total cohesion REF=Reference COJ=Conjunction LEX=Lexicalisation ATT=Attempted cohesion DYSF=Dysfluencies
*p<.05(2-tailed)**p<.01 (2-tailed)

A31.2 Personal narratives

	REL	D.G	NW	WT	WCL	CLT	MA	LEF	RGH	NS	SUB	CON	CLA	REF	SBN	ELL	COJ	AND	CNN	LEX	ATT	COH	DYS
REL	------																						
DG	-.250	------																					
NW	.487	-.896**	------																				
WT	-.356	-.299	.071	------																			
WCL	-.430	.120	-.286	------	------																		
CLT	.048	-.548	.400	------	.491	------																	
MA	-.225	.777*	-.571	------	.241	------	------																
LEF	-.505	.000	-.143	------	-.429	------	------	------															
RGH	.599	-.717	.821*	------	.000	------	------	-.571	------														
NS	-.767*	.299	-.321	.143	.286	-.055	.536	.214	-.500	------													
SUB	------	------	------	------	------	------	------	------	------	------	------												
CON	-.243	-.120	.143	-.571	-.679	-.582	-.143	.893**	-.286	.107	------	------											
CLA	-.805*	.179	-.250	-.143	-.071	-.455	.321	.786*	-.643	.750	------	.679	------										
REF	-.453	.121	-.396	-.270	-.342	-.266	-.324	.739	-.523	.054	------	.559	.432	------									
SBN	-.819*	.517	-.673	-.109	.127	-.509	.527	.636	-.927**	.727	------	.346	.837*	.505	------								
ELL	-.580	.777*	-.643	-.036	.286	-.346	.786*	.071	-.571	.714	------	.036	.536	-.036	.600	------							
COJ	.170	-.422	.505	.342	.054	.725	-.505	-.450	.775*	-.090	------	-.162	-.324	-.236	-.633	-.108	------						
AND	.717	-.558	.371	.519	.296	.226	-.579	.222	.334	-.371	------	.148	.00	.019	-.208	-.408	.093	------					
CNN	.056	-.777*	.714	.571	.179	.800*	-.714	-.250	.821*	-.143	------	-.071	-.214	-.198	-.582	-.393	------	------	------				
LEX	-.538	.181	-.378	.793*	.829*	.413	-.018	-.180	-.018	.144	------	-.378	.018	.018	.119	.342	.236	.449	.288	------			
ATT	.272	.062	-.074	-.259	-.408	.132	-.509	-.037	.222	-.482	------	.111	-.371	.467	-.377	-.185	.467	-.115	.185	.637	------		
COH	-.500	.000	-.306	.685	.577	.670	-.342	-.180	.036	.198	------	-.378	-.054	------	------	------	------	------	------	------	.337	------	
DYS	.585	-.090	.288	.270	.306	.505	.144	.955**	.577	-.162	------	-.811*	-.721	-.845*	-.624*	-.126	.355	-.280	.198	-.055	-.150	-.055	------

REL=Relevance DG=Discourse grammar CLA=Total Clarity disruptors NSP=Non-specific CON=Content and fluency CLT=clausal embedding WCL=Clause length WT=T-unit-length COH=Total cohesion REF=Reference COJ=Conjunction LEX=Lexicalisation ATT=Attempted cohesion DYSF=Dysfluencies

*p<.05(2-tailed)**p<.01 (2-tailed)

A31.3 Picture Sequences

	REL	D.G	NW	WT	WCL	CLT	MA	LEF	RGH	NS	SUB	CON	CLA	REF	SBN	ELL	COJ	AND	CNN	LEX	ATT	COH	FLU
REL	-------																						
DG	.854*	--------																					
NW	-.449	-.704	-------																				
WT	-.674	-.408	.286	--------																			
WCL	-.449	.222	.321	--------	-------																		
CLT	.019	.674	-.036	--------	-.321	--------																	
MA	.356	.259	-.250	--------	.000	--------	--------																
LEF	.566	.374	-.414	--------	-.288	--------	--------	--------															
RGH	-.599	-.566	.607	--------	.179	--------	--------	.378	--------														
NS	-.281	-.111	.036	.250	-.286	.464	-.393	.595	.429	--------													
SUB	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------												
CON	-.356	.222	.143	-.393	.321	-.571	.464	.180	-.357	-.821*	--------	-------											
CLA	.170	-.075	.396	-.432	.288	-.775*	.631	-.055	-.360	-.667	--------	.883**	--------										
REF	-.519	-.206	.342	.685	.901**	-.234	-.072	-.636	.306	.108	--------	108	.136	--------									
SBN	-.653	-.555	.356	.757*	.445	.445	-.757*	.022	.757*	-.089	--------	-134	-.270	.315	--------								
ELL	-.626	-.744	.179	.060	-.120	-.299	.179	-.211	.000	.179	--------	-418	-.060	-.121	.075	--------							
COJ	-.848*	-.736	.655	.582	.364	.073	-.400	-.844*	.727	.564	--------	-364	-.119	.606	.431	.396	-------						
AND	.717	-.636	.595	.468	.108	.270	-.505	-.818*	.775*	.739	--------	-505	-.273	.418	.337	.332	.954**	-------					
CNN	-.774*	-.673	.667	.505	.324	.054	-.360	-.891**	.703	.595	--------	-324	-.073	.600	.337	.332	-------	--------	-------				
LEX	-.886**	.755*	.655	.709	.491	.073	-.418	-.771*	.727	.491	--------	-364	-.138	.679	.522	.396	.981**	.899**	.954**	-------			
ATT	-.086	.170	.382	-.291	-.364	.00	.00	-.725	.255	.655	--------	-200	.064	.009	-.386	.122	.519	.670	.615	.361	--------		
COH	-.711	-.556	.679	.643	.536	.071	-.393	-.847*	.714	.500	--------	-214	-.036	--------	--------	--------	--------	--------	--------	--------	.473	--------	
FLU	-.561	-.519	.214	.321	.591	-.679	.464	-.288	-.214	-.143	--------	000	.288	.487	.045	.657	.346	.108	.288	.436	-.182	.2861	-------

REL=Relevance DG=Discourse grammar CLA=Total Clarity disruptors NSP=Non-specific CON=Content and fluency CLT=clausal embedding WCL=Clause length
WT=T-unit-length COH=Total cohesion REF=Reference COJ=Conjunction LEX=Lexicalisation ATT=Attempted cohesion DYSF=Dysfluencies
*p<.05(2-tailed)**p<.01 (2-tailed)

A31.4 Procedures

	REL	D.G	NW	WT	WCL	CLT	MA	LEF	RGH	NS	SUB	CON	CLA	REF	SBN	ELL	COJ	AND	CNN	LEX	ATT	COH	FLU
REL	--------																						
DG	.429	--------																					
NW	.111	-.315	-------																				
WT	.185	-.217	.929**	--------																			
WCL	.222	.020	.929**	-------	-------																		
CLT	-.296	-.374	-.071	-------	-.143	-------																	
MA	.408	.374	.179	--------	.286	--------	--------																
LEF	-.334	.059	-.536	--------	-.571	--------	--------	--------															
RGH	-.185	.129	.643	--------	.536	--------	--------	-.393	--------														
NS	.593	.491	.429	.286	.536	-.821*	.821*	-.786*	.143	--------													
SUB	.092	.210	.401	.579	.267	.579	-.223	-.223	.401	-.267	--------												
CON	-.704	.641	-.179	-.143	-.179	.107	.071	-.143	.036	-.357	.178	--------											
CLA	-.185	.197	.143	.214	.296	-.214	.536	-.536	-.071	.143	.223	.750	--------										
REF	.371	-.118	.393	.214	.214	-.250	.214	-.036	.250	.214	.134	.500	-.250	--------									
SBN	-.876**	-.506	.202	.147	.073	.257	-.184	.018	-.257	-.459	.252	.808*	.496	-.165	--------								
ELL	-.542	.437	-.018	-.036	.162	-.126	.072	.180	-.252	-.126	-.449	.450*	.487	-.252	.500	--------							
COJ	-.056	-.278	.523	.270	.450	-.559	.378	-.577	.613	.667	-.292	-.126	-.090	.018	.037	-.055	--------						
AND	.056	-.129	.252	-.054	.180	-.775*	.541	-.523	.288	.721	-.494	-.180	-.144	.126	-.130	-.109	.918**	-------					
CNN	.037	.000	.500	.250	.464	-.643	.464	-.607	.536	.750	-.356	-.179	-.071	.036	-.055	-.036	--------	--------	-------				
LEX	.673	.070	.595	.577	.559	-.216	.414	-.414	-.072	.450	.427	-.450	.090	.793*	-.296	-.309	-.027	-.027	.018	--------			
ATT	.222	.611	.000	-.143	.107	-.643	.607	-.071	-.714	.357	-.445	-.107	.286	.536	-.110	.468	-.090	.126	.000	.432	--------		
COH	.334	.118	.500	.250	.429	-.643	.571	-.321	-.214	.571	-.178	-.393	.000	-------	------	--------	--------	-------	-------	--------	.750	-------	
FLU	.408	.118	.750	.643	.786*	-.571	.750	-.786*	.143	.750	.178	-.107	.464	.500	-.018	.054	.414	.360	.464	.775*	.500	.750	-------

REL=Relevance DG=Discourse grammar CLA=Total Clarity disruptors NSP=Non-specific CON=Content and fluency CLT=clausal embedding WCL=Clause length
WT=T-unit-length COH=Total cohesion REF=Reference COJ=Conjunction LEX=Lexicalisation ATT=Attempted cohesion DYSF=Dysfluencies
*p<.05(2-tailed)**p<.01 (2-tailed)

Appendix A32

Modified T-Test Scores for the RBD Subjects as Assessed on Three Discourse Tasks

	RELEVANCE			DISCOURSE GRAM			SAMPLE LENGTH		
	Personal	Picture	Procedure	Personal	Picture	Procedure	Personal	Picture	Procedure
NN mean	1.57	1.46	1.65	1.96	1.80	1.68	348.7	111.84	212.9
M Group	1.64	1.44	1.53	2.22	2.00	1.64	294.5	96.6	176.5
Min-Max	1 - 3.33	1 - 2.5	1 - 2.20	1.25 - 4	1 - 3.25	1 - 2.67	55.7-697	34.3-199	34-381.7
Subj. 1	2.0	1.0	1.25	1.0	1.0	1.0	**1722.5**	189	327.5
Subj. 2	1.0	2.0	1.25	1.0	2.0	1.5	285.5	**283**	145.5
Subj. 3	1.0	**2.5**	1.5	2.0	3.0	1.5	85.5	37.5	63.5
Subj. 4	1.5	1.0	**3.0**	2.0	1.5	**3.0**	120.5	85.5	152.3
Subj. 5	**3.0**	2.0	2.0	1.0	2.5	1.5	438	64.5	114.5
Subj. 6	2.0	1.0	1.75	1.0	2.0	1.5	433	69.5	105.3
Subj. 7	2.0	1.5	1.25	2.5	2.0	2.75	63	63	28

NN = NBD subjects M Group=Matched Group.
Scores in **Bold** indicate rarity or abnormality in comparison to M group

	T-UNIT LENGTH			CLAUSE LENGTH			CLAUSAL EMBEDDING		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	11.4	12.7	12.75	7.8	7.9	7.2	1.49	1.74	1.75
M-Group	11.12	13.27	11.86	7.86	8.70	6.96	1.47	1.86	1.68
Min-Max	8.9-14.3	7.9-21.3	6.6-15.9	6.6-12.5	6.6-13.4	5.7-8.6	1.2-1.8	.98-5.5	1.1-2.4
Subj. 1	7.6	11.85	13.93	5.65	7.7	7.95	1.3	1.55	1.82
Subj. 2	9.1	8.2	9.68	6.55	**6.3**	7.65	1.35	1.3	1.3
Subj. 3	8.7	8.6	8.27	7.5	5.85	6.18	1.15	1.75	1.38
Subj. 4	10.8	9.15	12.45	8.75	7.5	**9.48**	1.35	1.25	1.33
Subj. 5	8.5	8.75	10.23	6.45	8.4	6.85	1.3	1.05	1.55
Subj. 6	11.7	13.05	9.63	7.7	7.85	6.8	1.5	1.7	1.48
Subj. 7	7.4	6.6	9.1	5.7	6.05	6.4	1.25	1.1	1.58

NN = NBD subjects M Group=Matched Group.
Scores in **Bold** indicate rarity or abnormality in comparison to M group

	MAIN CLAUSES			LEFT CLAUSES			RIGHT CLAUSES		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	60.93	50.38	52.20	6.94	4.19	6.65	32.34	44.37	40.99
M-Group	64.13	48.3	54.12	4.77	3.81	5.45	31.35	45.03	40.46
Min-Max	46.5-84.8	31.3-69.4	39.4-81.9	0-6.83	0-20.9	2.5-10.7	15.2-47.2	18.8-59.2	15.5-55.5
Subj. 1	64.1	47.8	41.68	3.65	7.65	**12.38**	32.3	44.55	45.98
Subj. 2	62.55	58.15	66.33	**8.4**	2.25	2.13	29.0	38.2	31.55
Subj. 3	70.45	51.8	63.4	**10.85**	14.55	**12.88**	18.75	33.65	23.73
Subj. 4	70.70	63.10	66.15	**0**	0	4.75	29.25	36.9	29.08
Subj. 5	65.95	**91.65**	65.5	3.35	4.15	2.55	31.15	**4.15**	31.42
Subj. 6	41.7	46.45	61.95	3.3	0	5.25	35.0	53.55	32.8
Subj. 7	70.2	**80.7**	53.85	3.55	3.55	**19.2**	26.2	**15.7**	26.98

NN = NBD subjects M Group=Matched Group.
Scores in **Bold** indicate rarity or abnormality in comparison to M group

	TOTAL CLARITY DYSRUPTORS			**NON-SPECIFIC ELEMENTS**			**CONTENT AND FLUENCY**		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	8.0	10.9	12.81	6.08	2.79	3.08	1.92	8.08	9.44
M-Group	6.31	9.94	11.14	5.49	2.03	2.72	.81	7.91	8.03
Min-Max	2.1-13.9	.55-26.6	3.2-28.9	2.1-9.4	0-6.9	.9-5.9	0-5.4	0-21.5	0-24.2
Subj. 1	**19.4**	14.95	16.3	3.75	.5	1.63	**15.7**	14.35	13.6
Subj. 2	**19.85**	**42.45**	**36.85**	7.2	2.1	**6.25**	**12.8**	**40.35**	**30.63**
Subj. 3	**20.15**	6.15	13.53	5.65	3.5	2.3	**14.5**	2.6	11.23
Subj. 4	**17.6**	11.15	**26.25**	**17.35**	**11.15**	**24.48**	.25	0	1.78
Subj. 5	4.55	**42.45**	**28.8**	2.45	.00	3.52	2.1	**42.45**	15.8
Subj. 6	2.8	10.35	9.32	2.30	3.75	5.15	.5	6.6	4.18
Subj. 7	7.4	**34.85**	28.15	3.65	.85	**.00**	3.75	**34**	**28.15**

NN = NBD subjects M Group=Matched Group.
Scores in **Bold** indicate rarity or abnormality in comparison to M group

	Total	**Coh**		**Ref.**	**Coh**		**Lexical**	**Coh.**	
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	1.34	2.42	1.73	.55	1.03	.58	.44	.90	.71
M-Group	1.33	2.39	1.67	.50	.99	.52	.48	.96	.69
Min-Max	.5-2.1	.9-3.6	.9-2.2	.2-.9	.4-1.7	.3-.9	.1-1.1	.3-1.7	.3-1.04
Subj. 1	1.3	2.05	1.9	.4	1.1	.6	.35	.55	.8
Subj. 2	1.7	2.15	1.93	.85	1.1	.4	.5	.45	.7
Subj. 3	1.35	.8	2.06	.45	0.7	.83	.6	**00**	.8
Subj. 4	1.6	2.85	2.15	.25	1.15	.63	.6	1.00	.93
Subj. 5	1.05	1.8	1.67	.3	1.25	.57	.25	.4	.9
Subj. 6	1.7	3.1	1.38	.4	1.4	.3	.7	1.00	.68
Subj. 7	1.45	1.7	1.33	.55	0.8	.22	.45	.4	.6

NN = NBD subjects M Group=Matched Group.
Scores in **Bold** indicate rarity or abnormality in comparison to M group

	Conjunct	**Coh.**		**"And"**			**Connect.**		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	.27	.28	.32	.29	.25	.27	.56	.53	.58
M-Group	.27	.23	.32	.32	.23	.26	.59	.45	.57
Min-Max	.17-.4	.1-.35	.06-.53	.1-.53	0-.5	.07-.44	.27-.73	.13-.85	.29-.82
Subj. 1	.4	.25	.35	.25	.35	.31	.52	.6	.66
Subj. 2	.25	.25	.42	.25	.4	**.45**	.5	.65	**.88**
Subj. 3	**00**	**00**	.3	.35	.15	.33	.35	.15	.63
Subj. 4	.3	**.4**	.35	.15	.45	.33	.45	**.85**	.68
Subj. 5	.15	.1	.2	.25	.1	.08	.4	.2	.27
Subj. 6	.4	**.4**	.38	.5	.45	.4	**.9**	**.85**	.78
Subj. 7	.2	.2	.13	**.05**	.25	**.00**	**.25**	.45	**.13**

NN = NBD subjects M Group=Matched Group.
Scores in **Bold** indicate rarity or abnormality in comparison to M group

	Subs.	Coh.		Ellipsis			Attempt.	Coh.	
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	.038	.052	.081	.057	.031	.035	.018	.129	.034
M Mean	.03	.031	.099	.065	.041	.025	.031	.123	.039
Min-Max	0-.1	0-.13	.02-.24	0-.18	0-.15	0-.13	00 - .17	.00-.65	.00-.1
Subj. 1	.01	**.16**	.15	.07	.05	.04	.04	.00	.01
Subj. 2	**.1**	.05	.15	.05	.0	**.13**	.02	.37	.11
Subj. 3	**.15**	.05	.05	**.2**	.0	.03	.00	.05	**.13**
Subj. 4	.05	.05	.03	**.45**	.1	.08	.00	.20	**.18**
Subj. 5	.01	.05	.05	.0	.0	.0	.00	.00	.01
Subj. 6	.0	.15	.03	.03	.0	**.0**	.1	.15	**.00**
Subj. 7	.05	.05	.13	.1	.05	**.15**	**.15**	.15	.05

NN = NBD subjects M Group=Matched Group.
Scores in **Bold** indicate rarity or abnormality in comparison to M group

	Dysfluencies		
	Personal	Picture	Proced.
NNmean	5.894	3.620	4.944
M Mean	4.335	2.731	4.048
Min-Max	.97 - 7.77	.00-8.55	.44-9.73
Subj. 1	**9.25**	6.9	6.63
Subj. 2	5.00	3.25	8.68
Subj. 3	1.6	.00	5.00
Subj. 4	**21.9**	**22.05**	**22.38**
Subj. 5	**10.00**	**14.95**	8.63
Subj. 6	**9.80**	3.60	4.70
Subj. 7	**9.25**	6.05	.00

NN = NBD subjects M Group=Matched Group.
Scores in **Bold** indicate rarity or abnormality in comparison to M group

APPENDIX A33
DETAILED CASE STUDIES OF SEVEN RBD SUBJECTS

This appendix provides a detailed discussion of the individual RBD subjects on each discourse measure. Their results on each task have been compared to the M group using the modified t-test (Crawford and Howell 1998).

A33.1 Tables

The tables given for each RBD subject provide the mean of the neurologically normal control group (32 subjects) and of the M group (12 subjects matched for age and socio-economic status). Tables providing the means for the RBD subjects and the NBD and M groups are provided in Appendix A32.

The scores provided for each RBD subject are the means of the discourse samples elicited in the three discourse tasks (two personal narratives, two picture sequences and four procedures).

To compare each subject's score with the M group, Crawford and Howell's (1998) modified t-test was used. The modified t-test was chosen rather than the z-score conversion for a number of reasons. The use of z-scores treats the normative sample as a population, rather than a sample of the population (the normative group is often a small sample, possibly broken down by demographic characteristics like age, gender, locality or socio-economic status). Furthermore, in single-case studies, the tasks may be novel and therefore no normative data may exist. z-scores may overestimate the rarity of an observation, when the control group is small (Crawford and Howell 1998). The problem with both the modified t-test and the z-score conversion is that both assume a normal distribution but are considered robust when this assumption is moderately violated (Crawford, Howell and Garthwaite 1998).

The emphasis of the modified t-test is on "obtaining an estimate of the rarity or abnormality of an individual's test score rather than on whether it is significant at a given significance level" (Crawford and Howell 1998, p 484). Although they suggest that the power of the method can be increased by adopting a more liberal significance level (e.g. 0.15 or .20), the conventional and more conservative 0.05 level was maintained in this study due to the large variation of scores within the M group. This significance level is indicated in each table by an asterisk (*) and the exact p value (one tailed) is provided. Crawford and his colleagues (Crawford and Howell 1998, Crawford et al 1998) believe that the use of this procedure will be a useful adjunct to the qualitative analysis of the performance of each subject and provide a more objective quantitative method of interpreting the rarity of differences in individual subjects.

For convenience, details of the RBD subjects are reiterated below.

	AGE	SES	T.P.O.	Site of lesion
S1	70	II	5 years	RH haemorrhage
S2	70	IV	2 yrs, 10 m	R. post-occipital, post. Internal capsule, partly fronto-parietal infarct.
S3	77	III	3 years	R external capsule and thalamic nucleus infarct
S4	67	III	2 yrs, 11 m	R fronto-parietal cerebral infarct
S5	72	II	3 yrs, 1m	R occipital lobe infarct
S6	77	II	3 years	R temporo-parietal infarct
S7	54	III	2 yrs, 6 m	R parietal infarct

Details of seven RBD subjects

A33.1 SUBJECT 1 (S1)

A33.1.1 Subject description

At the time of assessment, S1 was 70 years old. He had suffered a haemorrhage in the right hemisphere five years previously. He had received a university education, having been awarded a degree in chemistry. Until retirement, he had been the managing director of a manufacturing company. He lives with his wife and is involved in fund-raising and other activities for a number of charities. He has not received any speech or language therapy at any time. He presents with a left-sided hemiplegia. The main difficulty he had on the standardised tests was an impairment in the comprehension of metaphor.

A33.1.2 Description of discourse

	RELEVANCE			DISCOURSE GRAMMAR			SAMPLE LENGTH		
	Personal	Picture	Proc.	Personal	Picture	Proc.	Personal	Picture	Proc.
NN mean	1.57	1.46	1.65	1.96	1.80	1.68	348.7	111.84	212.9
M mean	1.64	1.44	1.53	2.22	2.00	1.64	294.5	96.6	176.5
Min-Max	1 - 3.33	1 - 2.5	1 - 2.20	1.25 - 4	1 - 3.25	1 - 2.67	55.7-697	34.3-199	34-381.7
Subj. 1	2.00 p =.292	1.00 p = .214	1.25 p=.216	1.00 p=.065	1.00 p=.101	1.00 p=.128	1722.5 *p= .000008	189 p=.064	327.5 p=.104

A33.1.3 Relevance

Although S1 was able to provide picture sequence narratives and procedures which were judged as more relevant than the M group, his personal narratives were rated as less relevant. This was due to the inclusion of too much additional information. S1 incorporated a number of lengthy digressions into his frightening narrative. This narrative incorporated other personal narratives (funny, embarrassing), procedures (chartering plane, driving lessons and test) and descriptive discourse (migraine attack, celebration plans) (see flow chart in Figure A33.3). He was able to return to the main theme of the narrative after each digression although it could be argued that his narrative was organised around the theme of "stroke" rather than a frightening experience. During this narrative, chains of events took him further and further away from the starting point but he did return to the main theme. Brownell et al (1986) concluded that "some, though not all, RHD patients are characterized by a susceptibility to following associations that are tangential to the overall meaning of a discourse" (p 318). After completing the funny narrative and verbally indicating the ending ("So I thought that was funny"), he then produced additional details (16% of the T-units) regarding one of the participants and their working conditions which was irrelevant to the main narrative.

FRIGHTENING NARRATIVE SEQUENCE - S1

Length of each section	Main Events	Digressions
33 T-units	**Stroke and summoning help**	
28 T-units	---Digression------>	"There are funny sides to these frightening stories" (conversation with ambulance man).
23 T-units	**Hospital**	
32 T-units	------Digression------>	Experience of migraine
31 T-units	**Scan and diagnosis of stroke**	
18 T-units	------Digression-------->	"I was also in the middle of organising a big family outing" (effects of stroke on celebration plans).
14 T-units		"It's an interesting experience because I had to charter a plane" (details of how to charter a plane)
12 T-units		Involvement of charity
17 T-units		"And I'd gone through the arrangements so much in my mind I knew exactly where I should be...." (reminiscence of planned events for celebration)
16 T-units	**Depression/ medication**	
28 T-units	------Digression------->	"I was back to driving my car again" (driving lessons and test)
14 T-units		Physiotherapy
18 T-units		"I fell in love with them all actually" (embarrassing experience)
	End ("and that was an embarrassing moment when I realised that I had probably taken it a little bit too far)"	

Flow-chart depicting S1's frightening experience.

A33.1.4 Discourse grammar

The discourse grammar of S1's discourse samples was rated as appropriate. He usually included optional elements such as the abstract and coda in both the narratives and procedures. He provided appropriate evaluative information in both narrative tasks although he tended to include less in the "stones" picture sequence. He also provided appropriate resolutions in the two picture sequences which required inferencing skills. (He demonstrated no deficit on inferred meanings in the RHLB). He also produced procedures with appropriate essential and optional steps.

A33.1.5 Productivity and syntactic analysis

S1 produced a mean length of personal narratives which was more than twice as long as the maximum produced by the M group. His sample length on the funny narrative (357 words) was well within the range of the M group whereas his frightening narrative contained 3088 words. The main theme of his frightening discourse was the experience of having a stroke and its implications for him. The length of the frightening narrative can be accounted for in a number of ways. Firstly there were a number of digressive narratives, procedures and descriptions incorporated into the main narrative, as discussed above. Secondly, he used a considerable amount of direct speech which contributed to the sample length. Berko-Gleason et al (1980) considers the use of direct speech as a means of avoiding the use of embedded constructions. The use of direct speech can mean that the content/length ratio is decreased. For example,

> "I had to have the last test session with him.
> I said "Well, how did I do? Will I pass the driving test?".
> "No" he said, "You wouldn't pass the driving test today".
> So I said "Why? What have I done wrong?".
> So he said "You go far too slow".
> So I said "Well I'm not going fast for anybody".
> I said "I go within my capabilities and I mean I never was a racing driver".

Thirdly, the length was also increased by the repetition of ideas and personal value judgements - see clarity disruptors section below.

S1's personal narratives, although lengthy, can certainly be considered engaging and interesting. Stories are to engage and entertain listeners while communicating information to them, usually emotionally engaging information (see Brewer and Lichtenstein 1982, Mandler and Johnson 1977, Stein and Glenn 1979). However, it is not clear if S1 attempts to be engaging as he did not demonstrate any awareness of his communication difficulties and also wrote that

> "I do not believe my speech has been permanently affected apart from what the nurses in hospital and my wife dubs 'verbal diarrhoea' ".

On the picture sequences, S1's mean sample length was about twice the mean length of the M group and near the upper end of the range. Both his picture sequence narratives were similar in length (187 and 191). Thus he was either constrained by the nature of the task and/or its lack of personal relevance.

The mean length of the procedural discourse samples was again about twice as much as that of the M group. Of the four procedural samples, the jacket procedure elicited the least number of words (216), close to mean of the M group. The inclusion of comments on the task, personalizations and repetition of ideas lengthened the samples (see Clarity below). As with the narratives, S1 also incorporated direct speech into his procedures e.g.

> "and then you can say to them" Well OK. now you're going to do it on your own". Tell them that they're going to do it on their own. (direct speech, repetition of ideas).

	T-UNIT LENGTH			CLAUSE LENGTH			CLAUSAL EMBEDDING		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	11.4	12.7	12.75	7.8	7.9	7.2	1.49	1.74	1.75
M mean	11.12	13.27	11.86	7.86	8.70	6.96	1.47	1.86	1.68
Min-Max	8.9-14.3	7.9-21.3	6.6-15.9	6.6-12.5	6.6-13.4	5.7-8.6	1.2-1.8	.98-5.5	1.1-2.4
Subj. 1	7.6 p=.074	11.85 p=.366	13.93 p=.239	5.65 p=.107	7.7 p=.319	7.95 p=.168	1.3 p=.192	1.55 p=.403	1.82 p=.352

S1's T-unit length increased from the personal narratives to the procedures with the greatest reduction occurring in the personal narratives, indicating less phrasal and clausal complexity in this task.

His clausal length in the personal narratives was also reduced compared to the mean and fell below the lower range of M group's scores, particularly in the funny narrative (4.7). He produced these narratives with reduced nominal (adjectives, postmodifying clauses) and verbal complexity (complex verbs, adverbial phrases). The verbal constructions used tended to be predominantly the simple past and infinitives. On the picture sequences, S1's clause length was shorter than the mean but longer on the procedures Clause length in the procedures varied from 6.2 to 9.1 indicating that the selection of topic is critical in determining clausal length.

Clausal embedding of S1 was the least in the personal narratives with increasing amounts in the picture sequence and the most in the procedures, a pattern also demonstrated by the M group. Compared to the M group mean, S1 produced less embedding in the personal narratives but more in the procedures. In the latter, he produced more subordinate clauses as well as longer clauses.

> "and you must continue doing this holding them less and less tight each time until you could see that they were getting their own balance and that they were using the steering wheel as a means of balancing which they've got to learn".

Thus the reduction in embedding is task dependent and does not indicate that he is unable to produce longer T-units or less clausal embedding.

A33.1.6 Clausal structure

	MAIN CLAUSES			LEFT CLAUSES			RIGHT CLAUSES		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	60.93	50.38	52.20	6.94	4.19	6.65	32.34	44.37	40.99
M mean	64.13	48.3	54.12	4.77	3.81	5.45	31.35	45.03	40.46
Min-Max	46.5-84.8	31.3-69.4	39.4-81.9	0-6.83	0-20.9	2.5-10.7	15.2-47.2	18.8-59.2	15.5-55.5
Subj. 1	64.1 p=.498	47.8 p=.482	41.68 p=.164	3.65 p=.317	7.65 p=.281	12.38 *p=.009	32.3 p=.459	44.55 p=.484	45.98 p=.325

The percentage of main clauses and right-branching clauses produced by S1 in the discourse samples was similar to the M group. He also showed a similar configuration in main clauses with a greater percentage in the personal narratives compared to the picture sequences and procedures. The incidence of left-branching clauses was similar to the M group in the narrative types but he produced more than twice the amount in the procedures (with a range from 7.7 to 22.5%). The increased incidence of these clauses is reflected in the comparative increase in clausal embedding. As with clausal embedding, the incidence of left branching clauses is task and topic dependent and S1 does not have difficulty producing left-branching clauses per se.

A33.1.7 Clarity disruptors

	TOTAL CLARITY DISRUPTORS			NON-SPECIFIC ELEMENTS			CONTENT AND FLUENCY DISRUPTORS		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	8.0	10.9	12.81	6.08	2.79	3.08	1.92	8.08	9.44
M mean	6.31	9.94	11.14	5.49	2.03	2.72	.81	7.91	8.03
Min-Max	2.1-13.9	.55-26.6	3.2-28.9	2.1-9.4	0-6.9	.9-5.9	0-5.4	0-21.5	0-24.2
Subj. 1	19.4 *p=.0019	14.95 p=.292	16.3 p=.269	3.75 p=.277	.5 p=.258	1.63 p=.225	15.7 *p=.00001	14.35 p=.234	13.6 p=.245

S1 produced considerably more clarity disruptors than the M group in all three discourse types but only beyond the range for the personal narratives. Non-specific clauses were reduced compared to the M group and provided only a small percentage of the total disruptors, particularly on the picture sequences.

The incidence of content and fluency disruptors in S1's discourse was substantially higher than the M group in all three discourse tasks. Unlike the

M group which had a reduced amount in the personal narratives, S1 produced three times their upper limit in these narratives and a similar amount to that of the picture sequence and procedures. The "funny" narrative elicited a greater amount (25.9%) than the "frightening" one (5.6). In the funny topic, S1 added digressive comments (9 additional T-units) after he had indicated the end of the narrative with the coda "So I thought that was funny".

On the picture sequence task, content and fluency disruptors varied by topic with a high percentage in stones sequence (23.5%) but not in wasp (5.2). In the stones sequence, the most frequent of these disruptors were the comments on the task (e.g. "Whether that's the right interpretation or not but that's what it looks like to me").

In the procedures, there was a range in the incidence of content and fluency disruptors from 5.6% (jacket) to 20.9% (window) and 19.3% (tyre). The latter two contained predominantly the repetition of ideas and also comments on the task. For example:-

> "Get rid of those first by knocking or breaking them off. Then with a hammer and chisel or a knife or something like that take all the old putty out. Knock it out with a bit of hard hammering. Chisel it out." (repetition of ideas).
>
> "and loosen the nuts on the wheel while it's still on the ground. If you don't do that, it will just spin round on the axle. So while it's still on the ground loosen the wheel nuts".(repetition of ideas).
>
> "You want me to replace it now?" (comment on task).

Some comments suggested that he had an impairment in determining shared knowledge, e.g.

> "And suddenly I had a paroxysm I think is the word. It's a big word but you know what I mean I'm sure".

"Be careful of the broken bits left all round the edge which are very sharp and will cut you if you're not careful"

"and the bits of glass that are left stuck in it put them away carefully. Try and put the whole lot in the dustbin to avoid leaving them lying around".

A deficit in RBD subjects' sensitivity to what the speaker knows and what the speaker knows about what the addressee knows has been reported (Brownell et al 1997). This would require further investigation using different interlocutors, e.g. older and younger males.

A33.1.8 Cohesion

	TOTAL COHESIVE TIES			REFERENCE			LEXICAL COHESION		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	1.34	2.42	1.73	.55	1.03	.58	.44	.90	.71
M Mean	1.33	2.39	1.67	.50	.99	.52	.48	.96	.69
Min-Max	.5-2.1	.9-3.6	.9-2.2	.2-.9	.4-1.7	.3-.9	.1-1.1	.3-1.7	.3-1.04
Subj. 1	1.3 p=.467	2.05 p=.361	1.9 p=.27	.4 p=.31	1.1 p=.403	.6 p=.34	.35 p=.316	.55 p=.225	.8 p=.336

S1 produced similar proportions of total cohesive ties to the M group. He also produced a similar configuration of increased cohesion in the picture sequence narratives and reduced cohesion in the personal narratives.

His referential cohesion was similar to the M group, with a similarly increased proportion in the picture sequence. Lexical cohesion was reduced in his personal and picture narratives compared to the M group although it was within the M group range. In the personal narratives these ties tended to be "same item" and "collocation" whereas those in the picture sequences were "same item". Two of the procedures had higher amounts of lexicalization (tyre - 1.1, window - 1.0) than the other two procedures (.5 and .6), probably due to the former requiring repeated reference to the same objects such as tools).

	CONJUNCTIONS			"AND"S			CONNECTIVES		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	.27	.28	.32	.29	.25	.27	.56	.53	.58
M mean	.27	.23	.32	.32	.23	.26	.59	.45	.57
Min-Max	.17-.4	.1-.35	.06-.53	.1-.53	0-.5	.07-.44	.27-.73	.13-.85	.29-.82
Subj. 1	.4 p=.059	.25 p=.399	.35 p=.415	.25 p=.313	.35 p=.22	.31 p=.308	.52 p=.316	.6 p=.249	.66 p=.316

Whilst the incidence of conjunctions was similar in the picture narratives and the procedures, the number in personal narratives was considerably higher than the M group with the predominantly occurring type being causal ties and continuatives. The picture sequences contained mostly causal and temporal conjunctions and the procedures were usually causal. S1's production of "and" was similar to the M group and within the range of each discourse type. His use of connectives lay within the ranges of each discourse task.

	SUBSTITUTION			ELLIPSIS			ATTEMPTED COHESION		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	.038	.052	.081	.057	.031	.035	.018	.129	.034
M Mean	.03	.031	.099	.065	.041	.025	.031	.123	.039
Min-Max	0-.1	0-.13	.02-.24	0-.18	0-.15	0-.13	00 - .17	.00-.65	.00-.1
Subj. 1	.01 p=.27	.16 *p=.007	.15 p=.226	.07 p=.47	.05 p=.44	.04 p=.368	.04 p = .48	.00 p=.283	.01 p=.256

S1 produced similar quantities of substitution and ellipsis to the M group, apart from an increased incidence of substitution in the picture sequences. His incidence of attempted cohesion was within the M group range and he produced no cohesive errors in five of the eight tasks.

A33.1.9 Dysfluency

DYSFLUENCIES			
	Personal	Picture	Proced.
NNmean	5.894	3.620	4.944
M Mean	4.335	2.731	4.048
Min-Max	.97 - 7.77	.00-8.55	.44-9.73
Subj. 1	9.25 *p=.029	6.9 p=.18	6.63 p=.19

Overall, S1 produced more dysfluencies on all three tasks than the M mean but substantially more occurred in his personal narratives. The mean dysfluency scores for each discourse task masks the variability of these elements which ranged from 1.9% (window procedure) to 11.1% (jacket procedure). The type of dysfluencies predominantly produced by S1 were false starts and repetitions e.g.

"*But I couldn't It was the fact* It was not so much that I couldn't speak (false start, frightening narrative)

"Well some of them their *their their* money had gone into the *into the* benefits fund for the *for the* patients" (repetition, frightening narrative)

A33.1.10 Summary of S1's performance

His discourse performance can be summarised as being appropriately structured but verbose and too detailed in all tasks. He demonstrated adequate syntactic complexity and cohesion. All three discourse tasks had a greater amount of content and fluency disruptors, particularly repetition of ideas and comments on the task in the personal narratives. His personal narrative production was characterised by an increase in dysfluencies. Of all tasks, his personal narratives were more problematic.

A33.2 SUBJECT 2 (S2)

A33.2.1 Description of subject

S2 was 71 years of age at the time of assessment. Almost three years previously he had suffered a "moderate sized right posterior-occipital, right posterior internal capsule and partly right fronto-parietal non-haemorrhagic infarct". He had left school at fourteen and had worked as a market trader all his working life. He lives with his son and continues to assist on the market stall for five hours a day, six days a week. He has not received speech and language therapy. He has reduced power and sensation in his left side. He demonstrated a reduction in metaphor comprehension on the RHLB.

A33.2.2 Relevance

	RELEVANCE RATINGS			DISCOURSE GRAMMAR			SAMPLE LENGTH		
	Personal	Picture	Proc.	Personal	Picture	Proc.	Personal	Picture	Proc.
NN mean	1.57	1.46	1.65	1.96	1.80	1.68	348.7	111.84	212.9
M mean	1.64	1.44	1.53	2.22	2.00	1.64	294.5	96.6	176.5
Min - Max	1 - 3.33	1 - 2.5	1 - 2.20	1.25 - 4	1 - 3.25	1 - 2.67	55.7-697	34.3-199	34-381.7
Subject 2	1.0 p=.169	2.0 p=.158	1.25 p=.216	1.0 p=.065	2.0 p=.5	1.5 p=.397	285.5 p=.482	283 *p= .0033	145.5 p=.394

S2 produced more relevant personal narratives and procedures than the M group but within the range but his picture sequences were judged as less relevant. The stones sequence was judged as mostly irrelevant as S2 digressed into a related but lengthy personal experience of throwing stones with his grandson after he had provided the picture sequence narrative. The digression constituted 55 percent of the total T-units in the sample. However as for S1, he did indicate the digression's beginning ("I used to do that with my grandson Jack") and end ("But that's what gives me the idea, the throwing stones"). At the end of his sample, he also provided a summary of the picture sequence narrative.

A33.2.3 Discourse grammar

The discourse grammar of the S2's personal narratives was rated as more appropriate than the M group whilst the other tasks were rated as similarly appropriate. One of the procedures (jacket) was rated as mostly inappropriate due to the fact that he did not provide the essential steps necessary to the procedure.

A33.2.4 Productivity and syntactic analysis

S2 produced personal narratives of a similar length to the M group mean and both were similar in length. Unlike the M group, he did not produce longer samples in the personal than the picture sequences. His mean for picture sequences was considerably higher than the M group mean. Although his production of the wasp sequence (164 words) was within the range of the M group, his stones sequence was 402 words long, four times longer than the mean. This greatly increased length was due to the fact that digressed to an account of a personal experience (see Relevance above). In both picture sequence narratives, he indicated the end of the narrative and then concluded with a summary of the picture sequence which increased the length of the sample. From his comments (e.g. "is that the story of it like?"), it would appear that he provided these summaries to ensure that he had completed the task appropriately, possibly indicating awareness of the requirements of the task and the listener.

S2's mean for the length of the procedures was somewhat reduced compared to the M group mean. However the length ranged from 101 words (jacket) to 239 (tyre).

	T-UNIT LENGTH			CLAUSE LENGTH			CLAUSAL EMBEDDING		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	11.4	12.7	12.75	7.8	7.9	7.2	1.49	1.74	1.75
M mean	11.12	13.27	11.86	7.86	8.70	6.96	1.47	1.86	1.68
Min-Max	8.9-14.3	7.9-21.3	6.6-15.9	6.6-12.5	6.6-13.4	5.7-8.6	1.2-1.8	.98-5.5	1.1-2.4
Subj. 2	9.1 p=.195	8.2 p=.118	9.68 p=.229	6.55 p=.225	6.3 p=.136	7.65 p=.249	1.35 p=.269	1.3 p=.330	1.3 p=.149

S2 demonstrated reduced clause and T-unit length on all tasks compared to the M group mean. He also produced less clausal embedding on all three discourse tasks but within range of the M group. Unlike the M group which had reduced embedding in the personal narratives and increased embedding in the picture sequence, S2 produced similar clausal embedding in all three tasks. This reduction also occurs regardless of topic. Even the greatest clausal embedding ratio of 1.5 (which occurred on the frightening narrative and the jacket procedure) was only the same as the lowest M group mean (personal narratives).

A33.2.5 Clausal structure

	MAIN CLAUSES			LEFT CLAUSES			RIGHT CLAUSES		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	60.93	50.38	52.20	6.94	4.19	6.65	32.34	44.37	40.99
M mean	64.13	48.3	54.12	4.77	3.81	5.45	31.35	45.03	40.46
Min-Max	46.5-84.8	31.3-69.4	39.4-81.9	0-6.83	0-20.9	2.5-10.7	15.2-47.2	18.8-59.2	15.5-55.5
SUBJ. 2	62.55 p=.436	58.15 p=.198	66.33 p=.168	8.4 p=.069	2.25 p=.406	2.13 p=.105	29.0 p=.399	38.2 p=.294	31.55 p=.235

S2's production of main and right-branching clauses was similar to the M group. His personal narratives contained more left-branching clauses than the upper limit of the group's range, with one of these narratives (frightening) containing 14.8% of these clauses. By contrast, in his procedures, left-branching clauses comprised less than the lower limit of the M group and only occurred in two of the four procedures. This is in contrast with S1's substantial increase in these clauses in procedures.

A33.2.6 Clarity disruptors

	TOTAL CLARITY DISRUPTORS			NON-SPECIFIC ELEMENTS			CONTENT AND FLUENCY		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	8.0	10.9	12.81	6.08	2.79	3.08	1.92	8.08	9.44
M mean	6.31	9.94	11.14	5.49	2.03	2.72	.81	7.91	8.03
Min-Max	2.1-13.9	.55-26.6	3.2-28.9	2.1-9.4	0-6.9	.9-5.9	0-5.4	0-21.5	0-24.2
Subj. 2	19.85 *p=.0016	42.45 *p=.0019	36.85 *p= .0045	7.2 p=.278	2.1 p=.487	6.25 *p=.014	12.8 *p= .000007	40.35 *p= .0015	30.63 *p=. 0072

The total clarity disruptors produced by S1 considerably exceeded the mean and the upper limit of the range of the M group in each discourse task. One of the personal narratives (frightening) elicited a substantially higher incidence of disruptors (25.6) than the other (funny) experience which was just outside the range (14.1). The wasp sequence sample was comprised of almost sixty percent clarity disruptors. On the procedural tasks the clarity disruptors ranged from 22.9 percent (window) to 67.3 percent (jacket)

S2 produced more non-specific elements than the M group mean in the procedures although he exhibited a wide range of these elements in different topics (from 9% in the bike procedure to 1.2% in the wasp picture sequence) He tended to produce empty phrases (rather than indefinite or deictic terms) in all the discourse topics.

> "but the thing is *you know* I'd just try it on *and that* "(empty phrases, jacket).

> "she danced *and everything you know*" (empty phrases, frightening).

> "so I had little *things you know* block up my nose *like*" (indefinite terms, empty phrases, funny)

He also produced a considerably greater percentage of content and fluency disruptors than the M group mean and above the upper range limit in all three tasks. He demonstrated a similar configuration to the M group of decreased content and fluency disruptors in the personal narratives and increased amounts in the picture sequences and procedures. In the personal narratives, the predominant component was repetition of ideas whilst in the picture sequences, comments on the task and repetition of ideas were most prominent. For example,

> ".. I found the wife when I went to take her a cup of tea at five in the morning and I found her laying there dead. .....I took her a cup of tea into bed and there she was laying there dead....When I got up and took that cup of tea, she'd died in the night" (personal narrative, repetition of ideas).

> "Is that what he's doing in the first part?" (picture sequence, comment on task).

The repetition of ideas is appropriate to maintain focus on the complicating action (Labov 1972) but his repetition goes beyond this requirement.

The content and fluency disruptors in the procedural topics ranged from 18.1% (bike) to 60.4% (jacket). The most frequently occurring types of content and fluency disruptors were personalised comments and repetition of ideas. For example,

> "and I could manage then okay. I could perhaps do it now at a pinch but it'd be a very struggle. I wouldn't like to do it you know, like to think I'd got to do it." (personalised comments, tyre).

> "but I could manage alright like but that would come the awkward part but I could do it okay. I'm sure I could. Yeah at the moment I could." (personalised comments, repetition of ideas, jacket).

A33.2.7 Cohesion

	TOTAL COHESION			REFERENCE			LEXICAL COHESION		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	1.34	2.42	1.73	.55	1.03	.58	.44	.90	.71
M mean	1.33	2.39	1.67	.50	.99	.52	.48	.96	.69
Min-Max	.5-2.1	.9-3.6	.9-2.2	.2-.9	.4-1.7	.3-.9	.1-1.1	.3-1.7	.3-1.04
Subj. 2	1.7 p=.21	2.15 p=.4	1.93 p=.245	.85 p=.053	1.1 p=.403	.4 p=.252	.5 p=.462	.45 p=.175	.7 p=.487

S1's discourse samples were as cohesive as the M group but he demonstrated less variation with task. However, the procedural discourse topics elicited a considerable range of total cohesion (1.5 ties/T-unit in jacket to 2.3 in tyre).

Referential cohesion in the personal narrative task was higher in S2's samples than the mean. As with the M group, he produced more referential cohesion in the picture sequences than the other two tasks but the reduction was not so marked in his personal narratives as in the M group.

His configuration of lexicalization across tasks did not mirror that of the M group. He had less of these ties in his picture sequences whilst the M group had more than the other two tasks. As discussed in the previously (Chapter 12), both reference and lexicalization are necessary to differentiate between the two male characters in the picture sequences. In the wasp sequence, the paucity of lexicalization resulted in increased cohesive errors (see below). S2's mean on the procedures masks two extremes of lexicalization with two topics producing samples below the range (jacket - 0.1, bike - 0.2) whilst the other two topics had lexical ties above the range (tyre - 1.2, window - 1.3). A closer examination of S2's procedures revealed that the decrease in lexicalization and reference co-occurred with an increase in content and fluency disruptors. For example, over sixty percent of his jacket procedure comprised these disruptors so it is not surprising that the ratio of lexical ties was reduced to 0.1 ties per T-unit. Therefore his ability to use lexicalization is camouflaged by the increase in clarity disruptors. This was not observed in the RBD group as a whole.

	CONJUNCTIONS			"AND"S			CONNECTIVES		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	.27	.28	.32	.29	.25	.27	.56	.53	.58
M mean	.27	.23	.32	.32	.23	.26	.59	.45	.57
Min-Max	.17-.4	.1-.35	.06-.53	.1-.53	0-.5	.07-.44	.27-.73	.13-.85	.29-.82
S2	.25 p=.423	.25 p=.399	.42 p=.255	.25 p=.313	.4 p=.141	.45 *p=.043	.5 p=.266	.65 p=.184	.88 p=.055

S2 produced similar amounts of conjunction to the M group. The personal narratives elicited a variety of conjunctions whilst mostly temporal and causal conjunctions were found in the picture sequences. In three of the procedural topics, temporal conjunctions were the predominant kind whereas in the jacket topic (which did not provide appropriate steps) adversative conjunctions were the most common. The incidence of "and" was similar to the M group in the narratives but considerably greater in the procedures. Procedures ranged from zero (jacket) to 0.8 (bike), indicating that topic rather than genre or task produces the greatest variability. Connectives in his narratives occurred to a similar extent to the group but substantially more in his procedures. Two of these (tyre and jacket) had a similar mean to that of the M group (viz. 0.6) whereas the other two (window and bike) had considerably higher proportions of connectives (1.1 and 1.2 respectively). The latter two contained an increase in main clauses joined by "and"s (over 70 percent)

	SUBSTITUTION			ELLIPSIS			ATTEMPTED COH		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	.038	.052	.081	.057	.031	.035	.018	.129	.034
M Mean	.03	.031	.099	.065	.041	.025	.031	.123	.039
Min-Max	0-.1	0-.13	.02-.24	0-.18	0-.15	0-.13	00 - .17	.00-.65	.00-.1
Subj. 2	.1 *p=.023	.05 p=.34	.15 p=.226	.05 p=.41	.0 p=.24	.13 *p=.018	.02 p = .391	.37 p = .131	.11 p = .063

S2 used more substitution in the personal narratives and more ellipsis in the procedures than the M group, although the incidence was extremely small for all subjects.

S2 produced more errors than the M group in the procedures but similar amounts in the two narrative tasks. The means for each task obscures the variability in his errors on each topic as errors ranged from zero (in the frightening narrative and two procedures) to 0.5 errors per T-unit (in the wasp sequence). In the latter sequence, increased errors were accompanied by a decrease in lexicalization. This emphasises the importance of examining not only the incidence of pronouns and their referents, as in previous studies, but also the relative incidence of other types of cohesion. The tendency in previous research has also been to examine only one type of cohesion in RBD and other neurologically impaired groups (see Chapter 6).

A33.2.8 Dysfluency

	DYSFLUENCY		
	Personal	Picture	Proced.
NNmean	5.894	3.620	4.944
M Mean	4.335	2.731	4.048
Min-Max	.97 - 7.77	.00-8.55	.44-9.73
Subj. 2	5.00 p=.39	3.25 p=.43	8.68 p=.06

S2 produced more dysfluencies than the M group in the procedures (particularly in the window and jacket procedures) but not in the narratives. The dysfluencies in the procedures consisted predominantly of repetitions and false starts.

A33.2.9 Summary of S2's performance

S2 produced relevant and appropriately structured discourse with adequate syntactic complexity. His picture sequence narratives were longer than the M group. He produced a larger quantity of content and fluency disruptors in all three tasks and an increased amount of non-specific elements in the procedures. His cohesion was broadly unimpaired although he demonstrated an increase in the use of "and" and increased cohesive errors in the procedures. He demonstrated increased difficulty in the procedures.

A33.3 SUBJECT 3 (S3)

A33.3.1 Description of subject 3

S3 was 77 years old at the time of assessment and had suffered a right external capsule and thalamic nucleus infarct three years previously. He has residual left hemiparesis. He had fourteen years of schooling and had worked as a toolmaker on the railways until his retirement. He lives with his son. He received two weeks of speech and language therapy for his dysarthria immediately following his CVA. He now has mild dysarthria which does not affect his intelligibility or speech production. He demonstrated deficits on the emphatic stress and discourse rating subtests of the RHLB.

A33.3.2 Relevance

	RELEVANCE RATINGS			DISCOURSE GRAMMAR			SAMPLE LENGTH		
	Personal	Picture	Proc.	Personal	Picture	Proc.	Personal	Picture	Proc.
NN mean	1.57	1.46	1.65	1.96	1.80	1.68	348.7	111.84	212.9
M mean	1.64	1.44	1.53	2.22	2.00	1.64	294.5	96.6	176.5
Min-Max	1 - 3.33	1 - 2.5	1 - 2.20	1.25 - 4	1 - 3.25	1 - 2.67	55.7-697	34.3-199	34-381.7
Subject 3	1.0 p=.169	2.5 *p=.0362	1.5 p=.466	2.0 p=.383	3.0 p=.101	1.5. p=.397	85.5 p=.154	37.5 p=.157	63.5 p=.169

The personal narratives produced by S3 were rated as more relevant than those of the M group whereas the picture sequences were rated as less relevant. The stones picture sequence was rated as mostly inappropriate because he provided a brief sample giving the gist rather than the narrative itself. His procedural discourse was considered similarly relevant to the M group although the jacket and bike procedures were only rated as "mostly appropriate" due to the lack of details given.

A33.3.3 Discourse grammar

The discourse grammar of the personal narratives and the procedures was rated as similarly appropriate to the M group but the sequences were rated as less. As stated above, S3 provided the gist of a narrative on the stones sequence and this was therefore rated as "inappropriate". His wasp sequence narrative comprised more of a description of each action rather than an integrated narrative. A notable characteristic of his narratives was the lack of evaluation. Labov (1972) has emphasised the critical importance of evaluation to narratives and Freedman-Stern et al (1984) have also stressed this, stating that

> "narratives without evaluation strike listeners as flat and pointless or as strictly reporting rather than story telling. Thus evaluation may be considered a necessary element in a fully formed narrative episode". (p. 190).

For RBD subjects, who may have difficulties in the processing of emotion, the evaluation aspect is of particular relevance. Further examination of the performance of RBD subjects on this aspect of discourse structure is warranted.

Two of the procedural samples were rated as "mostly appropriate" due to a reduction in the number of essential steps and a lack of optional details.

A33.3.4 Productivity and syntactic analysis

The length of S3's discourse samples was substantially reduced on all three tasks compared to the matched mean but within range. On one picture sequence (stones), however, he only produced 18 words, about half of the lower range limit. In this sample, he provided the gist of the narrative of the sequence, followed by a comment on his performance, viz.

> "If you haven't got any stones, go home and fetch some. That's what I would say."

Even his longest sample (window procedure) containing 107 words was only similar to the M groups lowest mean length. Although his discourse samples were reduced in length, he maintained the task configuration of the M group with longer personal narrative samples, shorter procedures and even shorter picture sequences.

His response to the picture sequences was not considered relevant to the instructions given but may perhaps be relevant to the task if it is not ecologically valid (see Chapter 9).

	T-UNIT LENGTH			CLAUSE LENGTH			CLAUSAL EMBED		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	11.4	12.7	12.75	7.8	7.9	7.2	1.49	1.74	1.75
M mean	11.12	13.27	11.86	7.86	8.70	6.96	1.47	1.86	1.68
Min-Max	8.9-14.3	7.9-21.3	6.6-15.9	6.6-12.5	6.6-13.4	5.7-8.6	1.2-1.8	1-5.5	1.1-2.4
Subj. 3	8.7 p=.153	8.6 p=.136	8.27 p=.115	7.5 p=.416	5.85 p=.098	6.18 p=.223	1.15 p=.056	1.75 p=.466	1.38 p=.204

S3s clause length was reduced on all three tasks compared to the M group, particularly on the picture sequences where he produced clause lengths below the lower range limit. T-unit length was also reduced on all three tasks with the personal narratives being lower than the M Group's lower limit reflecting the reduced clausal embedding and verbal complexity. He showed no task variation in T-unit length unlike the M group. However, variability by topic was found in the procedures (from 5.6 to 10.5).

S3's clausal embedding was reduced on all three tasks compared to the M group, particularly in the personal narratives. On four topics (frightening narrative, wasp picture sequence, tyre and bike procedures), S3 demonstrated none or virtually no embedding. However on other topics (e.g. jacket procedure), he produced relatively complex syntax (1.8 clauses/T-unit). Thus he was able to produce more complex syntax but did not frequently do so, regardless of discourse genre, task or topic. Evaluation in narratives often shows syntactic complexity whilst narrative clauses show syntactic simplicity (Cortazzi 1993). However, this cannot account for his generally reduced syntactic complexity.

A33.3.5 Clausal structure

	MAIN CLAUSES			LEFT CLAUSES			RIGHT CLAUSES		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	60.93	50.38	52.20	6.94	4.19	6.65	32.34	44.37	40.99
M mean	64.13	48.3	54.12	4.77	3.81	5.45	31.35	45.03	40.46
Min-Max	46.5-84.8	31.3-69.4	39.4-81.9	0-6.83	0-20.9	2.5-10.7	15.2-47.2	18.8-59.2	15.5-55.5
Subj. 3	70.45 p=.262	51.8 p=.379	63.4 p=.23	10.85 *p=.011	14.55 p=.062	12.88 *p=.006	18.75 p=.094	33.65 p=.187	23.73 p=.094

S3 produced more main clauses than the M group on the personal narratives and procedures and fewer right-branching clauses in all three tasks. The incidence of left-branching clauses in his discourse samples was substantially greater than that of the M group on all tasks and mostly beyond the upper range limit. An examination of individual topics reveals that he did not produce any left-branching clauses in one topic (bike procedure) but 28.6% of clauses in the jacket procedure. The increased use of left-branching clauses did not compensate for the fact that overall S3 produced fewer dependent clauses (see clausal embedding above).

A33.3.6 Clarity disruptors

	TOTAL CLARITY DISRUPTORS			NON-SPECIFIC ELEMENTS			CONTENT AND FLUENCY		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	8.0	10.9	12.81	6.08	2.79	3.08	1.92	8.08	9.44
M mean	6.31	9.94	11.14	5.49	2.03	2.72	.81	7.91	8.03
Min-Max	2.1-13.9	.55-26.6	3.2-28.9	2.1-9.4	0-6.9	.9-5.9	0-5.4	0-21.5	0-24.2
Subj. 3	20.15 *p= .0014	6.15 p=.339	13.53 p=.387	5.65 p=.476	3.5 p=.265	2.3 p=.384	14.5 *p= .00002	2.6 p=.275	11.23 p=.344

S3 produced substantially more total clarity disruptors in the personal narratives than the M group but less on the picture sequences. Thus on the more constrained task he was able to produce discourse with greater clarity. The relative increase in clarity disruptors in his personal narratives compared to the other two tasks is in direct contrast to the M group which produced more of such elements in the more constrained tasks.

No differences were observed between S3 and the M group on the incidence of non-specific clauses in the three tasks. He demonstrated a similar pattern to the M group in producing an increased incidence of these clauses in the personal narratives. His non-specific clauses consisted primarily of deictic terms. He produced a high percentage of content and fluency clauses on the personal narratives (three times the upper range limit of the M group) and less in the picture sequences. In contrast the M group produced fewer in their personal narratives and more in the picture sequences and procedures. On all of S3's tasks, comments on the task were the only type of these disruptors that he used e.g.

> "Not really. If it did, I don't remember it" (frightening narrative)
> "I know how to change a wheel. I'd have to show you" (tyre)

Once again, the means of these elements obscures the true variability in S3's discourse. On some topics, he produced none of these elements (e.g. jacket procedure) whereas on other topics, they comprised more than 20 percent (e.g. frightening experience, tyre procedure).

A33.3.7 Cohesion

	TOTAL COHESION			REFERENCE			LEXICAL COHESION		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	1.34	2.42	1.73	.55	1.03	.58	.44	.90	.71
M mean	1.33	2.39	1.67	.50	.99	.52	.48	.96	.69
Min-Max	.5-2.1	.9-3.6	.9-2.2	.2-.9	.4-1.7	.3-.9	.1-1.1	.3-1.7	.3-1.04
S3	1.35 p=.488	.8 p=.058	2.1 p=.154	.45 p=.4	.7 p=.272	.83 p=.059	.6 p=.316	0 *p=.047	.8 p=.336

The total cohesive ties produced by S3 were similar to the M group in the personal narratives, substantially fewer in the picture sequences and more in the procedures. His reduction in total cohesion in the picture sequence compared to the other two tasks is in direct contrast to the M group.

S3's referential cohesion was increased in the procedures compared to the M group. Two of the these topics had relatively low levels of reference (0.3) whilst the other two had high levels (i.e. 1.5 and 1.2 on jacket and bike respectively). The high incidence in the jacket sample reflected a lack of re-lexicalization. For example,

> "... and then try it on you know off the peg and try it for size and if it's okay, keep it. If it's not okay, leave it..." (jacket).

S3's lexical ties were similar to the M group in the personal narratives and procedures. No lexicalization was evident in the picture sequences which reflects the difficulties which he had with this task (as discussed above). Lexicalization in the procedures ranged from zero (jacket) which is below the range limit to 1.3 (bike) which is above the range limit.

	CONJUNCTIONS			"AND"S			CONNECTIVES		
	Pers.	Picture	Proced.	Pers.	Picture	Proced.	Pers.	Picture	Proced.
NNmean	.27	.28	.32	.29	.25	.27	.56	.53	.58
M mean	.27	.23	.32	.32	.23	.26	.59	.45	.57
Min-Max	.17-.4	.1-.35	.06-.53	.1-.53	0-.5	.07-.44	.27-.73	.13-.85	.29-.82
S3	00 *p=.003	00 *p=.019	.3 p=.458	.35 p=.412	.15 p=.307	.33 p=.246	.35 p=.051	.15 p=.087	.63 p=.376

Although S3 produced a similar quantity of conjunctions to the M group in the procedures, he used none in the narrative tasks but used "and" instead. However in the procedures he used both conjunctions and "ands" resulting in similar amounts of connectives to the M group in procedures but reduced connectives in the other two tasks. The conjunctions used in the procedures were predominantly temporal (e.g. then).

	SUBSTITUTION			ELLIPSIS			ATTEMPTED COH.		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	.038	.052	.081	.057	.031	.035	.018	.129	.034
M Mean	.03	.031	.099	.065	.041	.025	.031	.123	.039
Min-Max	0-.1	0-.13	.02-.24	0-.18	0-.15	0-.13	00 - .17	.00-.65	.00-.1
S3	.15 *p=.001	.05 p=.34	.05 p=.235	.2 *p=.03	.0 p=.24	.03 p=.46	.00 p = .273	.05 p = .367	.13 *p=.029

S3 provided substantially more substitution and ellipsis than the M group in the personal narratives. These cohesive devices contributed to the brevity of his personal narratives. He produced fewer cohesive errors than the M group on the two narrative tasks but considerably more in the procedures. The M group produced more errors in the picture sequences than the other tasks but, like S2, S3 produced more in procedures.

A33.3.8 Dysfluency

	DYSFLUENCIES		
	Personal	Picture	Proced.
NNmean	5.894	3.620	4.944
M Mean	4.335	2.731	4.048
Min-Max	.97 - 7.77	.00-8.55	.44-9.73
S3	1.6 p=.13	.00 p=.172	5.00 p=.37

S3 demonstrated a decreased incidence of dysfluencies compared to the M group in the personal narratives with none being observed in the picture sequences. He was less fluent in the procedures than the M group and than his own narrative productions. These dysfluencies comprised mainly repetition and false starts.

A33.3.9 Summary of S3's performance

He demonstrated adequate relevance and discourse grammar in the personal narratives and procedures but relevance was reduced in the picture sequences. His output was decreased, particularly in the picture sequences, and clausal embedding was reduced. He used more left-branching clauses in the personal narratives and the procedures. He provided an increased amount of total clarity disruptors and content and fluency disruptors on personal narratives which was not observed in the other RBD subjects. His use of cohesion was generally appropriate although there was a reduction in lexicalization in the picture sequence task and a decrease in conjunctions in both narrative tasks. He also produced a greater number of cohesive errors in the procedures. He produced limited dysfluencies in all tasks. No word-finding difficulties were observed with his reduction in non-specific elements and dysfluency and a zero incidence of substitutions. The picture sequences appeared to elicit his most impaired discourse samples.

A33.4 SUBJECT 4 (S4)

A33.4.1 Description of subject

S4 was 67 years of age at the time of the assessment and had suffered a right fronto-parietal cerebral infarct almost three years previously. He presented with no residual physical difficulties. He had attended school until the age of 14 and had been employed within the shoe manufacturing industry for his entire working life. He had not received any speech and language therapy since his CVA. He lives with his adult son. On the standardised tests, he presented with deficits in metaphor comprehension, inferencing, humour and stress on the RHLB and in repetition and word fluency on the WAB.

A33.4.2 Relevance

	RELEVANCE			DISCOURSE GRAM			SAMPLE LENGTH		
	Pers.	Picture	Proc.	Pers.	Picture	Proc.	Pers.	Picture	Proc.
NN mean	1.57	1.46	1.65	1.96	1.80	1.68	348.7	111.84	212.9
M mean	1.64	1.44	1.53	2.22	2.00	1.64	294.5	96.6	176.5
Min-Max	1 - 3.33	1 - 2.5	1 - 2.20	1.25 - 4	1 - 3.25	1 - 2.67	55.7-697	34.3-199	34-381.7
Subject 4	1.5 p=.415	1.0 p=.214	3.0 *p=.0006	2.0 p=.383	1.5 p=.255	3.0 *p=.014	120.5 p=.196	85.5 p=.424	152.3 p=.417

Although S4's personal narratives were rated as similarly relevant to the M group, his funny experience was rated as mostly irrelevant due to the fact that he provided a description of his state of mind (e.g. "I've been a happy person") rather than a narrative. His picture sequences were considered more relevant than those of the M group.

He produced procedures which were considerably less relevant than the M group. All four procedures were rated as mostly irrelevant to the task because he provided descriptive information that was broadly related to the topic but he did not provide a procedure as requested. For example, when asked how he would replace a pane of glass, S4 described the general improvements that they had made to their house viz. the double-glazing, painting, landscape gardening. Similarly, on the jacket topic, he described where he would go to buy a jacket but then provided information about other items of clothing and how he takes care of his clothes.

A33.4.3 Discourse grammar

The discourse grammar of the personal narratives was considered as mostly appropriate which was similar to the ratings of the M group. The funny personal narrative was rated as mostly inappropriate due to the fact that S4 provided a description rather than a narrative. The discourse grammar of his picture sequence narratives was rated as more appropriate than the M group. In these, he provided well-structured narratives with appropriate evaluation.

The discourse grammar of all of S4's procedures was rated as mostly inappropriate (3) and his mean discourse grammar ratings were considerably lower than the M group. In most procedures he would provide an appropriate abstract and the first essential step. For example, in the jacket procedure:-

> "Since the wife died, my son's always come with me. We've either gone to the Fosse Park, you know to the M & S. We've either gone there or to a handy shop".

He would then digress into descriptions of related topics (see Relevance section) but not provide the remaining essential steps, any optional steps or a coda.

A33.4.4 Productivity and syntactic analysis

S4 produced shorter discourse samples than the M group on the personal narratives, viz. less than half the length. His funny personal narrative was particularly short (57 words). In a similar configuration to the M group, his sequence narratives were shorter than the other two tasks. Although S4's procedures were similar in length to the group, they ranged in length from 80 (tyre) to 267 words (jacket), indicating the sometimes overriding effect of topic over genre or task.

	T-UNIT LENGTH			CLAUSE LENGTH			CLAUSAL EMBED.		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	11.4	12.7	12.75	7.8	7.9	7.2	1.49	1.74	1.75
M mean	11.12	13.27	11.86	7.86	8.70	6.96	1.47	1.86	1.68
Min-Max	8.9-14.3	7.9-21.3	6.6-15.9	6.6-12.5	6.6-13.4	5.7-8.6	1.2-1.8	.98-5.5	1.1-2.4
Subj. 4	10.8 p=.445	9.15 p=.165	12.45 p=.419	8.75 p=.419	7.5 p=.287	9.48 *p=.0134	1.35 p=.269	1.25 p=.316	1.33 p=.169

S4 produced longer clauses than the M group in the procedures. The relatively longer clauses of his procedures compared to the other two tasks is in contrast to that of the M group which had the shortest in the procedures. At first glance, S4's longer clause length in procedures (beyond the upper range limit) may reflect the fact that he inappropriately produced descriptions, thereby including more nominal and verbal complexity. However his procedures contained a greatly inflated incidence of non-specific elements, especially empty phrases.

> Oh yeah yeah yeah well *I mean* these are quite respectable *really I mean* if they're double-glazing *like you know*" (empty phrases, window procedure).

Thus the clauses were longer but not more complex in terms of noun or verb phrases. The shorter clause length in his picture sequences reflects his (relatively) lower number of non-specific elements and lack of increased phrasal complexity. This reinforces the importance of looking at different aspects of discourse in one individual and thereby avoiding incorrect conclusions.

His T-units tended to be shorter in the picture sequences. This was due to the decreased clause length and lack of clausal embedding. His clausal embedding was reduced in all three tasks compared to the M group. He showed no task variation in embedding unlike the M group which had more embedding in the picture sequences than the other two tasks. Although he was able to produce more complex syntax (e.g. 1.7 in the frightening narrative), he did not usually demonstrate this. An explanation for this may lie in his high dysfluency rate (particularly false starts) and his increased use of non-specific elements which may have made more complex syntax difficult to produce. He did appear to attempt more embedding but then abandoned it in favour of simple syntax, e.g.

> "*If I'd have kept my... I was so...* I was carrying groceries" (attempted embedding, frightening)
>
> "*Yeah you see that that's where they they didn't it it* they didn't reset it (attempted embedding, frightening)

This may have been a conscious or unconscious compensatory strategy.

A33.4.5 Clausal structure

	MAIN CLAUSES			LEFT CLAUSES			RIGHT CLAUSES		
	Personal	Picture	Proced.	Pers.	Picture	Proced.	Personal	Picture	Proced.
NNmean	60.93	50.38	52.20	6.94	4.19	6.65	32.34	44.37	40.99
M mean	64.13	48.3	54.12	4.77	3.81	5.45	31.35	45.03	40.46
Min-Max	46.5-84.8	31.3-69.4	39.4-81.9	0-6.83	0-20.9	2.5-10.7	15.2-47.2	18.8-59.2	15.5-55.5
S4	70.70 p=.254	63.10 p=.106	66.15 p=.172	0 *p=.03	0 p=.283	4.75 p=.392	29.25 p=.409	36.9 p=.261	29.08 p=.179

S4 tended to produce more main clauses in all three tasks with a relatively increased percentage in the personal narratives than in the picture sequences, a configuration similar to the M group. Main clauses varied in frequency substantially in his personal narratives and procedures (from over 50 to over 80%). He demonstrated very limited use of left-branching clauses with only two procedural topics (jacket and bike) containing any. As discussed above, his increased incidence of non-specific elements and false starts meant that he used simpler syntax. As left-branching clauses are considered to be more demanding to produce (see Chapter 5), it would follow that these would be even more difficult for him. His somewhat reduced percentages of right-branching clauses reflected his increased use of main clauses and the reduction in clausal embedding and left-branching clauses.

A33.4.6 Clarity disruptors

	TOTAL CLARITY DISRUPTORS			NON-SPECIFIC ELEMENTS			CONTENT AND FLUENCY		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Pers.	Picture	Proced.
NNmean	8.0	10.9	12.81	6.08	2.79	3.08	1.92	8.08	9.44
M mean	6.31	9.94	11.14	5.49	2.03	2.72	.81	7.91	8.03
Min-Max	2.1-13.9	.55-26.6	3.2-28.9	2.1-9.4	0-6.9	.9-5.9	0-5.4	0-21.5	0-24.2
Subj. 4	17.6 *p=.005	11.15 p=.447	26.25 *p=.045	17.35 *p=.0007	11.15 *p=.001	24.48 *p=.0000	.25 p=.37	0 p=.189	1.78 p=.22

S4 produced substantially more clarity disruptors on all tasks than the matched control, particularly on the personal narratives and procedures. As discussed above, his samples were reduced in length. A combination of this reduction and the increase in clarity disruptors and dysfluencies (see below) resulted in discourse that was reduced in content and thus rated as reduced in relevance (see above).

Non-specific clauses were considerably more frequent in all three discourse tasks than the M group. In fact he produced four times more than the upper range limit in the procedures. The majority of these clauses were comprised of empty phrases For example

> "I've never been *you know* over the moon *like anything you know"* (funny personal narrative).
>
> "They always buy me shirts for the birthdays *like you know and that sort of thing* so ..." (jacket procedure).
>
> "and he suggests things *and this that and the other you know* and any other little problems *like that*"" (jacket procedure).

This excessive use of such elements may be considered as a stalling technique to provide additional time to overcome planning difficulties at a conceptual or formulation level. However, overuse of these elements may disrupt the continuity of meaning of the discourse (Ripich and Terrell 1988) and increase the communicative burden placed on the listener (Demboswki et al 1989) (see Chapter 2).

In contrast to the non-specific clauses, he produced extremely few content and fluency elements compared to the M group mean and range. In fact, only two of the eight samples contained these disruptors (frightening narrative and bike procedure) and these took the form of repetition of words and ideas. He made no comments on the tasks or personalised comments in contrast to other subjects. S4 suffered a fronto-parietal infarct. Anterior lesions have been associated with an increase in disruptive or off-topic elements (e.g.Wapner et al 1981, Hough 1990), although Lojek-Osiejuk (1996) found no differences between anterior and posterior RBD subjects in the inclusion of irrelevant or personalised comments.

A33.4.7 Cohesion

	TOTAL COHESION			REFERENCE			LEXICAL COHESION		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	1.34	2.42	1.73	.55	1.03	.58	.44	.90	.71
M mean	1.33	2.39	1.67	.50	.99	.52	.48	.96	.69
Min-Max	.5-2.1	.9-3.6	.9-2.2	.2-.9	.4-1.7	.3-.9	.1-1.1	.3-1.7	.3-1.04
Subj. 4	1.6 p=.278	2.85 p=.317	2.15 p=.108	.25 p=.115	1.15 p=.363	.63 p=.284	.6 p=.316	1.00 p=.471	.93 p=.179

S4's discourse samples were more cohesive than that of the M group but within their range. The procedures contained cohesive ties similar to the upper range limit of the M group. This may reflect the fact that these procedures were in fact descriptions. The procedures ranged from 1.7 (tyre and window) to 2.9 (bike). S4 was similar to the M group in producing relatively more cohesion in the picture sequences.

The amount of reference in S4's samples was within the range of the M group. He also demonstrated a similar task effect to the M group in producing an increased amount in the picture sequence relative to the other two tasks. The procedural samples ranged from 0.7 (tyre and window) to jacket (1.3) reflecting the descriptive nature of these procedures.

	CONJUNCTIONS			"AND"S			CONNECTIVES		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	.27	.28	.32	.29	.25	.27	.56	.53	.58
M mean	.27	.23	.32	.32	.23	.26	.59	.45	.57
Min-Max	.17-.4	.1-.35	.06-.53	.1-.53	0-.5	.07-.44	.27-.73	.13-.85	.29-.82
Subj. 4	.3 p=.337	.4 *p=.047	.35 p=.415	.15 p=.122	.45 p=.086	.33 p=.246	.45 p=.164	.85 *p=.042	.68 p=.278

S4 provided similar amounts of conjunctions in the personal narratives and procedures but considerably more in the picture sequences. These were predominantly continuative conjunctions in the personal experiences, adversatives in procedures and temporal and continuative conjunctions in the sequences. The production of "and" and the connectives was lower than the M group in S4's personal narratives but more in his picture sequences and similar in his procedures. His relatively increased incidence of connectives in the picture sequences (compared to the other two tasks) is in contrast to the M group's decreased amount in this task. This may reflect S4's better performance generally on the picture sequences. The occurrence of "and" in the procedures ranged from zero (tyre) to 0.8 (bike), the latter being well above the upper range limit of the M group. The bike also elicited connectives well above the range limit (2.1 per T-unit).

	SUBSTITUTION			ELLIPSIS			ATTEMPTED COH.		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	.038	.052	.081	.057	.031	.035	.018	.129	.034
M Mean	.03	.031	.099	.065	.041	.025	.031	.123	.039
Min-Max	0-.1	0-.13	.02-.24	0-.18	0-.15	0-.13	00 - .17	.00-.65	.00-.1
Subj. 4	.05 p=.27	.05 p=.34	.03 p=.158	.45 *p = .00005	.1 p=.16	.08 p=.117	.00 p= .277	.20 p= .359	.18 *p = .0036

S4 produced similar substitution and ellipsis to the M group apart from an increased incidence of ellipsis in the personal narratives. As for subjects 2 and 3, S4 produced more cohesive errors on the procedures than the M group. The framework provided by the picture sequence task seem to have helped him not to produce excessive errors as commonly occurred in this task for the M group.

A33.4.8 Dysfluency

	DYSFLUENCIES		
	Personal	Picture	Proced.
NNmean	5.894	3.620	4.944
M Mean	4.335	2.731	4.048
Min-Max	.97 - 7.77	.00-8.55	.44-9.73
Subj. 4	21.9 *p = .000006	22.05 *p = .000011	22.38 *p = .000022

S4 had a greatly increased dysfluency rate on all three tasks. Even his minimum rate (7.2% on the stones sequence) was above the M group mean. Furthermore, although his lowest rate occurred in a picture sequence, so did his highest rate (36.9% on the wasp sequence). Thus the supportive framework of this task was not sufficient overcome his lack of fluency. As stated previously, the high incidence of dysfluencies and non-specific clauses resulted in a decreased content/length ratio. Bliss et al (1998) have concluded that dysfluencies can reduce coherence because they interfere with the transmission of a message. The types of dysfluency that he used were predominantly false starts and incomplete mazes with no part-word repetitions and few non-word fillers. e.g.

> "Oh yeah yeah well I mean *that's the I mean these I mean like these are quite I mean* these are quite respectable really I mean if they're double-glazing like you know *and they're quite and they* "(window procedure)
>
> "and of course now *he's got now he's having now he's* he got this car"(bike procedure).

Thus although stuttering (characterised by phoneme, syllable and part-word repetitions) has been reported following right brain damage (Ardila 1984, Ardila and Lopez 1986, Horner and Massey 1983), S4 did not show such a pattern of dysfluency. However, the high incidence of false starts and incomplete mazes may indicate that a speaker is correcting overt errors, adding or deleting information (Dollaghan and Campbell 1992). This may also indicate that S4 is able to monitor his speech/language.

A33.4.9 Summary of S4's performance

S4 produced adequately relevant and appropriately structured narratives but not procedures. The length of his output was appropriate in all tasks but they contained less clausal embedding. His personal narratives contained a smaller number of left-branching clauses. His personal narratives and procedures contained an increased use of clarity disruptors and all his tasks demonstrated an increased amount of non-specific elements but a decrease in content and fluency disruptors, unlike other subjects. He produced appropriately cohesive discourse with increased conjunctions and connectives in the picture sequence narratives but he made more cohesive errors in his procedures. His discourse production was characterised by a greatly increased incidence of dysfluencies. The structure and content provided by the picture sequences enabled him to perform better on this task.

A33.5 SUBJECT 5 (S5)

A33.5.1 Description of subject

S5 was 73 years of age at the time of the assessment. He had suffered a right hemisphere CVA three years previously, resulting in a "large low attenuation area involving the occipital lobe consistent with a right posterior cerebral artery territory infarct". He had attended university and received a first-class mathematics degree. He had been a secondary school teacher for most of his working life, with some short periods in industry. He is retired and lives alone. He has not received any speech and language therapy. He had mild residual hemiparesis. No visual difficulties were recorded in his medical notes or reported. On the standardised tests he demonstrated some reduction in inferencing skills on the RHLB and a reduction in scores on the spontaneous speech, repetition and word fluency sub-tests of the WAB.

A33.5.2 Relevance

	RELEVANCE			DISCOURSE GRAM.			SAMPLE LENGTH		
	Personal	Picture	Proc	Personal	Picture	Proc	Personal	Picture	Proc
NN mean	1.57	1.46	1.65	1.96	1.80	1.68	348.7	111.84	212.9
M mean	1.64	1.44	1.53	2.22	2.00	1.64	294.5	96.6	176.5
Min-Max	1 - 3.33	1 - 2.5	1 - 2.20	1.25 - 4	1 - 3.25	1 - 2.67	55.7-697	34.3-199	34-381.7
Subject 5	3.0 *p=.028	2.0 p=.158	2.0 p=.099	1.0 p=.065	2.5 p=.255	1.5 p=.397	438 p=.239	64.5 p=.289	114.5 p=.297

The relevance of the picture sequences and procedures produced by S5 were rated as less relevant than those of the M group but within their range of scores. Both the personal narrative topics were rated as mostly irrelevant due to the fact that he produced a short (relevant) introduction before digressing into descriptions of a related topic. The stones picture sequence was also rated as mostly irrelevant because less than half of the short sample consisted of information regarding the task whereas the majority of the sample consisted of comments on the task. Although his procedures lay within the M group range, the bike procedure was rated as mostly irrelevant because his sample consisted of some personalised description of learning how to ride a bike and then comments on the task, mostly repeated.
e.g.

> "I can remember. I can remember. I must have been taught to ride a bicycle. Yes, they just pushed me down a plank (sic), yes. Somebody down there to catch me but after a few of these I soon leant how to ride a bicycle ..... I still remember that. One of the things that I remember."

A33.5.3 Discourse grammar

The discourse grammar of the personal narratives elicited from S5 were rated as appropriate and more appropriate than that of the M group. The discourse grammar of the picture sequences was rated as less appropriate than that of the M group. On the stone sequence, the discourse grammar was rated as mostly inappropriate because S5 did not produce a narrative but only provided two actions with no other aspects of the narrative discourse grammar given.

His procedural mean was similar to the M group mean but in the jacket and bike procedures, he provided a reduced number of essential steps.

A33.5.4 Productivity and syntactic analysis

S5's personal narratives were longer than the M group but within the range. As with most other subjects, the frightening experience elicited the longest sample (539 words). The mean length of his picture sequences and procedures was shorter than that of the M group. His picture sequences were short due to the fact that he provided comments on the task rather than an account of the narrative depicted in the pictures (see clarity disruptors below). His longest procedure (tyre - 173 words) was closer to the matched mean whilst his shortest (jacket) only had 61 words.

	T-UNIT LENGTH			CLAUSE LENGTH			CLAUSAL EMBED.		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	11.4	12.7	12.75	7.8	7.9	7.2	1.49	1.74	1.75
M mean	11.12	13.27	11.86	7.86	8.70	6.96	1.47	1.86	1.68
Min-Max	8.9-14.3	7.9-21.3	6.6-15.9	6.6-12.5	6.6-13.4	5.7-8.6	1.2-1.8	.98-5.5	1.1-2.4
Subj. 5	8.5 p=.135	8.75 p=.144	10.23 p=.288	6.45 p=.209	8.4 p=.443	6.85 p=.457	1.3 p=.192	1.05 p=.263	1.55 p=.357

Although S5's clause length was similar in configuration to the M group (longer clauses in the picture sequences than the other two tasks), his clause length in the personal narratives was somewhat reduced compared to the M group. This was due to the fact that he provided few qualifications of nouns or verbs and used simple verb structures. His T-unit length was reduced on the two narrative tasks relative to the M group and below the range in the personal narratives. The shorter T-units in the latter reflected his decreased clause length as his clausal embedding was adequate relative to the M group. In contrast, his shorter picture sequence T-units were due to decreased clausal embedding. In the M group, picture sequences tended to elicit greater embedding than the other two tasks whereas S5 presented with the reverse configuration. His reduced embedding on this task is due to the fact that he provided brief descriptions of each frame rather than integrating them into a narrative.

A33.5.5 Clausal structure

	MAIN CLAUSES			LEFT CLAUSES			RIGHT CLAUSES		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	60.93	50.38	52.20	6.94	4.19	6.65	32.34	44.37	40.99
M mean	64.13	48.3	54.12	4.77	3.81	5.45	31.35	45.03	40.46
Min-Max	46.5-84.8	31.3-69.4	39.4-81.9	0-6.83	0-20.9	2.5-10.7	15.2-47.2	18.8-59.2	15.5-55.5
Subj. 5	65.95 p=.427	91.65 *p=.0013	65.5 p=.184	3.35 p=.273	4.15 p=.479	2.55 p=.134	31.15 p=.491	4.15 *p=.003	31.42 p=232

The incidence of S5's main clauses was similar to the M group mean in the personal narratives and increased in the other two tasks, particularly in the picture sequences, reflecting the decrease in clausal embedding. The increase in main clauses in his picture sequences as compared to the other two tasks was in contrast to the trend of the M group. In the stones picture sequence, all the T-units produced consisted solely of main clauses.

The incidence of left-branching clauses on all three tasks was within the range of the M group. Two of the procedural topic samples contained no left-branching clauses. S5 produced a similar amount of right-branching clauses to the M group in the personal narratives and procedures but they were considerably reduced in the picture sequences. In the latter task, he produced similar, but limited, amounts of both left and right-branching clauses.

A33.5.6 Clarity disruptors

	TOTAL CLARITY DISRUPTORS			NON-SPECIFIC ELEMENTS			CONTENT AND FLUENCY		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	8.0	10.9	12.81	6.08	2.79	3.08	1.92	8.08	9.44
M mean	6.31	9.94	11.14	5.49	2.03	2.72	.81	7.91	8.03
Min-Max	2.1-13.9	.55-26.6	3.2-28.9	2.1-9.4	0-6.9	.9-5.9	0-5.4	0-21.5	0-24.2
Subj. 5	4.55 p=.317	42.45 *p=.0019	28.8 *p=.026	2.45 p=.153	.00 p=.196	3.52 p=.288	2.1 p=.223	42.45 *p=.001	15.8 p=.17

S5's total clarity disruptors were reduced in personal narratives but substantially increased in the picture sequences and procedures. He did however mirror the M group's trend to fewer clarity disruptors in the personal narratives compared to the other two tasks. The incidence of non-specific clauses was reduced in the narratives but similar in the procedures. No non-specific elements occurred in the two picture sequences. The content and fluency clauses produced by S5 were higher than the M group mean in the personal narratives and procedures but within the range. However his picture sequences contained substantially more than the M group and double their upper range limit. This was due to the high number of comments on the task e.g.

> *"Oh not another one of these. I did a whole host of these in hospital"* (wasp picture sequence).

> *"Some more of this. I can't make any sense out of this"* (stones picture sequence).

As stated previously, S5 had obvious difficulty with the picture sequences and this was reflected in his comments. These comments on the task and personalised comments can give clues to self-appraisal (Nespoulous 1996).

The similarity in the mean of content and fluency clauses in his procedures and the M group masks the range observed where one procedure (jacket) had no such clauses whereas another (tyre) contained 36.4%, mostly personalised comments. After beginning to provide the required steps for the tyre task, S5 proceeded with

> "Not that I want a car you see. I'd already got rid of my car before I went into hospital. I'd got rid of it for economic reasons. I took to cycling but I had to throw that away".

He then provided a relevant and appropriately structured procedure.

A feature of two of S5's procedures was the incidence of substitution errors (circumlocution, paraphasias, neologisms). This was not observed in any other subjects. On the window and jacket procedures he made 8.5% and 29.5% of these errors respectively. For example

" What's it called oh dear somebody anybody the man who sells clothes tiler no not a tiler. That's not it. Tailor yes tailor, people who sell it, people who measure things, a gentleman's outfitters ...."(paraphasias and circumlocution, jacket procedure)

"and take these little thin nails, the special kind of nails, spins, specks spiny short nails that keeps the glass in" (paraphasias and circumlocution, window procedure).

From this it is apparent that he had word-finding difficulties although he produced few non-specific elements.

A33.5.7 Cohesion

	TOTAL COHESION			REFERENCE			LEXICAL COHESION		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	1.34	2.42	1.73	.55	1.03	.58	.44	.90	.71
M mean	1.33	2.39	1.67	.50	.99	.52	.48	.96	.69
Min-Max	.5-2.1	.9-3.6	.9-2.2	.2-.9	.4-1.7	.3-.9	.1-1.1	.3-1.7	.3-1.04
Subj. 5	1.05 p=.261	1.8 p=.27	1.67 p=.498	.3 p=.165	1.25 p=.287	.57 p=.402	.25 p=.198	.4 p=.154	.9 p=.21

On the two narrative tasks S5 produced less cohesive ties than the M group but still within the range. The relatively increased incidence of cohesive ties in the M group's picture sequence relative to the other two tasks was not evident in his discourse. He did produce more cohesive ties in the picture sequences than the personal narratives but only slightly more than the procedures. The decrease in cohesive ties in the sequence narratives reflects the high incidence of clarity disruptors in this task.

S5's referential cohesion on all three tasks lay within the M group range and like the M group, he also provided greater referential cohesion in the sequence narratives than the other two tasks. His somewhat increased use in the picture sequences is due to the greater incidence of demonstratives in the comments on the task that he produced. He demonstrated reduced lexicalization in both narrative tasks compared to the M group but an increased amount in the procedures, particularly in the jacket procedure which contained 1.5 lexical ties per T-unit. Whilst the M group tended to produce more lexical ties in the picture sequences than the other two tasks, S5 produced the greatest amount in the procedures. As stated previously, increases in both referential and lexical ties are required to unambiguously differentiate between the two male characters in the picture sequences. The lack of increased lexicalization in S5's picture sequences reflects the incidence of clarity disruptors on this task.

	CONJUNCTION			"AND"S			CONNECTIVES		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	.27	.28	.32	.29	.25	.27	.56	.53	.58
M mean	.27	.23	.32	.32	.23	.26	.59	.45	.57
Min-Max	.17-.4	.1-.35	.06-.53	.1-.53	0-.5	.07-.44	.27-.73	.13-.85	.29-.82
Subj. 5	.15 p=.086	.1 p=.109	.2 p=.23	.25 p=.313	.1 p=.206	.08 p=.055	.4 p=.094	.2 p=.125	.27 p=.057

S5 produced fewer conjunctions and "ands" than the M group on all tasks. The few conjunctions used were predominantly continuatives. In half of the topic samples he did not produced any "ands". The incidence of connectives was reduced in all tasks, particularly in the procedures, e.g.

> "Put the spare wheel on. Put the nuts on. Make sure they're nice and tight. Put the hubcap on". (tyre procedure)

	SUBSTITUTION			ELLIPSIS			ATTEMPTED COH.		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	.038	.052	.081	.057	.031	.035	.018	.129	.034
M Mean	.03	.031	.099	.065	.041	.025	.031	.123	.039
Min-Max	0-.1	0-.13	.02-.24	0-.18	0-.15	0-.13	00 - .17	.00-.65	.00-.1
Subj. 5	.01 p=.27	.05 p=.34	.05 p=.235	.0 p=.168	.0 p=.24	.0 p=.289	.00 p= .273	.00 p = .283	.01 p = .256

S5 produced limited substitution and no ellipsis on all the tasks. His narrative tasks contained no cohesive errors and his procedures an extremely small amount.

A33.5.8 Dysfluency

	DYSFLUENCIES		
	Personal	Picture	Proced.
NNmean	5.894	3.620	4.944
M Mean	4.335	2.731	4.048
Min-Max	.97 - 7.77	.00-8.55	.44-9.73
Subj. 5	10.00 *p=.017	14.95 *p=.0005	8.63 p=.066

Like S4, S5 produced considerably more dysfluencies than the M group in all three tasks, particularly on the picture sequences. On all tasks, the predominant dysfluencies were non-word fillers and incomplete mazes, e.g.

> "Oh yes the father he's got he's enticing the the child with a a banana I think...."

A33.5.9 Summary of S5's performance

S5 produced appropriately relevant picture sequence narratives and procedures but his personal narratives demonstrated a reduction. All three tasks were rated as having similarly appropriate discourse grammar to the M group. In the picture sequences, he used more main clauses and fewer right-branching clauses and less clausal embedding, unlike the M group who had increased embedding in this task. Clarity disruptors were increased in incidence in his picture sequences and procedures and he produced more content and fluency disruptors in the picture sequence narratives. He was the only subject to produce word substitutions. Generally his use of cohesion was unimpaired. His rate of dysfluencies was considerably increased, particularly on the picture sequences. He demonstrated considerable difficulty in the picture sequences but it is not clear if this was due to any visual impairments. No visual difficulties were recorded or reported nor observed on other tasks (e.g. RHLB, WAB).

A33.6 SUBJECT 6 (S6)

A33.6.1 Description of subject

S6 was 77 at the time of assessment and had suffered a right hemisphere temporo-parietal infarct three years previously. He had no residual physical disabilities and had not received any speech and language therapy. He had left school at fourteen and had worked within the advertising sector all his working life until his retirement. He lives with his wife. He demonstrated some reduction in humour on the RHLB.

A33.6.2 Description of discourse

	RELEVANCE			DISCOURSE GRAM.			SAMPLE LENGTH		
	Pers.	Picture	Proc.	Pers.	Picture	Proc.	Pers.	Picture	Proc.
NN mean	1.57	1.46	1.65	1.96	1.80	1.68	348.7	111.84	212.9
M mean	1.64	1.44	1.53	2.22	2.00	1.64	294.5	96.6	176.5
Min-Max	1 - 3.33	1 - 2.5	1 - 2.20	1.25 - 4	1 - 3.25	1 - 2.67	55.7-697	34.3-199	34-381.7
Subject 6	2.0 p=.292	1.0 p=.214	1.75 p=.267	1.0 p=.065	2.0 p=.5	1.5 p=.397	433 p=.247	69.5 p=.319	105.3 p=.270

A33.6.3 Relevance

Compared to the M group, S6 produced discourse that was rated as similarly relevant for all three tasks. He did not demonstrate any specific difficulty with relevance in any of the topics.

A33.6.4 Discourse grammar

S6 achieved discourse grammar ratings similar to or better than the M group on all tasks. His relatively less appropriate rating on the picture sequence (compared to his performance on the other two tasks) related to the limited or non-existent evaluation given on the picture sequences.

A33.6.5 Productivity and syntactic analysis

S6 produced shorter samples on the picture sequence and procedures compared to the M group but the personal narratives were longer. The former two tasks contained a reduced amount of detail and no increase in the incidence in clarity disruptors (as most other RBD subjects did). Even his longest picture sequence task (wasp) and procedure (tyre) did not reach the respective means of the M group. He did however maintain the M group's proportionally longer personal narratives compared to the other two tasks.

	T-UNIT LENGTH			CLAUSE LENGTH			CLAUSAL EMBED.		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	11.4	12.7	12.75	7.8	7.9	7.2	1.49	1.74	1.75
M mean	11.12	13.27	11.86	7.86	8.70	6.96	1.47	1.86	1.68
Min-Max	8.9-14.3	7.9-21.3	6.6-15.9	6.6-12.5	6.6-13.4	5.7-8.6	1.2-1.8	1-5.5	1.1-2.4
Subj. 6	11.7 p=.4	13.05 p=.48	9.63 p=.224	7.7 p=.462	7.85 p=.344	6.8 p=.438	1.5 p=.428	1.7 p=.45	1.48 p=.288

S6's clause and T-unit length as well as clausal embedding was similar on all tasks to the M group. His clausal embedding was somewhat reduced in the procedures but the topics ranged from no embedding (window) to 2.1 clauses per T-unit (jacket). Thus although he demonstrated reduced embedding in a small number of topics, he did not demonstrate the reduced overall performance on syntactic measures of the other RBD subjects.

A33.6.6 Clausal structure

	MAIN CLAUSES			LEFT CLAUSES			RIGHT CLAUSES		
	Personal	Picture	Proced.	Pers.	Picture	Proced.	Personal	Picture	Proced.
NNmean	60.93	50.38	52.20	6.94	4.19	6.65	32.34	44.37	40.99
M mean	64.13	48.3	54.12	4.77	3.81	5.45	31.35	45.03	40.46
Min-Max	46.5-84.8	31.3-69.4	39.4-81.9	0-6.83	0-20.9	2.5-10.7	15.2-47.2	18.8-59.2	15.5-55.5
Subj. 6	61.7	46.45 p=.436	61.95 p=.266	3.3 p=.266	0 p=.283	5.25 p=.469	35.0 p=.346	53.55 p=.251	32.8 p=.267

S6's percentages of main and right-branching clauses was similar on all tasks compared to the M group. The lack of left-branching clauses in the picture sequence was balanced by an increased incidence of right-branching clauses.

S6 demonstrated his ability to produce left-branching clauses in the personal narratives and procedures.

A33.6.7 Clarity disruptors

	TOTAL CLARITY DISRUPTORS			NON-SPECIFIC ELEMENTS			CONTENT AND FLUENCY		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	8.0	10.9	12.81	6.08	2.79	3.08	1.92	8.08	9.44
M mean	6.31	9.94	11.14	5.49	2.03	2.72	.81	7.91	8.03
Min-Max	2.1-13.9	.55-26.6	3.2-28.9	2.1-9.4	0-6.9	.9-5.9	0-5.4	0-21.5	0-24.2
Subj. 6	2.8 p=.176	10.35 p=.482	9.32 p=.414	2.30 p=.142	3.75 p=.232	5.15 p=.054	.5 p=.428	6.6 p=.4409	4.18 p=.316

S6 produced less total clarity disruptors in the personal narratives and similar amounts to the M group in the other two tasks. His reduced incidence in the personal narratives reflects the use of fewer non-specific and content and fluency elements. His picture sequences and procedures contained somewhat more non-specific elements but fewer content and fluency elements than the M group. Some procedures had very few non-specific clauses (jacket - 1.2%) whereas others had amounts above the range limit (tyre - 8.8%). These non-specific elements consisted mainly of deictic and indefinite terms, possibly indicating a word-finding difficulty. e.g.

"by this automatic thing" (tyre procedure).

S6 had fewer non-specific elements in the personal narratives than the other two tasks, in contrast to the M group's tendency to produce fewer on this task than the other tasks.

Like the M group, S6 had a similarly increased incidence of content and fluency clauses in the picture sequences compared to personal narratives. Three topic samples (stones picture sequence and tyre and window procedures) had no such clauses whereas others (wasp picture sequence and bike procedure) had more than 13%, indicating inter-individual variation with topic.

A33.6.8 Cohesion

	TOTAL COHESION			REFERENCE			LEXICAL COH.		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	1.34	2.42	1.73	.55	1.03	.58	.44	.90	.71
M mean	1.33	2.39	1.67	.50	.99	.52	.48	.96	.69
Min-Max	.5-2.1	.9-3.6	.9-2.2	.2-.9	.4-1.7	.3-.9	.1-1.1	.3-1.7	.3-1.04
Subj. 6	1.7 p=.21	3.1 p=.232	1.38 p=.225	.4 p=.309	1.4 p=.192	.3 p=.119	.7 p=.198	1.00 p=.471	.68 p=.481

S6's cohesive tie incidence was higher than the M group in the narrative tasks. Although his procedural mean was similar to the M group, the topics ranged from 0.5 (bike) to 2.0 (window). As is the case for the M group, he produced more cohesive picture sequences than the other two tasks. His use of referential cohesion was similar to the M group and he also demonstrated the same proportional increase in referential ties in the picture sequence compared to the other two tasks. He produced a somewhat increased amount of lexicalization in the personal narratives compared to the M group, but again as in the group, the highest amount of lexicalization occurred in the picture sequence task.

	CONJUNCTIONS			"AND"S			CONNECTIVES		
	Pers.	Picture	Proced.	Pers.	Picture	Proced.	Pers.	Picture	Proced.
NNmean	.27	.28	.32	.29	.25	.27	.56	.53	.58
M mean	.27	.23	.32	.32	.23	.26	.59	.45	.57
Min-Max	.17-.4	.1-.35	.06-.53	.1-.53	0-.5	.07-.44	.27-.73	.13-.85	.29-.82
Subj. 6	.4 p=.059	.4 *p=.047	.38 p=.34	.5 p=.106	.45 p=.086	.4 p=.095	.9 *p=.018	.85 *p=.042	.78 p=.132

S6 produced considerably more conjunctions in the two narrative tasks than the M group. Although S6's means were similar across tasks there was considerable variation on individual topics. For example, sequence pictures ranged from 0.1 and 0.7 and procedures from 0.1 in jacket to 0.8 in window. Temporal and continuative conjunctions were used predominantly in procedures. He also produced more "ands" than the M group on all three tasks resulting in considerably higher amounts of connectives than the M group in the two narrative tasks. His use of connectives in the procedural topics ranged from 0.4 (jacket) to 1.4 (window) which is above the M group range.

	SUBSTITUTION			ELLIPSIS			ATTEMPTED COH.		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	.038	.052	.081	.057	.031	.035	.018	.129	.034
M Mean	.03	.031	.099	.065	.041	.025	.031	.123	.039
Min-Max	0-.1	0-.13	.02-.24	0-.18	0-.15	0-.13	00 - .17	.00-.65	.00-.1
Subj. 6	.0 p=.18	.15 *p=.01	.03 p=.158	.03 p=.29	.0 p=.24	.0 p=.289	.1 p= .156	.15 p= .449	.00 p = .191

Apart from a considerably greater incidence of substitution in the picture sequences, S6 produced similar substitution and ellipsis cohesion to the M group in all tasks. The incidence of cohesive errors in S6's discourse was similar to the M group and he made no errors on any of the procedural topics.

A33.6.9 Dysfluency

	DYSFLUENCIES		
	Personal	Picture	Proced.
NNmean	5.894	3.620	4.944
M Mean	4.335	2.731	4.048
Min-Max	.97 - 7.77	.00-8.55	.44-9.73
Subj. 6	9.80 *p=.019	3.60 p=.38	4.70 p=.41

S6's personal narrative contained substantially more dysfluencies than the M group but similar amounts on the two other more constrained tasks. The predominant types of dysfluency were false starts and repetitions, e.g.

> "... *and when we got on the way down but* but unfortunately the *the* fellow that was being responsible for that Ian Neals well a friend of his said he *he* would tell him about it but *he must have told him* he must have told him the opposite way because he corrected it so that...." (frightening experience).

A33.6.10 Summary of S6's performance

S6 produced appropriately relevant and structured discourse on all tasks. He demonstrated adequate sample length, syntactic complexity and clausal structure. He produced reduced clarity disruptors of all types. His cohesive use was appropriate with an increased use of conjunctions and connectives in the narratives. His personal narratives contained an increased incidence of dysfluencies. Overall, his discourse performance can be considered to lie within normal limits. As stated in his letter, "I don't suffer from any physical or speech difficulties".

A33.7 SUBJECT 7 (S7)

A33.7.1 Description of subject

S7 was 54 years old at the time of the assessment and had suffered a right parietal infarct two and a half years previously. He had left school at sixteen and had worked as a skilled manual worker in the engineering and construction industries. He had a residual left-sided hemiparesis. He had not received any speech and language therapy. He lives with his wife and is unemployed due to his physical impairments. On the RHLB, he demonstrated deficits in metaphor comprehension and on discourse ratings.

A33.7.2 Description of discourse

	RELEVANCE			DISCOURSE GRAM.			SAMPLE LENGTH		
	Personal	Picture	Proc.	Personal	Picture	Proc.	Personal	Picture	Proc.
NN mean	1.57	1.46	1.65	1.96	1.80	1.68	348.7	111.84	212.9
M mean	1.64	1.44	1.53	2.22	2.00	1.64	294.5	96.6	176.5
Min-Max	1 - 3.33	1 - 2.5	1 - 2.20	1.25 - 4	1 - 3.25	1 - 2.67	55.7-697	34.3-199	34-381.7
Subject 7	2.0 p=.292	1.5 p=.456	1.25 p=.216	2.5 p=.363	2.0 p=.5	2.75 *p=.032	63 p=.130	63 p=.281	28 p=.107

A33.7.3 Relevance

The relevance of S7's discourse was rated as similarly appropriate as the M group's. His frightening personal experience was rated as mostly inappropriate as he provided a description of his feelings about having a brain scan rather than a narrative.

A33.7.4 Discourse grammar

S7 provided less appropriate discourse grammar on the personal narratives and particularly on the procedures. One of the personal narratives was rated mostly inappropriate as he provided considerable evaluation but only provided details of the participants and setting with no complicating action or resolution. Three of the procedures were also rated as mostly inappropriate due to a greatly reduced number of essential steps and the lack of optional steps. For example,

"Go to shop. I usually know what I want before I go. It's very simple". (Complete sample for buying a jacket).

A33.7.5 Productivity and syntactic analysis

S7 produced substantially shorter discourse samples than the M group on all tasks, with his mean for procedures being below the matched range limit. Even his longest topic sample (frightening with 86 words) was short compared to the mean on any task and his shortest (jacket procedure with 16 words) was below the range limit of any task.

Unlike the M group and the other RBD subjects, his longest samples were not in the personal narratives. Both his narrative tasks had similar means with less on the procedures. Nonetheless, his frightening experience was his longest sample as with the other RBD subjects. The brevity of his samples was due to lack of details provided in all tasks reflected in the reduced appropriateness of his discourse grammar ratings (see above).

	T-UNIT LENGTH			CLAUSE LENGTH			CLAUSAL EMBED.		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	11.4	12.7	12.75	7.8	7.9	7.2	1.49	1.74	1.75
M mean	11.12	13.27	11.86	7.86	8.70	6.96	1.47	1.86	1.68
Min-Max	8.9-14.3	7.9-21.3	6.6-15.9	6.6-12.5	6.6-13.4	5.7-8.6	1.2-1.8	.98-5.5	1.1-2.4
Subj. 7	7.4 p=.064	6.6 p=.063	9.1 p=.175	5.7 p=.112	6.05 p=.113	6.4 p=.292	1.25 p=.131	1.1 p=.276	1.58 p=.388

Although S7 maintained adequate clause and T-unit lengths in the procedures, these were reduced on the narrative tasks compared to the M group and were shorter than the lower range limit. This was the result of his use of the simple present or past tense in the narratives and the imperative in the procedures. Furthermore he demonstrated limited nominal complexity (e.g. few adjectives). His clausal embedding was somewhat reduced on the narrative tasks. Although his procedural mean for clausal embedding was similar to the M group, the topics ranged from none in the tyre procedure to 2.0 in the bike. He often used simple syntax e.g.

"Get a new pane cut to size. Putty it in. Paint it". (window procedure).

In the picture sequence (which elicited the M group's highest incidence of embedding), S7 demonstrated less embedding than the other two tasks. The reduction in complexity may be exaggerated by the task which he may have deemed as ecologically invalid.

A33.7.6 Clausal structure

	MAIN CLAUSES			LEFT CLAUSES			RIGHT CLAUSES		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	60.93	50.38	52.20	6.94	4.19	6.65	32.34	44.37	40.99
M mean	64.13	48.3	54.12	4.77	3.81	5.45	31.35	45.03	40.46
Min-Max	46.5-84.8	31.3-69.4	39.4-81.9	0-6.83	0-20.9	2.5-10.7	15.2-47.2	18.8-59.2	15.5-55.5
Subj. 7	70.2 p=.27	80.7 *p=.007	53.85 p=.491	3.55 p=.302	3.55 p=.485	19.2 *p=.00009	26.2 p=.289	15.7 *p=.018	26.98 p=.641

S7 had higher percentages of main clauses in the two narrative tasks than the M group, particularly in the picture sequences which was above the upper range limit. Although the picture sequence task of the M group contained the least main clauses of all tasks, for S6 it contained the most due to the limited use of right-branching clauses which were substantially reduced. The incidence of these clauses was somewhat lower in his procedures than his other tasks but he produced considerably more left-branching clauses on this task than the M group, almost double the upper range limit. The high procedural mean of these clauses masks the fact that there were no left-branching clauses on the jacket procedure, whereas in the tyre procedure, 50 percent of the clauses used were left-branching. Furthermore, in the procedures, it was often the comments on the task (see clarity disrupters below) that contained the left-branching clauses rather than the production of the procedure itself, e.g.

> When I say it, it sounds like I do jobs quickly (window procedure).

> Whether it works every time, I don't know (bike procedure).

This again highlights the importance of examining more than one aspect of discourse within the same subject.

A33.7.7 Clarity disruptors

	TOTAL CLARITY DISRUPTORS			NON-SPECIFIC ELEMENTS			CONTENT AND FLUENCY		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Personal	Picture	Proced.
NNmean	8.0	10.9	12.81	6.08	2.79	3.08	1.92	8.08	9.44
M mean	6.31	9.94	11.14	5.49	2.03	2.72	.81	7.91	8.03
Min-Max	2.1-13.9	.55-26.6	3.2-28.9	2.1-9.4	0-6.9	.9-5.9	0-5.4	0-21.5	0-24.2
Subj. 7	7.4 p=.384	34.85 *p=.0085	28.15 *p=.03	3.65 p=.265	.85 p=.308	.00 *p=.038	3.75 *p=.049	34.00 *p= .0057	28.15 *p=.013

S7 produced substantially more total clarity disruptors than the M group on the picture sequences and procedures. Although he demonstrated fewer in the personal narratives compared to the other tasks as the group did, his decrease was more marked. His production of non-specific clauses was reduced or non-existent in all three tasks, particularly in the procedures, compared to the group. In contrast, a comparison with the group indicates that S7's incidence of content and fluency disruptors was substantially increased in all tasks, with two tasks containing three to four times the M group mean. He did however demonstrate a smaller number of these clauses in the personal narratives than the other two tasks, a configuration observed in the M group. On picture sequences and procedures, the only type of these clauses were comments on the task. For example

"Does it carry on over this side?" (wasp sequence).

"I don't know how else you'd do it" (bike procedure).

His short samples and increased incidence of clarity disruptors combine to produce discourse with a low content/length ratio, as was observed in S3 and S4.

A33.7.8 Cohesion

	TOTAL COHESION			REFERENCE			LEXICAL COHESION		
	Personal	Picture	Proced.	Personal	Picture	Proced.	Pers.	Picture	Proced.
NNmean	1.34	2.42	1.73	.55	1.03	.58	.44	.90	.71
M mean	1.33	2.39	1.67	.50	.99	.52	.48	.96	.69
Min-Max	.5-2.1	.9-3.6	.9-2.2	.2-.9	.4-1.7	.3-.9	.1-1.1	.3-1.7	.3-1.04
Subj. 7	1.45 p=.4	1.7 p=.237	1.33 p=.189	.55 p=.405	0.8 p=.347	.22 p=.059	.45 p=.462	.4 p=.154	.6 p=.359

S7's total cohesive ties were similar to the M group on all three tasks and demonstrated a similarly increased amount in the picture sequences. He maintained adequate referential cohesion in the narrative tasks but provided less than the M group in the procedures. Only two of the procedural topics contained referential cohesion due to the lack of essential steps and the increased incidence of clarity disruptors. Although he used similar amounts of lexical ties to the M group in the personal narratives and the procedures, he produced less in the picture sequences. Furthermore, the picture sequences elicited the highest number of lexical ties of all tasks in the M group but the least in S7's samples. As stated previously, to efficiently and unambiguously differentiate between the two male characters in the picture sequences, both increased reference and lexicalization is required. S7 only increased his use of reference on this task which affected the incidence of cohesive errors (see below). S7's lexical ties on procedures ranged from zero (bike) to 1.5 (tyre) i.e. from below the M group mean to above it, indicating the wide intra-individual variability that can occur on different topics.

	CONJUNCTIONS			"AND"S			CONNECTIVES		
	Pers	Picture	Proced.	Pers	Picture	Proced.	Pers	Picture	Proced.
NNmean	.27	.28	.32	.29	.25	.27	.56	.53	.58
M mean	.27	.23	.32	.32	.23	.26	.59	.45	.57
Min-Max	.17-.4	.1-.35	.06-.53	.1-.53	0-.5	.07-.44	.27-.73	.13-.85	.29-.82
Subj. 7	.2 p=.212	.2 p=.399	.13 p=.123	.05 *p=.038	.25 p=.446	.00 *p=.014	.25 *p=.014	.45 p=.293	.13 *p=.014

On the picture sequence narratives S7 was able to provide similarly more adequate conjunctions and "and"s to the M group but his personal narratives and procedures can be characterised by a comparative substantial decrease in connectives. In the personal narratives, this was due to a considerable decrease in the incidence of "and". In his procedures, a combination of substantially reduced "and"s and conjunctions accounted for the low mean of connectives. Only two of the procedures contained any conjunctions and none of them contained "and"s.

Although the M group produced more conjunctions on the procedures compared to the other tasks, S7 produced less. Furthermore, whilst the picture sequence elicited the least connectives of any task for the M group, it elicited the most from S7.

	SUBSTITUTION			ELLIPSIS			ATTEMPTED COH.		
	Pers.	Picture	Proced.	Pers.	Picture	Proced.	Pers.	Picture	Proced.
NNmean	.038	.052	.081	.057	.031	.035	.018	.129	.034
M Mean	.03	.031	.099	.065	.041	.025	.031	.123	.039
Min-Max	0-.1	0-.13	.02-.24	0-.18	0-.15	0-.13	00 -.17	.00-.65	.00-.1
Subj. 7	.05 p=.27	.05 p=.34	.13 p=.323	.1 p=.29	.05 p=.44	.15 *p=.008	.15 *p=.042	.15 p = .449	.05 p = .401

S7 produced similar quantities of substitution and ellipsis to the M group, except for an increased incidence of ellipsis in the procedures. On the picture sequences and procedures, he produced a similar amount of attempted cohesion to the M group but considerably more in the personal narratives. In fact the cohesive errors occurred entirely in the frightening experience (0.3 per T-unit which is almost double M group's upper range limit). On the wasp picture sequence, which contained a small number of lexical ties, S7 produced a relatively high number of cohesive errors (0.2) as reference alone could not distinguish between the two male characters. Although the attempted cohesion in the procedures was similar to the M group, three of the four procedures which S7 provided contained no cohesive errors. This may be due to the lack of essential details of the procedure and the increased content and fluency elements (see reference above).

A33.7.9 Dysfluency

	DYSFLUENCIES		
	Personal	Picture	Proced.
NNmean	5.894	3.620	4.944
M Mean	4.335	2.731	4.048
Min-Max	.97 - 7.77	.00-8.55	.44-9.73
Subj. 7	9.25 *p=.029	6.05 p=.13	.00 p=.089

S7 produced more dysfluencies than the M group in the two narrative tasks, particularly in the personal narratives. The dysfluencies were predominantly repetitions and false starts. On the other hand, he did not produce any dysfluencies on any of the procedural topics which was in contrast to the M group.

A33.7.10 Summary of S7's performance

S7 produced discourse which was rated as relevant and appropriately structured but he demonstrated a decreased performance in the discourse grammar of the procedures. His discourse output was reduced, particularly on less structured tasks (personal narratives and procedures). He had limited or no clausal embedding (even in picture sequences which usually have more embedding than other tasks). He used an increased amount of main clauses in the picture sequences and more left-branching clauses in some procedures. His picture sequences and procedures contained a greater incidence of clarity disruptors. All three tasks were characterised by an increase in content and fluency disruptors but in the procedures non-specific elements were decreased. He provided adequate cohesion in all tasks but a decrease in the incidence of "and" and connectives in the personal narratives and procedures. His personal narratives contained an increase in the incidence of dysfluencies.

APPENDIX A34

HIERARCHY OF RBD DISCOURSE MEASURE RESULTS BY TOPIC

Relevance (Most)	Discourse Gr. (Most approp)	Clarity Disrup. (Least)	Sample Length (Shortest)	Clausal Embed. (Least)
Wasp	Tyre	Funny	Stones	Funny
Tyre	Window	Frightening	Wasp	Frightening
Frightening	Frightening	Wasp	Bike	Tyre
Window	Bike	Jacket	Jacket	Window
Funny	Wasp	Stones	Tyre	Wasp
Stones	Jacket	Tyre	Window	Bike
Bike	Stones	Bike	Funny	Jacket
Jacket	Funny	Window	Frightening	Stones

Main Clauses (Lowest)	Rt-Br Clauses (Lowest)	Cohesive Ties (Least)	Attempted Ties (Least)	Dysfluencies (Least)
Bike	Funny	Funny	Frightening	Stones
Wasp	Tyre	Frightening	Window	Wasp
Jacket	Frightening	Jacket	Tyre	Window
Stones	Window	Window	Funny	Jacket
Window	Stones	Tyre	Jacket	Frightening
Frightening	Jacket	Bike	Bike	Funny
Tyre	Bike	Stones	Wasp	Bike
Funny	Wasp	Wasp	Stones	Tyre