

READING IN ENGLISH FOR ACADEMIC PURPOSES (EAP) - THE  
EFFECT OF BACKGROUND KNOWLEDGE WITH SPECIAL REFERENCE TO  
SCHEMA-DIRECTED PROCESSES

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## ABSTRACT

Previous work in the field of English for Academic purposes (EAP) has highlighted the need to analyse the role that prior knowledge of topic plays in the comprehension of academic texts. Schema-theoretic views have become a promising framework for research in this area.

In this work a discussion is presented on features of schema theory particularly relevant to EAP reading. This discussion constitutes the theoretical background of the investigation. An experiment is carried out with Mexican university students, undergraduates in biology and psychology, to investigate the effect of background in their own discipline on reading and summarizing academic texts.

The summaries elicited from both experimental groups undergo a two stage analysis. First, a statistical analysis is undertaken to verify whether subjects perform better in summarizing texts in their own discipline, and if so, to what extent. Secondly, a qualitative or interpretative analysis is performed by means of which specific effects of background knowledge are recovered from the data and discussed. Special reference is made to the following 'constructive' phenomena: prediction, selection, elaboration, and tolerance of vagueness.

The statistical analysis reveals that the positive influence of background knowledge is significant when

subjects read a topic in their own discipline.

The interpretative analysis reveals that the constructive processes that have been observed in a number of areas of cognition also occur in EAP reading, but particular tendencies are manifest attributable to the low level of competence in the foreign language which characterizes the EAP situation in which the study was carried out.

DECLARATION

The work presented in this thesis is my own.

Maria Guadalupe Alvarez-de-Galicia

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I N T R O D U C T I O N

## INTRODUCTION

The present research project originates in an 'English for Academic Purposes' milieu within the National University of Mexico where reading comprehension is the most important foreign language study skill, the ultimate aim of EAP courses being to provide the student with the possibility of accessing specialized literature of his own field published in English.

In this context, an enhanced understanding of the processes that characterize EAP reading, i.e., of how specialized texts are processed by the corresponding specialists in spite of an insufficient command of the foreign language, is highly relevant to support the implementation of pedagogical practices. To advance towards such improved understanding is the purpose of the present investigation.

In this work I will specifically deal with some of the effects that familiarity with the content area of the text may have on the extraction and reportability of information from EAP texts, a topic of unquestionable interest in the previously mentioned educational context.

It is my contention that essential aspects of EAP reading, some of which I intend to treat in the present work, can be studied more effectively if we do not see EAP reading in isolation but relate it to the superordinate process of language comprehension. Thus, EAP reading, L1

reading,<sup>1</sup> and comprehension of oral language are assumed to share common essential features such as the extraction of relevant information, the assimilation of information to prior knowledge, or the making of inferences. All these phenomena have been extensively studied in verbal comprehension research, recently from the renewed mentalistic perspective represented by schema theory, an approach that seems very promising to our field of study.

Schema oriented views offer a comprehensive interpretation of the reading process as they move apart from earlier reductionist<sup>2</sup> views and enhance "... what readers do to acquire meaning by mobilizing existing knowledge in an effort to make sense of the text." (Smith, Harste & Carey, 1979: 1).

In accordance with the above contentions, the effect that familiarity with text topic may have on EAP reading comprehension, i.e., the general theme of this work, will be approached within a paradigm in which reading comprehension is understood as the process by which meaning - implicit and explicit - is obtained from the written text through 'interactive' (Rumelhart, 1976; Adams, 1978; Rumelhart and McClelland, 1981) and

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<sup>1</sup>Reading in the native language.

<sup>2</sup>I am using this term to refer not to the intent of studying psychological phenomena solely by referring them to physiology or biochemical terms, but, within a wider sphere, to sentence oriented studies or even serial multi-stage processing models.

'constructive' (Bartlett, 1932; Smith, Harste & Carey, 1979; Spiro, 1980) psycholinguistic mechanisms. As has been pointed out, in this approach there are rich possibilities for an insightful analysis of reading comprehension, specifically, for the processes of recognition and interpretation on which both the theoretical discussion and the experiment of this study are focused.

Basically, the theoretical discussion in chapter 1 is related to one of the central aims of the schema approach to reading comprehension which is to explain "... how the reader's knowledge interacts with and shapes the information on the page ..." on the basis of "... a specification of how that knowledge must be organized ..." (Adams and Collins, 1979: 3). A trust in the possibility of investigating how this process takes place in reading comprehension in general and in EAP reading in particular, underlies the whole initiative of the present study. (Obviously, the aim of the schema approach to reading just mentioned, is of great complexity and the aspects we intend to study here will result extremely modest).

Chapter 2 concentrates on a group of four reading comprehension phenomena closely interrelated with the schema directed processes that are described in Chapter 1: **prediction, selection, elaboration and tolerance of vagueness.** The final section of the chapter presents conjectures on how these same four reading comprehension phenomena should occur in an EAP context considering the



influence that the linguistic deficit of the reader should have on the occurrence of these phenomena during the process of extraction of information from the text.

The four phenomena introduced in this chapter represent in fact the operational angle that has been given to this research and are again resorted to for the analysis of the corpus presented in chapter 6.

Chapters 3 to 5 are related to the experimental study whose purpose was to test the hypothesis of whether there were significant differences in the reading performance of two experimental groups, differences which would then be attributed to the effect of background knowledge given that the two groups came from different academic disciplines.

Chapter 3 presents the rationale and methodology of the experiment, and the setting, i.e., the EAP situation at the National University of Mexico is described in some detail.

Chapter 4 describes the preparatory stages and the realization of the experiment.

In chapter 5 the corpus obtained is statistically analysed.

Chapter 6 contains what I have called the qualitative or interpretative analysis of the data. This analysis was inspired by Tannen (1979) who isolated various types of surface evidence of how expectations affect the interpretation of events (in her research, events presented in a silent film). The interpretative

analysis of the corpus represents an attempt to search for evidence of those phenomena discussed in chapter 2. The specific manifestations of these phenomena in the corpus are presumed to be determined by the readers' previous knowledge of the text topic.

Finally, in chapter 7, the main findings of the work are summarized and conclusions are presented of what can be said to be the contributions of the present work to an EAP theory. Some pedagogical recommendations drawn from the study are also presented.

CHAPTER 1

The Schema Theoretic Approach to Comprehension

## Chapter 1

### The Schema Theoretic Approach to Comprehension

#### 1.1 Preamble

During the last 18 years or so, after the decades of behaviouristic and neobehaviouristic views in which terms such as 'concept', 'image' or 'percept' seemed to have been banished, an important group of researchers, who frequently acknowledge the origins of some of their central notions to earlier theorists like Piaget, (1950, 1970), Bartlett (1932) or even Kant, (1781), have again postulated the existence of some sort of generic concepts or prototypical ideas stored in memory, and propose that these 'structures' play a highly relevant role in the performance of important cognitive functions such as perception, comprehension, remembering, learning and problem solving (Rumelhart, 1980). The process of comprehension is assumed to involve "... a large variety of cognitive processes all working together to integrate new information into the structures that already exist in a person's mind" (Norman and Rumelhart, 1975: 32).

Schema theorists differ in technical specification and terminology, but the postulation of stored knowledge structures or 'schemata' ('frames', 'scripts', etc.) is crucial to the various models proposed.

The characterization of these schemata and of

schema directed processes continues to be worked on (e.g., Rumelhart, 1984: Rumelhart, McClelland and the PDP research group, 1987). A complete, experimentally validated theory i.e., one of a less conjectural nature, is still far from being achieved.<sup>1</sup> However, as Hintzman (1978) has pointed out, what is quite clear is that the recent schema theoretic models have reached a much more complete and detailed picture of schemata than anything the pre-eminent founders of the theory seemed to have had in mind.

In the sections that follow, I will very briefly demarcate the framework that schema theory provides for language comprehension, and a description will be provided of schemata characteristics and of processing mechanisms of particular interest for this research. For this purpose I will follow Rumelhart and Ortony (1977), Bobrow and Norman (1975), Norman and Bobrow (1975) and Rumelhart (1980) whose accounts of knowledge representation and of information processing operations can be taken to be, for the purposes of the present work, sufficiently representative of a wide range of research within the general schema approach, and particularly adequate to provide an integrating view of the aspects of reading comprehension that will be dealt with. The fact that Rumelhart (1976) has presented a model of reading

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<sup>1</sup>So far, ideas are tested by simulation on computers but this is held to be different from experimental validation with 'real world' data.

comprehension has been another reason for selecting the mentioned version of the theory.

## 1.2 A Definition of Schema Theory

A schema theory is basically a theory about knowledge. It is a theory about how knowledge is represented and about how that representation facilitates the use of the knowledge in particular ways. According to schema theories, all knowledge is packed into units. These units are the schemata. Embedded in these packets of knowledge is, in addition to the knowledge itself, information about how this knowledge is to be used.

(Rumelhart, 1980: 34).

The genesis of these schemata is to be found in the organized accumulation of past experience. In Bartlett's words, such active and organized mass of past reactions or experience begins "with the functioning of appetite and instinct, and goes much further with the growth of interests and ideals." (Bartlett, 1932: 213).

We can see schemata as the "building blocks of cognition" (Rumelhart, 1980) or, more in accordance with the approach to be adopted here, of the human information processing system. They are conceived as 'data structures' "... for representing the generic concepts stored in memory ... concepts underlying objects, situations, events, sequences of events, actions and sequences of actions." (Rumelhart, 1980: 34). In a sense, they are stereotypes of these concepts.

### 1.3 Characteristics of Schemata

#### 1.3.1 Active Structures

The terms employed above, 'blocks', 'packets', 'stereotypes', as well as 'schema' itself, may give the impression that knowledge is conceived as a monumental system composed of immutable structures. While in some computer models such a conceptualization may be adequate, many influential cognitive psychologists such as the group of theorists we are following here, have emphasized the dynamic nature of schemata in the human system: schemata are not only 'interactive knowledge structures' capable of referring to each other, but also capable of internal modification via the various modes of learning, for instance, Piaget's notion of 'accommodation', or Rumelhart and Norman's (1978) 'accretion', 'tuning' and 'restructuring'.

Bartlett himself was unhappy about the rigidity or passivity implied by the term (which he in turn had adopted from Head, 1920).

"I strongly dislike the term 'schema'. It is at once too definite and too sketchy... it does not indicate what is very essential to the whole notion that the organized mass results of past changes in position and posture are actively doing something all the time... developing from moment to moment... it would probably be best to speak of 'active developing patterns'..."

(Bartlett, 1932: 201)

### 1.3.2 Levels of Abstraction

Concurrently with their dynamic nature, schemata have been characterized by some theorists as capable of representing knowledge 'at all levels of abstraction', or rather, they are assumed to be our knowledge at all levels of abstraction: "... from ideologies and cultural truths, to knowledge about what constitutes an appropriate sentence... a particular word... knowledge about patterns of excitations associated with letters of the alphabet." (Rumelhart, 1980: 41)<sup>1</sup>. Thus, a schema may be said to represent what Fillmore describes as "any kind of coherent segment of human beliefs, actions, experiences or imaginings" (Fillmore, 1975: 124).

### 1.3.3 Embedding

The structures of the system of knowledge or schemata are not atomic, rather they are composed of subschemata, the result being a hierarchical organization "... not only by class inclusion, but in a more general way" (Rumelhart and Ortony, 1977: 106). One consequence of embedding is that when we comprehend an event or a sequence of events, we may do so by first apprehending the top of the structure or by first dealing with the bottom

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<sup>1</sup>This proposal of all levels of abstraction schemata is present in the authors we are following but not in many other theorists who have concentrated in representing only the semantic structure of lexical items.



or internal constituents. The infinite regress resulting from each schema having lower level sub-schemata is solved with the notion of ultimately atomic sub-schemata or "...unanalysable conceptual components ... such as 'causal connection'..." (ibid.).

The active nature of schemata as well as their embedding properties have been illustrated (Rumelhart, 1980: 39) by comparing schemata with procedures or computer programmes: the constituents of the represented concept, event, etc., are organised as a network of sub-schemata or sub-procedures, which, when necessary, may be speedily 'invoked' and 'activated'. This activation though, unlike the usual procedure calls in a computer, flows not only top-down, i.e., from procedure to sub-procedure, but also bottom-up.

#### 1.3.4 Variables

Any particular schema contains a number of interdependent variables which may be bound to features of the particular situation to be processed. This property has frequently been illustrated by comparing schemata to plays. In a similar manner that the different roles of a play-script may be performed by different actors on different occasions, so the variables or slots in a schema can be filled by different features of the environment stimulus. Another way to see how values are bound to schema variables is by considering schemata as case

frames. Thus, the **give** schema may accept different values corresponding to ACTOR, BENEFICIARY, OBJECT, etc.

Essential to schemata is that they contain not only the value slots or variables for instantiation, but also specified restrictions "... about the types of objects that may be bound to the variables..." (Rumelhart and Ortony, 1977: 103). These specifications or constraints allow only acceptable value bindings to the schema variables (e.g., <animate> for the ACTOR in the **give** schema). It should be noted, however, that constraints are not necessarily absolute, but rather, that they represent 'realistic' distributions of possible values (ibid., p 105), some values being more typical than others. So, nature <inanimate> may become GIVER of her fruits, etc.

### 1.3.5 Default Value Assignment

One of the most important properties of schemata is their capacity to assign default values whenever the environment stimulus does not provide sufficient information to attach to the variables of the schema, i.e., "when the assignment of values to variables cannot be made merely on the basis of the current input..." (Rumelhart and Ortony, 1977: 105), a more frequent case than one would suspect. These default values, in turn, will depend on the values of the other variables in the schema. The assigned 'default' values are given

contingently, as it were, to the already established variable values, e.g., if the **break** schema is activated when we are presented with the proposition "break window with ball" the default value METHOD is assumed: 'by throwing'.

The organization of schemata just described allows us to suppose that its whole purpose is to enable schemata to function as interpretation devices which are capable of evaluating their own goodness-of-fit to incoming data (in the reading comprehension situation, the text chunks being comprehended).

The assumption that schemata have variables, and the modes in which these variables are filled to 'instantiate' a schema, have great explanatory power regarding the issues of interest in the present work. The modes of the instantiation process just described will be resorted to in subsequent chapters for the discussion of reading comprehension phenomena of particular interest in this thesis. (Cf. sections 2.2, 2.3.2, 6.2.3 and 6.3.3).

#### 1.4 Processing Principles

Besides establishing schemata characteristics, one of the main issues of schema theory is to give an account of how the already mentioned evaluation of goodness-of-fit takes place. The processing principles that permit schemata to function as recognition/interpretation devices of the incoming information need to be stipulated.

Bobrow and Norman (1975) have proposed three general principles assumed to regulate the availability and use of schemata:<sup>1</sup>

(i) The human processing system has always in progress two basic modes of processing information: 'event-driven' and 'conceptually-driven' processes. Event driven processing "... tends to be bottom-up, finding structures in which to embed the input." (Bobrow and Norman, 1975: 140). Incoming sensory information searches, as it were, schemata capable of accounting for it. It activates superordinate schemata until structures are found capable of 'recognizing' such input.<sup>2</sup> Simultaneous to this bottom-up processing, but running in the opposite direction, i.e., top-down, conceptually-driven processing is carried out which incorporates input into expectations (ibid.). In this case, the system searches for data to be fit into partially filled higher order schemata. In interactive information processing models such as Rumelhart's (1976), both processes may take place in a parallel, or, rather, in a convergent mode, so that information from the input meets with top-down

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<sup>1</sup>The first one of these principles has been extensively resorted to among current reading comprehension researchers.

<sup>2</sup>There are different accounts of how this activation should occur. For our purpose, it suffices to say, as Fillmore (1975: 24) does, that schemata associate with each other "... by virtue of sameness or similarity of the entities or relations or substances in them, or their contexts of occurrence."

'expectations' and thus finds plausible interpretive schemata in a remarkably economical and expeditious way: "Our apprehension of information at one level of analysis can often depend on our apprehension of information at a higher level ..." (Rumelhart 1976:19). Letter recognition, for instance, has been shown to depend on word recognition, etc.

(ii) The second principle, "All data must be accounted for" is what in fact calls for the modes of processing described in (i).

The wording of this principle might represent an unpalatable statement for any one aligned with the "psycholinguistic guessing game" position in reading research (Goodman, 1967; Smith, 1971), which assumes a process of 'sampling' of relevant data. Actually for the purpose of this research, the two positions are not irreconcilable if we consider that what this second principle implies is, merely, that "... all incoming signals require processing at some level ..." (Bobrow and Norman, 1975: 140) (emphasis mine). That is, the well known findings regarding the limitations of human attention are not ignored by the principle in question. The fact that many sensory inputs are not consciously attended to does not mean they are non-existent for the comprehender. Every input is given appropriate interpretation by being fitted into a schema however tentative this fitting might be. It should be remembered

that schemata do not require absolute values for the process of instantiation to take place. "... there is sufficient flexibility in the use of schemata that an incorrect or very general accounting for data does not cause harm." (Bobrow and Norman, 1975: 143). Misinterpretations, thus, can be said to be common and acceptable to the system. When strictly necessary, new schemata will be searched for a better fit, or the chosen schema will undergo certain modifications.

(iii) The third principle coincides with the extensively validated argument that high level cognitive mechanisms have a limited processing capacity: "There is a limit to the processing resources available to the organism" (Bobrow and Norman, 1975: 140).

According to Bobrow and Norman, though, this limit "... may vary with arousal ... in situations requiring performance on more than one task, each of these can be allocated only a fraction of the then available resources." (ibid.)

Processing of information is conceived as drawing 'computational resources' from some sort of 'central pool', the result being a limitation of the activities that can be performed at the same time. If the limit is exceeded, that is, if too many tasks are attempted, a degradation of task performance occurs.

## 1.5 Processing Limits

The discussion on how a cognitive task like comprehension is affected by the limitations of the human processing system is particularly relevant for the present investigation. In EAP reading we are, by definition, dealing with what can be called a deficit situation. The normal processing limitations are exacerbated by the insufficient knowledge of the linguistic elements that are to be processed.

Bobrow and Norman's discussion on processing limits (1975: 140-141) seems particularly relevant in an investigation of how EAP reading takes place, and reference to their proposals will be made both in the final section of Chapter 2 which is focussed on EAP reading, and in Chapter 6 in which the qualitative analysis of the corpus is carried out.

What these same authors propose is that "a process can be limited in its performance either by limits in the amount of suitable processing resources (such as memory or processing effort) or by limits in the quality of the data available to it" (Norman and Bobrow, 1975: 44).

### 1.5.1 Resource-Limited and Data-Limited Processes

If an increase in the amount of processing resources improves performance, the task in question is said to be resource limited. However, once all the

possible processing capacity has been allotted to the task, performance upgrading is considered to depend, from then on, on the quality of the data, i.e., the task is 'data-limited'. Norman and Bobrow (ibid.) propose two forms of data limitations: those resulting from the signal and those from the memory.<sup>1</sup> Signal data limitations originate in the environment stimulus (for instance, in the graphical and orthographical features in the case of a reading text). If an improvement of the signal resulted in an upgrading of task performance, the task would be signal data-limited. When neither the allocation of more processing resources nor the improvement of the signal quality result in improved task performance the problem is assumed to reside in that the necessary memory structures to account for the stimulus are insufficient. Limitations concerning memory data are widespread in reading. Recognition may be hampered at all levels, from letter features for the child who is in the initial stages of learning to read, to the rhetorical forms confronted by the proficient reader. Memory data limitations are, as we have said, inevitably magnified in foreign language reading, as will be shown in the interpretative analysis of the summarization protocols produced by the experimental subjects of this study.

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<sup>1</sup>By 'memory' it is meant the whole system of stored knowledge.



CHAPTER 2

Four Schema Directed Phenomena in Reading Comprehension

## Chapter 2

### Four Schema Directed Phenomena in Reading Comprehension

#### 2.1 Introduction

In this chapter I will refer to a group of four pervasive and interrelated phenomena characteristic of reading comprehension which can be explicable to a great extent by the influence of the organized set of structures assumed to represent the comprehender's previous knowledge.

The discussion of these phenomena is by no means intended as a comprehensive account of schema directed reading processes. There are indeed important issues, such as learning from reading, which may be interpreted within a schema approach, but which lie beyond the scope of this work.

The chosen phenomena simply represent the operational slant or general focus that will be given to the present research. The phenomena in question are: **prediction, selection, elaboration and tolerance of vagueness.** Each will be discussed in turn. I would like to emphasize however, that these four phenomena are interrelated in various ways and that demarcation lines among them are drawn only for purposes of description and analysis.

As the phenomena in question are discussed I will

try to establish their association with the aspects of schemata organization and processing principles that were described in Chapter 1. At the end of the present chapter (section 2.6), I will draw a comparative outline by means of which it will be hypothesized how these phenomena should occur in the EAP context. In Chapter 6 the same four phenomena, particularly some elaborative aspects are retaken and illustrated as the interpretative analysis of the corpus is performed.

## 2.2 Prediction

Several influential psycholinguists working in reading comprehension (Goodman, 1967; Smith, 1971; Kolers, 1970; Hochberg, 1970; Cooper and Petrosky, 1976), as well as schema-oriented theorists dealing with verbal or non verbal comprehension (Kuipers, 1975; Tannen, 1979; Rumelhart, 1980), have enhanced the role of prediction in perception and in comprehension proper.<sup>1</sup>

By prediction it is meant the use of previous knowledge "to eliminate unlikely alternatives" (Smith, 1971) of what is to follow in the current flow of events. It is as if we were asking questions about what is to follow and answering them on the basis of a 'private

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<sup>1</sup>In some analyses the differentiation between these two may actually be eliminated (e.g. Rumelhart, 1976). Such would be the case of the present discussion, since this study is situated within a paradigm in which sequential stage processing is not considered

theory' which we all have developed from our accumulated experience of the world. In the reading comprehension situation this 'private theory' would include the already understood earlier sections of the text. Our previous knowledge, thus, leads us to expect certain further events and aspects in our environment, and helps us to deal with the richness of the everyday stimuli.

Generally, though, we are not aware of the continuous flow of predictions we are producing. These are almost invariably implicit (*ibid.*, p 126). Our normal state can thus be said to be one of constant, usually unwitting anticipation which facilitates the processing of information and "... protects us from bewilderment ..."  
(*ibid.*, p 83).

In accounting for the role of prediction, some researchers have compared the comprehender to a scientist testing a theory who seeks evidence in order to confirm or disconfirm his hypothesis. If the theory seems to account for the observed data we consider that we understand the phenomenon in question.

The analogy is appropriate to the extent that, just as it happens with theories, we are able to predict aspects of the environment that we have not observed, our understanding thus becoming more expeditious. We have to be cautious though, not to take the analogy too literally, since, in the comprehension process we do not seem to be strictly and impartially seeking evidence to confirm or reject our hypotheses. Actually, as comprehenders we very

frequently resemble a biased scientist who, facing hard counter evidence relaxes his criteria to accommodate such counter evidence.

The prediction strategy proposed by psycholinguists like Goodman, Smith, or Cooper and Petrosky, can be compared - paying due consideration to paradigm differences - to the 'conceptually driven' processing proposed by Bobrow and Norman (1975) and other schema theorists: at any particular moment in time we have a set of partially instantiated schemata, a sort of on-going internal model of the situation (in the case of reading, of the situation depicted in the text). On the basis of this internal model, or, borrowing Spiro's (1977) phrase, 'state of schema', prediction mechanisms abbreviate the way for subsequent instantiation. Thus, in reading as in other instances of interpretation of reality, the hypothesis testing process involves, inextricably, both the immediate situation and the individual's previous knowledge.

The already mentioned group of psycholinguists (Goodman, Smith, Cooper and Petrosky) have argued that, due to the limitations in the visual processing capacity of the brain, when readers predict, they make only partial use of the multi-level information available in the text, i.e., they make use of only some of the 'cues' in the text. As has already been pointed out (cf. section 1.4) there seems to be a discrepancy between this account of how textual information is used and the one that can be

derived from schema theorists who propose that all data "... require processing at some level ..." (Bobrow and Norman, 1975: 140). Since in this latter view all data invoke processing, the necessary economy is achieved by means of the execution of pre-attentive processes. According to Bobrow and Norman, "an incorrect or very general account for data does not cause harm." The original interpretation generally suffices, and when the unfolding discourse requires a better interpretation, schemata may be modified or different ones activated to account for the 'problematic' data.

Accounts of how prediction takes place in reading no doubt lack accuracy. Goodman's 'macro-theory' (1971, 1979) for instance, though valuable for its broad generality is not without shortcoming regarding precision. Already in 1975, Gibson and Levin were raising questions concerning Goodman's (1967) and Hochberg's (1970) models. The unanswered questions concern textual sources from which the reader makes his predictions, the 'units' of prediction and confirmation, and in general, the mechanisms by means of which the reader knows where to focus his attention. Gibson and Levin argue that the mechanisms suggested by the 'psycholinguistic guessing game' advocates are rather vague. On the other hand, schema theorists such as Bobrow and Norman (1975) or Rumelhart and Ortony (1977) are not much more specific about the sort of elements in the stimulus that activate relevant schemata. The perceptual units that initiate a

search for schemata during the reading process are by no means well established.

In spite of the difficulties that the postulation of a prediction strategy poses for research, the phenomenon is too pervasive, too evident to be disregarded in the study of reading comprehension, and so, it has been studied through retrospective self-reports (Collins, Brown and Larkin, 1980), oral reading 'miscues' (Goodman, 1967; Hudelson, 1981), conversational methods (Thomas and Harri-Augstein, 1976; 1984) and in L2, introspective/retrospective methods (Cohen and Hosenfeld, 1981), thinking aloud methods (Hosenfeld, 1984) and prediction protocols (Henzell-Thomas, 1985).

Within the schema-oriented approach to reading comprehension adopted in the present work, it is axiomatic that an initial input triggers expectations and expectations narrow down the number of possible options for subsequent inputs. We will have to continue to merely infer the nature of the subprocesses involved in prediction and concentrate our efforts in the study of overt manifestations that demonstrate that knowledge stored in memory directs prediction and thus shapes our interpretation of events. For the purposes of an investigation like the present one, it should suffice to acknowledge the relevance of prediction and to re-assert that its bases are multiple (grapho-phonetic, syntactic, semantic, pragmatic) and mutually complementary.

### 2.2.1 Premature Commitment to Initial Hypothesis. A Problem for Comprehension

It can be said that the same kind of mechanism that produces correct predictions and aids comprehension, may also produce incorrect ones and hinder it.

An initial hypothesis, that should be tentative, is given credence without sufficient confirmatory cues. Not realizing that his initial hypothesis is incorrect, the reader persists in his attempt to complete the internal model that has been generated. This phenomenon is what McGinitie (1982) and other L1 reading researchers have called 'fixed hypothesis strategy'. The situation is by no means uncommon. Actually, misinterpretations due to an early commitment to initial hypotheses take place not only in the processing of the linear sequence of unfolding written discourse but also in more holistic apprehension of sensory stimuli, as the wealth of research in visual perception demonstrates (e.g., Bruner and Postman, 1949; Kuipers, 1975).

In reading, the probability of the occurrence of fixed hypotheses increases whenever the reader confronts texts that for one reason or another do not facilitate disconfirmation, for instance, syntactically complex or semantically overloaded texts.

The investigation of fixed hypotheses is thus highly relevant to EAP reading given that the EAP reader



will frequently confront difficult texts.<sup>1</sup> The findings in this field may in fact contribute to the understanding of fluent L1 reading. The L2 overt manifestations of adherence to an initial equivocal hypothesis magnifies the process of prediction which would remain unnoticed in fluent reading.

### 2.3 Selection

Whenever we read fluently and with comprehension a greater or lesser degree of selectivity of input takes place.

Not everything is 'encoded into internal representation', recalled, or learnt. The reader seems to be actively engaged in a process of filtering out part of the information offered by the text. Rather than being an unbiased recipient of information he sometimes represses and other times enhances pieces of the information contained in the text. A theory of reading would need to explain what makes the reader take more notice of some information and disregard other.

'Relevance' is a notion frequently invoked to account for the selective intake of information from texts. It has been regarded as perhaps the most important guiding principle for the assignment of priorities in the

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<sup>1</sup>One should be aware though, of the relativity of the term 'difficult'. A text can be said to be difficult only in relation to a particular reader or group of readers.

material to be processed if memory is not to be overburdened (Gibson and Levin, 1975: 474). However, to say that the reader takes only what is relevant seems a very insufficiently developed argument. Relevance itself calls for an explanation, since, evidently, it is a relative concept: relevant for whom? How does something turn to be relevant? Is 'relevant' equiparable to 'salient'?

We can distinguish three main sources for an explanation that a certain proposition or group of propositions in a text are recognized as relevant by the reader (Table 2.1).

Table 2.1 Three sources for the attribution of relevance to text information.

Text	Reader
a) The author's use of discourse grammar devices grants structural importance to certain parts of the text, which are in turn recognized by the proficient reader.	b) The reader's prior knowledge of subject matter guides him to ascribe relevancy to some portions of the text. c) The reader's purpose while engaged in a certain reading activity guides him in deciding what is relevant and what is not.

### 2.3.1 Selection and Text Structure

Since some information in the texts seems to be markedly more salient, selective encoding of relevant portions has been treated by some authors as a function of the hierarchical organization of propositions within the passage . It has been argued (Meyer and McConkie, 1973; Meyer, 1977; Kintch and Keenan, 1973) that the structure of the passage shows how some ideas in it are superordinate to other ideas, and that the former will be more easily detected and recalled, and in fact will facilitate the acquisition and recall of the latter. Intuitively, this seems quite convincing - markers of salience in the text are not to be ignored. As readers, not only do we have previous knowledge of topics but also we have developed an expertise on the structural organization of texts which allows us to identify what is supposed to be more noteworthy and what less. According to Meyer (1977), the aspects of passages that influence which ideas will be well or poorly remembered are: organization of passage content, serial position of the ideas in the passage, and relative importance raters assigned to ideas in the passage. However, if we assume that the reader, in order to retain what is important and filter out what is trivial relies mostly on the structural relations of the passage we are too close to the notion of meaning in the text. In other words, we are overlooking or diminishing the possibility that the reader be

"equipped with a very elaborate set of expectancies and values as to what is worth looking for ..." (Olson, 1977) and that these expectancies and values direct what he selects (and recalls) from the text. If we did not consider this influence, individual differences in understanding and recall of passages would be difficult to explain. Certainly, the reader needs to recognize and use the organizational structure by means of which the author has made some information more salient, but this is only one part of the story. The complementary process of the reader matching what he finds with what he expects needs to be accounted for. The reader is not only tuned by the hierarchically important parts of the text, but also, and in many cases more so, by his own previous knowledge and his purpose for reading.

### 2.3.2. Prior Knowledge and the Assignment of Relevance

The second, and for the purposes of the present research project, most interesting source of relevance assignment in reading comprehension are the expectations derived from the reader's own previous knowledge.

The theoretical perspective we have adopted posits that prior knowledge is used to determine what is important in a text (and should therefore receive priority of encoding). This view of prior knowledge is very closely related to what Nix and Schwarz have called the individual's 'system of relevances', acquired "in

cultural, peer and familial encounters" which determine those features of the world that will be attended to as well as those that will be ignored or diminished (Nix and Schwarz, 1979: 183). This 'system of relevances' is triggered during reading and makes the reader grant processing priority to certain parts of the material. It has been argued for instance, that the elements which are granted priority may represent the least expected propositions. Least expected in relation to the reader's present internal model of the situation, that is, of the text as so far understood, or, in a more general sense, least expected in relation to his general world views or prior knowledge of topic (Bobrow and Norman, 1975: 145; Tannen, 1979: 167).

Certainly, within the constructive approach to reading comprehension to which we will refer shortly (section 2.4), effort has been concentrated on investigating how it is that a person comprehends language in terms of what he or she already knows, a process which implies a selective intake .

### 2.3.3 Purpose

Given the wide range of research in reading comprehension, there are differences in what may be understood by 'purpose'. In some contexts, authors refer to particular practical or academic tasks undertaken by the reader, e.g., following directions, locating specific information,

getting the gist of a passage, etc. "A mature reader ... has become very skilled in actively assigning priorities to the features that have the greatest utility for his present task ..." (Gibson and Levin, 1975: 466). Other authors, e.g., Hidi and Baird (1986), emphasize the much more general interests and motivations that influence processing of written text.

Within the schema theoretic approach, it has been posited that in order for a system 'so diffuse and receptive' as the one regulating our processing of information, to maintain coherence, it must be "... imbued with purpose", that, without purpose, the system "will fail to pursue a line of inquiry in any directed fashion..." (Bobrow and Norman, 1975: 146). Conceptually driven processing tends to be "driven by motives and goals" (ibid.). Whatever the extension of the term, what cannot be disregarded in the present discussion, is the notion that if something is recognized as relevant-to-purpose, it will be selected for processing priority.

#### **2.3.4 A Final Remark on 'Selection'**

One observation that might be pertinent at this point regards the frequently raised question of whether attribution of relevance to some parts of textual information is an operation actually carried out during encoding or whether it occurs later, during retrieval of the comprehended material (cf. Eysenck, 1984: 127). The

dichotomization appears germane to research on recall in which the distinction between encoding and recall is essential (in which case one would be inclined to suppose that a significant degree of selectivity takes place during encoding, and again, a second bout of selection occurs in recalling). This view would coincide with Tannen's discussion on the effect of underlying expectations. According to Tannen (1979: 166), "structures of expectations are constantly mediating between a person and his/her perceptions and between those perceptions and the telling about them" (my emphasis).

The dichotomy however, becomes unnecessary in an investigation such as the present one in which the distinction between the encoding and the recalling operations is blurred in view of the task in which the experimental subjects were engaged: summarization, a process of on-the-spot encoding and recoding of textual information (cf. section 3.3).

## 2.4 Elaboration

### 2.4.1 Definition and Antecedents

We will assume here, following Spiro (1980) and other schema theorists, that the meaning of language in use would be insufficiently characterized by any linguistic or logical analysis. Specifically regarding comprehension, we will assume that a very considerable

part of the meaning obtained from discourse is actually the contribution of the comprehender. In other words, it is suggested that the reader not only selects the information he judges relevant to process, but also, alters it in various ways.

In reading comprehension, examples of elaborations that depart from the explicit content of discourse are numerous. These elaborations are part of the comprehension process itself. What the comprehender does is to elaborate on the basis provided by the text making it conform with his own views, a very different conception of reading comprehension from any notion of meaning in the text, or of views pertaining to the surface/deep structure psycholinguistic paradigm of the 1960's (e.g. Miller, 1962; Clark, 1969).

The process to which we will refer as 'elaboration' is extremely close, if not totally equivalent to Spiro's definition of 'construction': a "... process of knowledge based, contextually influenced and purposeful enrichment in comprehending language ..." (Spiro, 1980: 245). Here Spiro endorses the view of the text providing blueprint representations to be enriched by the comprehender's pre-existing world views and by the operative processes of understanding at a given time (which include the completion of meaning derived from previously read sentences and paragraphs, i.e., the refinement of the internal model being built).

Just as has been mentioned to occur with the



previously discussed processes of prediction and selection, elaborative processes pertain not only to comprehension but to a range of cognitive processes. According to Neisser, for instance, in the process of perceiving we construct 'percepts' by supplementing sensory inputs with what we already know (Neisser, 1967, cited in Lachman and Lachman, 1979: 198).

The origins of the constructive orientation to text understanding that concerns us here are generally traced back to Bartlett's studies on recall (1932). In his most well known experiments, Bartlett asked his subjects (British undergraduates) to listen to certain stories which would conflict with their own knowledge of the world: North American and African folk tales. The subjects' attempts at recall presented distortions which increased as time from input passed, and which, according to Bartlett's interpretation, were originated in a process he calls 'effort after meaning': "A process of connecting a given pattern [in the stimulus] with some setting or scheme [in the reader's mind]" (ibid., p 20).

Briefly, what Bartlett's experimental findings showed was a remarkable 'rationalization' of the recalled stories. The subjects turned the extraneous stories into more conventional English narratives. To be able to do this, they (inadvertently?) flattened unfamiliar details and emphasized the more familiar, more acceptable ones.

According to Bartlett, the process of 'effort after meaning' is essential to various important domains

of human cognition: "It is fitting to speak of every human cognitive reaction - perceiving, imagining, remembering, thinking and reasoning - as an effort after meaning" (ibid., p 44). This 'effort after meaning' that connects what is given with 'something else' exists essentially to facilitate cognitive tasks:

Certain of the tendencies which the subject brings with him into the situation with which he is called upon to deal are utilized so as to make his reaction the 'easiest' or the least disagreeable or the quickest and least obstructed that is at the time possible. (ibid., p 44)

Bartlett was interested mainly in the investigation of memory and the discussion of his findings indicates that he assumed distortions to be the product of reconstructive processes operating at the time of retrieval on the schemata. However, recent reviews of his work (e.g. Eysenck, 1984: 126) indicate that it is likely that most distortions occur because prior knowledge influences the way in which material is comprehended, that is, at the time of initial encoding.

Within the climate of the rising information processing paradigm of the 1970's, the rediscovery of Bartlett's studies promoted a profusion of experiments (Bransford and Johnson, 1972: Bransford, Barclay and Franks, 1972; Dooling and Lachman, 1972) in which meaning-in-the-text is rejected and the reconstructive process is shown to take place not only when the material is extraneous to the subject's experience (as was the case with Bartlett's most well known stories), but also in more

conventional situations.

The present research as will be seen in due course, (chapter 6) has yielded abundant evidence that comprehension of written texts entails elaborations on the linguistic material, elaborations which are determined both by the general prior knowledge of the reader and by the provisional model of the previously processed text.

#### 2.4.2 Inferences

Inextricably related to what we have been referring to as 'elaboration' is the process of inferencing. Inferences can be seen as the most important mechanism through which the constructive process in language comprehension takes place, though, certainly, not enough is known about the actual operation of the inferencing process.

Inferences have been granted a special place in both oral and written language comprehension research (Schank, 1975; Warren, Nicholas and Trabasso, 1979; Collins, Brown and Larkin, 1980; Anderson and Pearson, 1984). Here we will describe the process of inferencing from the perspective provided by the discussion of schema instantiation presented in chapter 1. In doing so, we will be closely following Anderson and Pearson (1984).

Anderson and Pearson identify four kinds of inference in reading comprehension.

The first type of inferences are those involved in

deciding "what schema among many should be called into play". The text very seldom informs the reader which of the possible schemata in his repertoire to use. In this sense he has to 'infer' one to serve as an appropriate initial model of the situation or event depicted by the text.

A good example of this kind of inferencing can be found in an experiment by Collins, Brown and Larkin (1980) in which the subjects were presented with a text whose initial line was: "He plunked down \$5.00 at the window. She tried to give him \$2.50 but he ...." It was found that different subjects initially activated different schemata: some activated the racetrack-betting schema, others, the theatre/cinema-going schema, and still others, the bank-teller schema.

Anderson and Pearson speak of inferences in this case in the sense that the reader seems to be saying to himself: "it must be a case of racetrack-betting" or, "it must be a case of theatre-going", etc., in order to start a plausible interpretation of the text, (cf. also the 'possible schemata' in sections 6.2.2 and 6.3.2 of this work).

The second type of inferences are those utilized in the process of instantiating the slots in a schema, i.e., once a schema has been selected for the interpretation of the situation or event depicted in the text, the reader makes inferences to decide which of the items or characters appearing in the text are intended to

fill a particular slot of the selected schema, e.g., the reader has to decide which character is the hero, which is the reason for a particular action, etc.<sup>1</sup>

The third type of inference concerns the assignment of 'default' values which has been described in section 1.3.5. Since the writer relies on a body of shared knowledge with his audience, he omits a good amount of information in his exposition or narrative. According to Anderson and Pearson the process of filling slots by assigning a default value is what most people think of where they are told that an inference has been made, and is the type of inference that has been most studied (Anderson and Pearson, 1980: 271).

Anderson and Pearson's fourth type of inference is not discussed here because the data in the present study do not allow the assumption of its occurrence.<sup>2</sup>

## 2.5 Tolerance of Vagueness

We can think of a hypothetical situation in which the text did not offer difficulties for comprehension. In such a situation, comprehension would merely involve the

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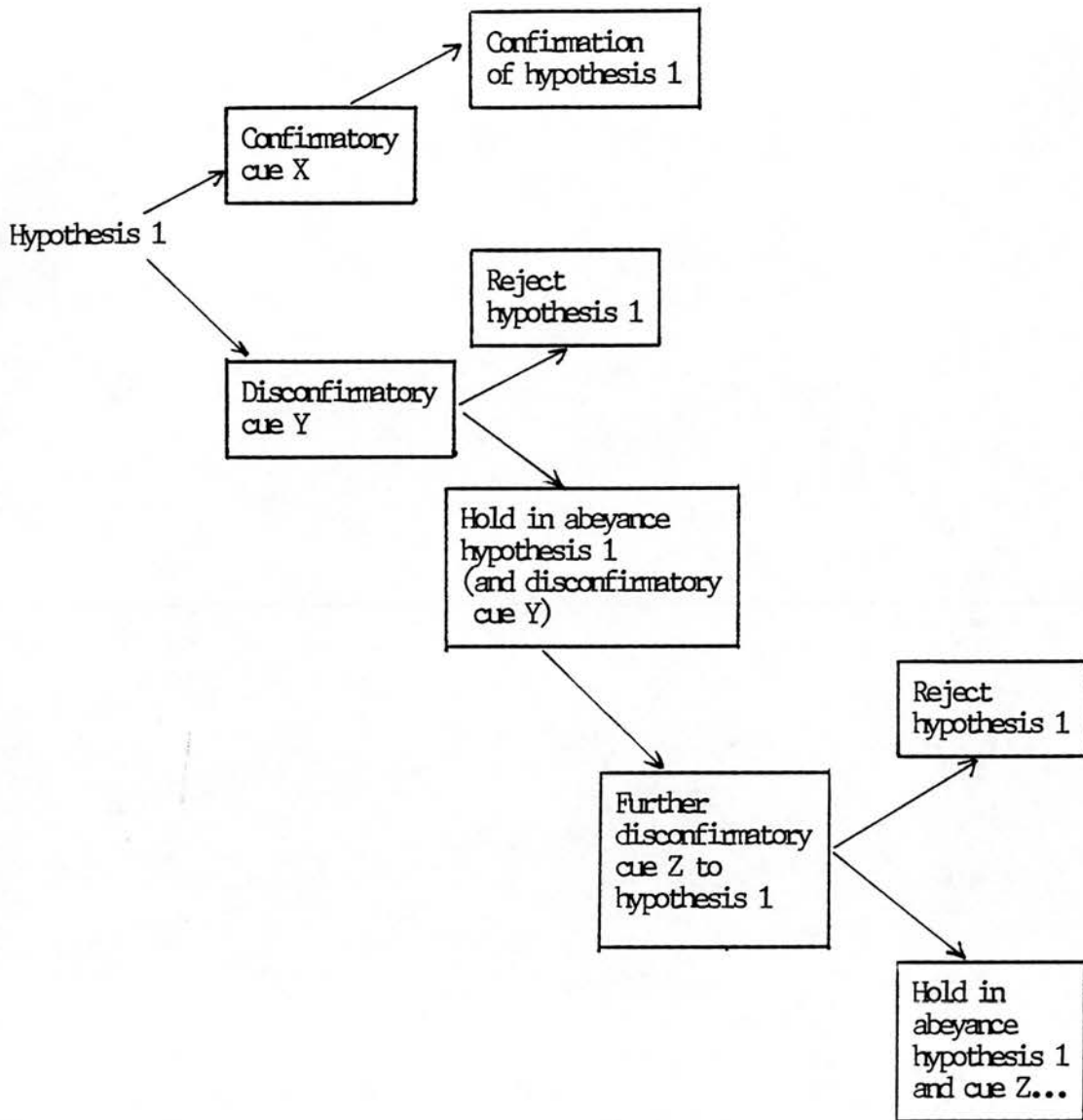
<sup>1</sup>Examples of this type of inference are abundant in our data. (Cf. sections 6.2.4.1 and 6.5.1.1 in what regards the assignment of values to schema slots).

<sup>2</sup>This type would involve "drawing a conclusion based upon lack of knowledge" and would have the logic: "If X were true, I would know it to be true. Since I do not know X to be true, it is probably false." (Anderson and Pearson, 1984:269).

smooth integration of the incoming units of meaning e.g., clauses or sentences, to the information acquired from previous sections of the same text and to the reader's knowledge retrieved from long term memory. However, except for very specific circumstances (e.g., a proficient reader reading children stories in his native language), this is never the case. We have seen how predictions may need to be disconfirmed, and how different portions of text are given processing priority, enhanced or downplayed.

In order for the internal representation to be progressively refined, a certain degree of indefiniteness may in fact become necessary. The comprehender intends to reach a coherent macro-structure, but in the process of building it he requires the strategic capacity to suspend definite interpretations. If the possibility of more than one meaningful option remains provisionally open, then necessary disconfirmations will be eased.

The reader's tolerance of vagueness may be seen as a mechanism that curbs the influence of prior knowledge which seemed so decisive in our description of prediction selection and elaboration, and which in the case of fixed hypotheses impedes the possibility of re-orientation and manoeuvring within the context of the text. This palliative role of tolerance of vagueness is implied in fig. 2.1 which shows how two or more discordant propositions may in fact coexist in working memory at a certain stage of processing.



**Fig. 2.1** Coexisting discordant propositions during the processing of text.

The theoretical framework of the present discussion certainly allows for a considerable degree of indefiniteness in the interpretation of textual input. As we saw in section 1.5 the schema approach to comprehension

accepts 'very general or even incorrect accounts' of incoming information (Norman and Bobrow, 1975: 143). The essential flexibility of knowledge schemata permits the normal or typical characteristics of an activated schema to be distorted before the schema in question no longer provides an adequate account of input.

The more demanding the processing task the more scarce resources may become, and some parts of the textual information will have to be left unattended.

If we leave aside any unchallenging situation such as the already mentioned cases of extremely easy material, tolerance of vagueness makes itself indispensable.

It is possible that what we have subsumed under the label 'tolerance of vagueness' is actually a manifold phenomenon but the expression is useful for the purposes of highlighting this case, which as will be seen in the analysis presented in chapter 6, pervades in the EAP reading situation and certainly requires further investigation.

## 2.6 Recapitulation

Throughout the previous sections of this chapter four typical phenomena of fluent reading comprehension have been discussed emphasizing their schema directed nature. The phenomena in question have been said to interrelate closely, the borderline between any two of them being difficult to draw.



The purpose of the present section is not only a retrospective recapitulation. What is intended is a manageable outline of the already discussed phenomena which should serve as a basis to delineate a (comparative) description of what we hypothesize should occur in low proficiency L2 reading, specifically in an EAP situation. The differences between both outlines are thus to be attributed to the effect that lack of command in the L2 should have on the four reading phenomena of our concern. In this sense, the second outline is predictive. It can be considered a tentative theory of EAP reading comprehension. Within the limitations of the present work we thus adhere to the commitment of cognitive psychology to construct models which can predict features of cognitive behaviour, in this case, features pertaining to foreign language reading.

Outline 1 - Proficient reading (L1 or L2):

Prediction: Carried out on the basis of apt recognition of textual items (i.e., items that match existent knowledge structures). Opportune recovery from equivocal initial hypothesis.

Selection: Portions of textual material that are to receive processing priority are selected according to long term and provisional purposes. Selection is facilitated by

adequate prior knowledge (semantic and pragmatic) as well as by the correct identification of important features of text structure.

Elaboration: Additions and inferences derived from the reader's stored knowledge are carried out to a degree that allows the final representation to remain acceptably close to author's intended message.

Tolerance of Vagueness: A certain degree of tolerance to inconsistencies is allowed as the internal model is progressively refined. The final product achieves inner consistency and coheres with the reader's own memory structures (which may have required modification).

Outline 2 - 'Low proficiency' L2 reading

Prediction: Poor recognition of cues in the text leads to frequent occurrences of equivocal hypotheses and to less efficient confirmations and disconfirmations, i.e.,

to a subsequent chain of misinterpretations.

Selection: Selection based on the limited number of recognizable features in the text rather than on topic relevant elements or on identification of important elements of text organization.

Elaboration: More blatant departure from author's intended message. Considerable number of elaborations and additions. Invalid generalizations and inferences.

Tolerance of Vagueness: Increased tolerance of vagueness. Inconsistency and disconnectedness allowed between propositions obtained from text and between these and prior knowledge.

**CHAPTER 3**

**General Aspects of the Study**

## Chapter 3

### General Aspects of the Study.

#### 3.1 Rationale

As was pointed out in the general introduction, the experimental study that will be presented in subsequent chapters of this thesis was devised first, to test the general hypothesis that the reader's previous knowledge of subject matter will significantly affect his comprehension of EAP texts, and secondly, to elicit and analyse specific manifestations of this assumedly general phenomenon.

Regarding the general hypothesis we may suppose that texts on one's own discipline are easier to understand than texts on an extraneous discipline.

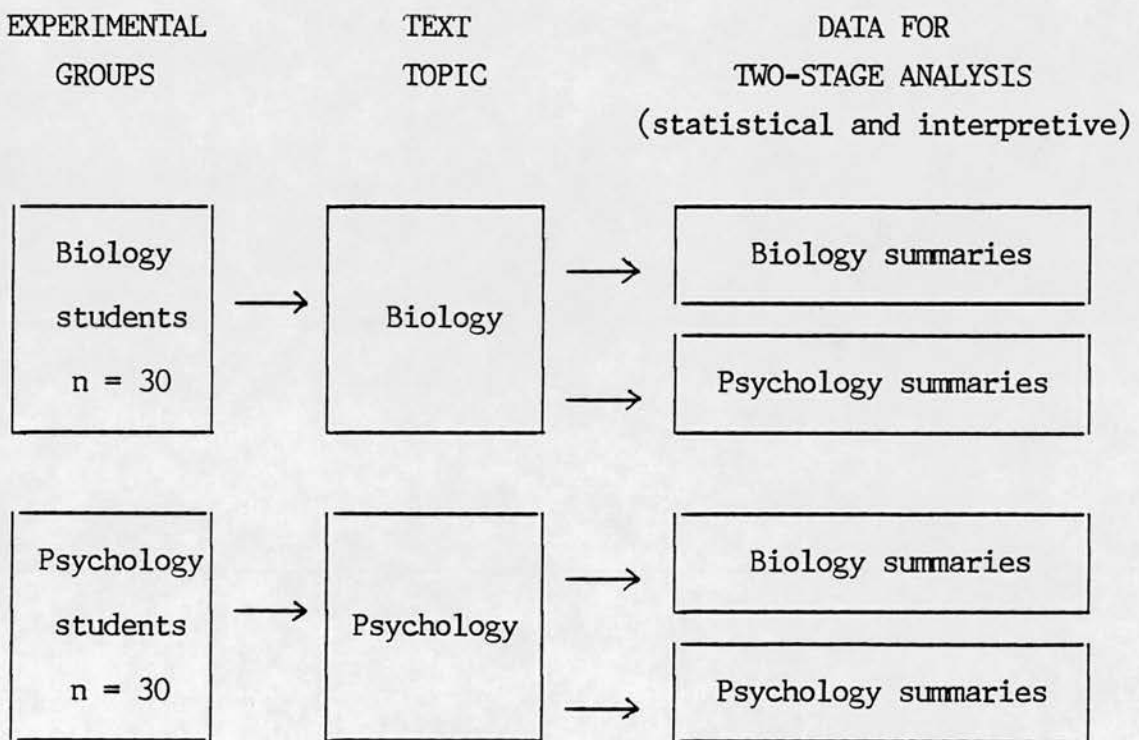
The purpose of the statistical analysis therefore, is not merely to test intuitively reasonable notions of this kind, but to establish as accurately as possible, the degree to which this can still be said to be the case, given the specific EAP context in which the study was carried out. Actually, within the framework of this study, the statistical analysis was a prerequisite to proceed to the interpretative or qualitative analysis of the corpus, that is, the second stage of the study.

Only if readers were to perform better when reading their own discipline, would the interpretative

analysis be carried out. If, on the other hand, the results of the statistical analysis did not confirm the general hypothesis, then it would be necessary to re-examine the basis of the project as a whole.

In the following section a brief description of the experimental study is presented.

### 3.1.1 Description of the Experimental Design.



**Fig. 3.1** Outline of experimental study carried out with Spanish speaking students at the National University of Mexico.

Spanish speaking undergraduates of biology and psychology, with a comparable level of proficiency in English were asked to read a text on a biology topic and a

text on a psychology topic, and were required to produce a summary of each text. Both texts were in English and both summaries had to be written in Spanish. The corpus comprising the 120 resultant summaries was submitted, first, to a statistical analysis for which the null hypothesis was:

H<sub>0</sub>: Previous knowledge of subject matter (as represented by academic field) will not affect significantly the comprehension of a reading text.

The second stage of the study consisted of an interpretative or qualitative analysis of the corpus, i.e., the summaries. In this analysis evidence was sought of the schema-directed processes presented in chapters 1 and 2 of this thesis. In this interpretative analysis special attention was given to aspects concerning the phenomenon that has been referred to as **elaboration** (cf. section 2.3).

It should be noticed that the two experimental groups (i.e., the thirty biology and thirty psychology students) were assumed to be comparable in all other aspects but field of specialization. General cultural background, socio-economic status and general academic achievement were considered to be the same for both groups.

The decision to include these two groups in the experimental design thus, was not intended for a



comparison of the reading comprehension performance of the two groups per se. This decision represents a double check of the fundamental conjecture that discipline of study will affect reading comprehension performance. Figure 3.1 shows in fact how the task performed by one group is a duplication or mirror image of the task performed by the other.

### 3.2 Setting

As has been indicated earlier, this research project was planned with reference to the EAP situation at the National University of Mexico (UNAM). An introduction to the setting in which the experimental study was carried out is now in order.

In this section I intend to describe the foreign language teaching situation in the country at large, and in the National University, making special reference to the EAP reading courses of the Centre of Foreign Languages (Centro de Enseñanza de Lenguas Extranjeras - CELE).

#### 3.2.1 Background

From the earliest colonial times, Spanish has been the medium of instruction in all areas of the educational



system in Mexico.<sup>1</sup>

At the turn of the century, coinciding with the introduction of scientific positivism in the most important institutions of higher education, a quite robust tradition of FLT was started at the high school level. French became the key to gain access to modern European 'civilization and thought'. In the academic sphere the immediate objective was an instrumental knowledge of the language that should enable students to read French textbooks in the main disciplines: Law, Medicine and Engineering. The method was a combination of grammar, translation, and 'explication de texte'.

Later, when the country's economic, technological and cultural interests moved from Europe to neighbouring USA, foreign language teaching emphasis also changed. The post-revolutionary era of the 1930's and 1940's witnessed the gradual surrender of French to English as the main foreign language taught. The following decades can be characterized by a mainstream of grammar-translation plus oral reading of contrived short texts, receiving the sometimes greater, sometimes lesser impacts of various oral-oriented approaches. During this period there were sporadic episodes of 'natural' and 'conversational' methods. It can be said however, that there were no dramatic changes until the arrival of audiolingualism in

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<sup>1</sup>Regarding groups speaking autochthonous languages the official policy has always been one of 'hispanization'. Bilingual education has been tried comparatively recently and only to a minor scale.

the late 1950's. During the 1960's, audiolingualism influenced not only isolated private institutions but had a visible impact on several official institutions. Audiolingually oriented practices and materials were adopted and language laboratories were installed in several important institutions of higher education e.g., the National University system. (This moment coincides with a general economic boom in the country). Also, due to increasing demands of a growing student population, there was the noteworthy creation of some programmed courses that were to be used in combination with the language laboratory. However, mostly for administrative reasons such programmes did not really succeed and were partially or totally abandoned.

During the last 12 years or so, recent American and British communicative trends have been adopted in various institutions with varying degrees of success. EAP as a branch of ESP was introduced at the National University in the middle 1970's and was adopted later on in other important institutions of the country.

### **3.2.2 The National University of Mexico**

Founded in the 16th century under Spanish rule,<sup>1</sup> the University is at present state subsidized but autonomous in internal government and organization. The

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<sup>1</sup>The University was founded by royal decree in 1551 and opened its doors in 1553.

UNAM<sup>1</sup> system comprises not only undergraduate and post-graduate courses in a wide range of disciplines, but also the 'Preparatory' or upper high school.

Since the 1950's student population has increased so much that the UNAM is acknowledged as a 'University of the masses', fees being little more than symbolic. Enrolment just in the main campus reached 88,000 in 1985, and in the whole system the figure was around 250,000.

Regarding foreign language teaching policies, there are clear differences between the two main sectors of the UNAM system (i.e., upper high school and university proper).

At the upper high school level, as was mentioned in the previous section, foreign language teaching has been taking place for many decades. English, French, and other modern languages have existed as compulsory subjects of the curriculum. However, neither a strict and detailed syllabus nor a standard exam has been imposed on classroom teachers, and the guidelines regarding methodology have been rather lenient. This state of affairs has persisted accompanied by a general feeling of dissatisfaction with whatever is achieved. There is the general complaint that, regarding foreign languages, 'you don't learn anything'. In other words, expectations are not generally matched by results, possibly because aims have been more ambitious in recent decades than they were for the the

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<sup>1</sup>Universidad Nacional Autonoma de Mexico

teaching of French at the beginning of the century.

### 3.2.2.1 Undergraduate and Postgraduate levels at UNAM

The average Mexican student can quite satisfactorily complete his or her course of study at UNAM (or at any private university) and later become a successful professional without having a real need to use a foreign language except on very rare occasions. There is however, an almost absolute consensus among teachers, students and administrators that knowledge of a foreign language, above all English, is useful and advisable, mostly at the postgraduate level, in order to have access to recent specialized literature. This opinion represents the rationale for maintaining a foreign language exam requirement. This exam is a prerequisite to graduate in some careers, and in other cases it is stipulated as a sine qua non condition to enter a postgraduate course. Students have to demonstrate the ability to read a foreign language, and in some cases, to have an all round proficiency. However, as a great number of candidates fail the exam, this requirement has become a major obstacle to the academic accomplishment of many students.

On the other hand, in spite of the long lived formal exam requirement, foreign language courses are not compulsory in any Faculty. It seems to have been assumed that high school instruction would provide sufficient background to cope with foreign language academic and

professional needs (the exam included). Measures to ameliorate the problem have been taken from time to time. Extra-curricular short courses were established on many occasions as a response to students' demands for foreign language instruction.

The creation of the Foreign Language Centre (CELE)<sup>1</sup> represented the biggest step towards the solution of a too obvious foreign language teaching problem. In 1966 the Centre was established to cater for the foreign language needs in the main University campus. (Newer campuses would later on establish their own language centres or 'Units'). At present the Centre offers basic general courses in 11 modern languages and has an enrolment of approximately 5,250 students, almost half of them in the English department.

One important moment in the development of the Language Centre was the creation in 1975 of a Research and Development Unit which was established through an agreement between the National University, the British Council and the University of Edinburgh. One of the first results of the work carried out in this Unit was the launching of EAP courses that have since been in operation in various Faculties with the participation of CELE personnel either in an advisory role or as teachers of the courses. The second, very influential achievement derived from the work of the original RDU (now Department of

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<sup>1</sup>Centro de Enseñanza de Lenguas Extranjeras

Applied Linguistics) was the creation in 1979 of the MA course in Applied Linguistics. Being the only one of its kind in the country and indeed in Hispanic South America, this MA course has a great projection for the advancement of the FLT profession.

### 3.2.2.2 EAP Courses

So far, CELE has produced nine EAP courses, all of them stressing reading comprehension as the main skill to be achieved.<sup>1</sup> The duration of these courses is about 70 hours.

Most, if not all EAP courses have been designed and put into operation as a response to a formal request from a specific Faculty. In every case CELE's commitment has been to develop courses according to the identified needs of the particular target population (almost invariably, reading of specialized literature). Needs analyses varying in depth and detail have been carried out on each occasion previously to course design. Some courses have been used more extensively than others, but the interest and attendance have not decreased in the years the courses have been offered.

If we examined the various courses produced during these years we would find discernible variations in approach. Different trends have been adopted with

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<sup>1</sup>Courses in French and German for Academic Purposes have also been organized.

enthusiasm.

An initial trajectory can be observed that goes from the register analysis orientation emphasizing the identification and teaching of typical grammatical and lexical forms, to the text and discourse analysis approach with stress on features of connected text and rhetorical functions (Widdowson, 1975). More recently, a focus on prior knowledge based prediction and 'risk-taking' strategies can be observed.

Our courses, as seems to be the case with many EAP situations, have evolved rapidly and have not been immune to fashion.

At present we are still searching for the most viable approach to enhance reading comprehension within our specific circumstances and restrictions. One still unresolved question, for instance, concerns the initial linguistic proficiency that would be necessary to profit fully from the courses. The hindering effect of too low levels in the L2 has often been obvious. A threshold level of proficiency to enter the courses might need to be stipulated. So far, however, the pressure students have to pass the foreign language requirement exam, has stopped any measure in this direction. Any applicant is accepted regardless of his or her initial linguistic level of proficiency.

It can finally be said that the UNAM case resembles other EAP situations in Latin America. We admittedly belong to that population that insists "...that

EAP courses should be reading courses" (Swales, 1985: 46). EAP has been acknowledged as necessary, and even in spite of a troubled financial situation, no one would suggest getting rid of the formal exam requirement or of the EAP courses.

The years of experience designing and conducting EAP reading courses have allowed a better appraisal of our needs and resources. A maturational process has taken place regarding the definition of policies. The initial imported 'orthodoxies' seem to have given way to greater flexibility in the attempt to meet our specific needs.

Following Holliday and Cooke's 'ecological metaphor' (Holliday and Cooke, 1982), EAP has not only survived at UNAM, but has undergone adaptations and indeed, propagated. Actually, the 'plant' is so strong that it is only shortage of funds that constrains our ambitions for a much needed revision of the courses and for research in general.

In a sense, the present work represents an effort in the direction of investing towards EAP re-evaluation and improvement.

### 3.3 Some Considerations Regarding Experimental Subjects and Task

An experiment poses a number of options regarding subjects, materials and procedures. In the case of the present experiment, the overall choices were not



particularly difficult. They were premised by the context in which the whole project originated. The choice of subjects was actually quite straightforward: a representative sample of the EAP population at the National University of Mexico, a population whose normal, 'real life' activities were clearly associated with our research questions. It can be said that the study achieves 'ecological validity' in that it is both determined by, and relevant to the academic experience of the target population.

The prospective subjects were assumed to be acquainted with the subject matter they would be required to read. Actually they were expected to be familiarized not only with the topic proper but also with the genre related characteristics of the texts they would be reading: specialized journal articles.

Following are some considerations in connection with the chosen experimental task.

(i) In the first place, it can be said that summarizing was not at all an extraneous activity for the experimental subjects. On the contrary, summarizing is a frequent and highly valued practice in the educational milieu in which the experiment was carried out.

(ii) A rather unusual aspect for this type of study, however, was the high level of difficulty the text posed to the readers. About this circumstance, the following points should be considered:

First, the task was realistic in spite of its difficulty. It is not infrequent that during the course of their studies these students are referred to an English text of their specialization which they find extremely difficult to read given their low competence in the L2.

Secondly, the level of difficulty posed by the experimental task did not diminish discrimination to the extent of affecting test validity.

We will now refer to one possible disadvantage implied in the choice of 'summarization' as the task by means of which comprehension was to be assessed, as well as to the measures that were introduced in the management of the experiment to compensate for such possible drawback.

It has been argued (Winograd, 1984; Taylor, 1983: 527) that the task of summarizing requires not only comprehension of the text, but actually an altogether different strategic skill that involves mental operations not required for comprehension proper. The danger of using summarization to assess reading comprehension then would be in the area of validity, i.e., of evaluating something other than that which we intended to evaluate: the ability to comprehend.

In the present study we expect to have circumvented the mentioned risk by the explicit instructions given to the subjects: they were to write, if possible, a summary, or, if they found this too difficult, they should state in their own words whatever important

ideas they could identify in the texts. (See 'Instructions' in App.D.).

The difficulties implied by the summarization task were also counterbalanced by the marking criteria adopted. The scoring of the summaries for the statistical analysis was based on the inclusion of certain specific points rather than on the intrinsic value of the summaries as actual abstracts conveying the 'sum and substance' of the passage.<sup>1</sup> Shorter and lengthier summaries were equally acceptable. In the pieces of work produced, subjects reported what they had understood. Some managed to achieve, while others only slightly approximated, what can be called a true summary.

The task is also thought to have been eased by the use of the native language in the summaries (although of course some perils may be anticipated in the shift from one language to the other).

The main advantage of the selected task lies in that it offers a real possibility of accessing tangible, rich, idiosyncratic data. Subjects employ their own repertoire of cognitive strategies in dealing with a real text in a rather free and spontaneous fashion while the researcher's biasing influence is reduced to a minimal level (cf. Fawcett, 1979: 214).

Finally, it might be pertinent to point out that

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<sup>1</sup>The 'analytical grid' (Davies, 1978: 215) used for the scoring of the summaries is presented in section 4.2.5.1.

though summaries certainly are not the best data to investigate the on-going interpretative process of reading, they do reveal a great deal about the final representation attained as a result of this process. This is in our view, a most relevant issue for research within the field of EAP since, after all, we are more interested or at least as interested in finding out what the reader takes away from the text as in finding out how he gathers such information (cf. Urquhart, 1987). From the 'finished' product of comprehension we may then attempt to stipulate the occurrence of certain information processing mechanisms whose identification we assume to be important for the development of an EAP theory.

#### 3.4 Paradigmatic Characterization of the Study.

The present study can be positioned in relation to the product-oriented vs. process-oriented research paradigm and in relation to the deductive-confirmatory vs. inductive-interpretative paradigm (Grotjahn, 1987). This placement is represented in figures 3.2 and 3.3.

In the product vs. process oriented research paradigm, the choice of summarization as the experimental task can in a sense be said to incline the study towards the product oriented pole. It is product oriented not in that we have a target product to be reached but in that it is the product (i.e., the summaries) that we are going to study.

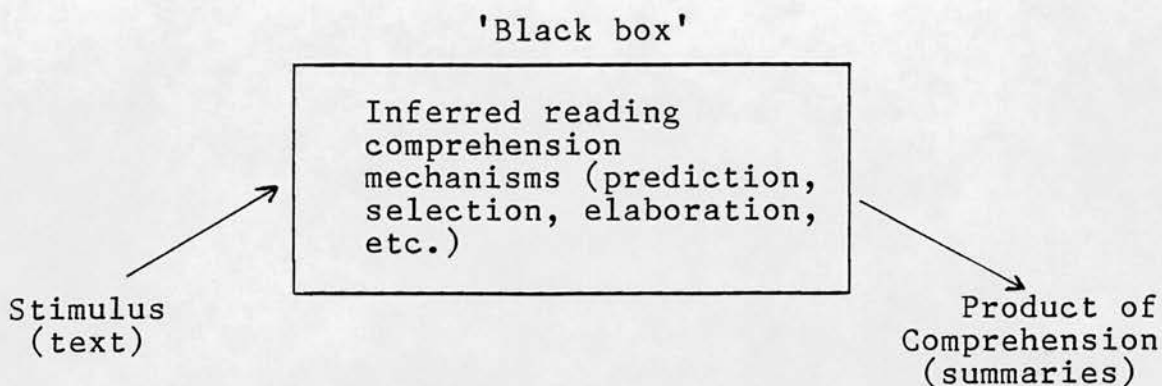
As was mentioned in the previous section, reading comprehension is assumed to be reflected in the summaries. These are seen as the final representation reached by the subjects and are evaluated for the statistical analysis against pre-established criteria (see section 4.2.5).

As for the second stage of the analysis, the 'interpretative' (or qualitative) analysis, the schema-directed phenomena that mostly interest us are dealt with also with reference to the product of the summarization task. The approach adopted falls in line with Anderson's (1976) description of the general procedure of cognitive psychology:

"Our data base consists of recording the stimuli humans encounter and the responses they emit. Nothing, not even introspective evidence escapes this characterization. Thus, basically we have the behavioristic black box into which go inputs and out of which come outputs. The goal is to induce the internal structure of that black box ... the difficulty with this data base is that it does not allow us to directly observe the mental objects and processes. We must infer their existence and their properties indirectly from behavior."

(J R Anderson, 1976:5)

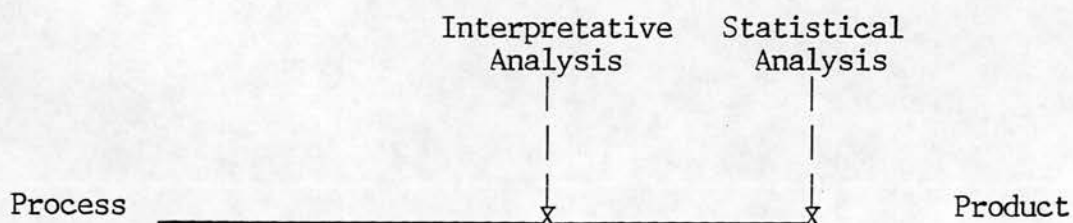
Our purpose in the second part of the analysis is to capture something of what must have occurred inside the 'black box' as our subjects read to produce the summaries. The mental phenomena we discuss are assumed not only on the basis of a theory but taking into consideration both the stimulus (text) and the observable product of comprehension (summaries):



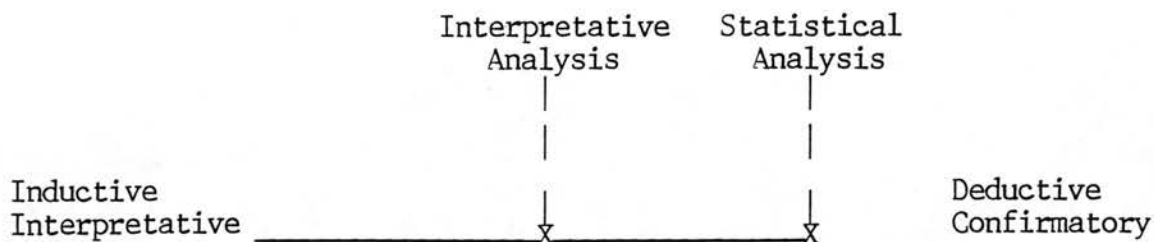
On a deductive-confirmatory vs. inductive-interpretative paradigm axis the two-stage analysis can be considered to be situated as follows:

The statistical analysis is definitely deductive-confirmatory. A number of hypotheses are set and the data are analysed in order to confirm or disconfirm such hypotheses. The procedure in question is described in chapter 5.

The interpretative analysis is somewhat more difficult to locate within a definite category. The analysis has inductive-exploratory aspects but the exploration is not at all undirected. The rich data offered by the summaries are studied according to pre-established theoretical views.



**Fig. 3.2** Location of two-stage analysis on a hypothetical axis representing process vs. product oriented research paradigms.

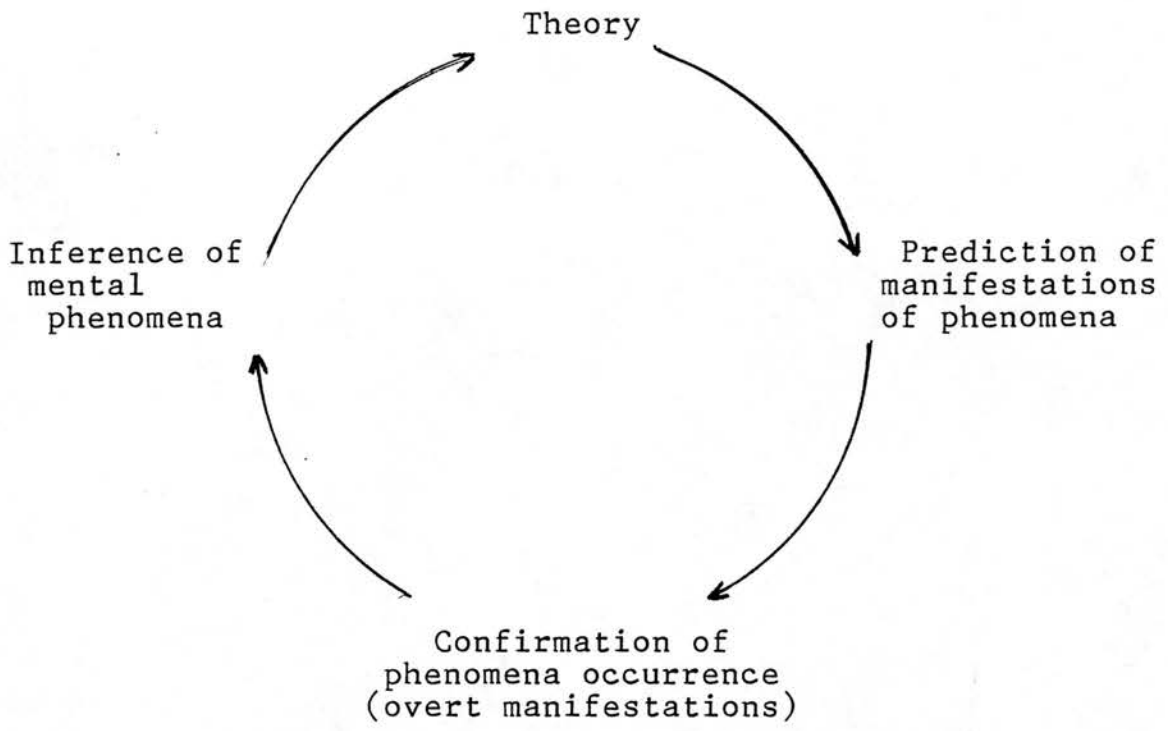


**Fig. 3.3** Location of two-stage analysis on a hypothetical axis representing the inductive-interpretative vs. deductive-confirmatory research paradigms (Grotjahn, 1987).

The exploration of data for this analysis gets quite close to the type that Grotjahn (1987) calls 'theory application in diagnosing' - an expression which he coins to refer, for instance, to interlanguage studies. In what we call the interpretative analysis we scrutinize the corpus with certain informality, but searching for evidence of postulated constructive phenomena (cf. chapter 2). Though we are not strictly hypothesis-testing, we do have certain conjectures for this analysis, for instance, that the schema-directed elaborations that ought to be found in the corpus, should differ according to whether summaries are produced by specialists or non-specialists.

The exploratory activity carried out for the interpretative analysis is illustrated in fig. 3.4.

Fig. 3.4/



Inductive-Interpretative

Deductive-Confirmatory

**Fig. 3.4** Diagrammatic representation of the 'exploratory activity' carried out during the interpretative analysis of the data.



CHAPTER 4

The Experiment

## Chapter 4

### The Experiment

#### 4.1 Preliminary Stage : Text Selection.

As already mentioned, the experimental design required the selection of two texts, one for each of the disciplines involved in the study (i.e., psychology and biology) matching in as many aspects as possible (e.g., difficulty, interest, type of discourse and length).<sup>1</sup> This control was necessary to ensure as much as possible that differences in reading comprehension outcomes would not be attributable to the effect of variables other than the experimental ones. That is, it was necessary to ensure that the differences in reading performance observed in the study would result from the relationship between the informational content (or topic) of the texts and the readers' own field of study. The latter would represent, for the purposes of the experiment, the subjects' assumed background knowledge.

A good amount of time was thus devoted to the task of selecting the most convincingly parallel texts. The procedure for this selection is described in the following section.

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<sup>1</sup>Cf. outline in section 3.1.1.

#### 4.1.1 Initial Selection Criteria

A general and thorough bibliographical survey was carried out in order to get acquainted with the various types of articles appearing in current specialized journals of both disciplines. Recent issues of 36 biology and 17 psychology journals were examined (App.A), and on the basis of this inspection a set of impressionistic criteria was established for the subsequent sampling of possible texts.

It has been pointed out that subjective judgements of passage difficulty may be more valid than reliable (cf., Oller, 1979: 349). As such, they can be helpful as initial screening devices. That is why the impressionistic criteria described below were used for the initial selection of the texts to be used in the experiment in Mexico. On the other hand, for their final selection a more reliable assessment of their difficulty was provided by a study conducted with students of both disciplines at Edinburgh University. This study will be reported in section 4.1.2.

The following, then, were the initial selection criteria:

Difficulty.

Aspects such as the following were taken into consideration to assess level of difficulty: conceptual density (conciseness vs. elaboration), proportion of

specialized terminology, distribution of statistical information, and general textual coherence as mediated by the overall organization of the text. This was done as a quick, impressionistic evaluation, keeping in mind the target readership, i.e., the prospective experimental subjects at the National University of Mexico.

Topic interest and required background knowledge of subject matter.

This was again a subjective assessment since it is well established knowledge that topic interest depends to a great extent on the reader's own purpose, personal motivation and prior information.

On the other hand, the researcher's own knowledge of the subject matter of the articles surveyed was insufficient to assess the basic information that a prospective reader would need to have.

To overcome the difficulties encountered in assessing interest and required background knowledge, the Biology and Psychology programmes of study of the UNAM were examined to identify which topics in the available journals seemed to match more evidently subjects in the curriculum. Also, two Mexican doctoral students of biology at the University of Edinburgh and one Mexican graduate of Psychology were consulted regarding the relevance of specific topics.

## Provision of abstract.

Though not an indispensable feature, articles accompanied by an abstract were given preference over those for which no abstract was provided. Abstracts were expected to be used as a sort of checklist of idea units for the scoring of the summarization protocols.

## Length

As far as length is concerned, both the nature of the task the experimental subjects would be required to perform (i.e., to produce a summary of the contents of the texts) and the time they would have available (approximately 90 minutes), were taken into consideration.

It was thus decided that the passages to be selected should not be excerpts but complete, short texts. Being complete, self-contained discursal units, they would lend themselves to the task of summarization. Being relatively short, they could be read and summarized in the time available. On several occasions, an otherwise suitable article had to be abandoned simply because it seemed too short or too long for the purpose.

Eventually, six texts within the range of 1012 to 1386 words were selected (three from each discipline). Their titles, length in words and source are contained in table 4.1.

**Table 4.1** Initially selected texts, including source and length in words.

TEXT	TITLE AND SOURCE	LENGTH IN WORDS
A	"Green islands-nutrition, not predation - an alternative hypothesis" by T.C.R. White. <u>Oecologia</u> (1985) 67: 455-456.	1050
B	"Rapid-aging in males, a way to increase fitness in a short-lived tropical lizard?" by R. Barbault. <u>OIKOS</u> (1986) 46: 2	1386
C	"Sex-biased philopatry and dispersal in mammals" by C.N. Johnson. <u>Oecologia</u> (1986) 69: 626-627	1373
A'	"National study of the effects of clients' socioeconomic status on clinical psychologists' professional judgements" by R.G. Sutton and M. Kessler. <u>Journal of Consulting and Clinical Psychology</u> (1986) 54: 2, 275-276	1125
B'	"Comparison of self-instruction and relaxation training in reducing impulsive and inattentive behaviour of learning disabled children on cognitive tasks" by T.H. Zieffle and D.M. Romney. <u>Psychological Reports</u> (1985) 57: 271-274	1020
C'	"Interspersed postpassage questions and reading comprehension achievement" by M.L. Seretny and R.S. Dean <u>Journal of Educational Psychology</u> (1986) 78: 3, 228-229	1012

#### 4.1.2. Assessment of Text Difficulty

It was now necessary to measure the difficulty of the six texts initially selected as accurately as possible in order to decide which two would be used in the experiment at UNAM, i.e., one on a biology and one on a psychology topic. This assessment was done by means of a pilot study which was carried out at the University of Edinburgh according to the following procedure.

##### 4.1.2.1 Cloze Construction

Although doubts have been expressed about the validity of the use of completion text scores (cloze scores) as a measure of reading comprehension (cf., Alderson, 1984: 9; and Davies, 1978: 218), this procedure has been widely used as a device for measuring readability (cf., Davies, 1978: 216; Oller, 1979: 353; and Nuttall, 1982: 28) since it was introduced by the American journalist W.L. Taylor (1953). Accordingly, it was decided to use this procedure to evaluate the difficulty of the texts initially selected for this study on the assumption that it would provide a measure of both readability proper and subject matter difficulty.<sup>1</sup>

The opening three to six paragraphs of each of the

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<sup>1</sup>"The ability to comprehend partially mutilated text reflects constraints that are due to S's experience with the language and due to his previous experience with the subject matter". (Rothkopf, 1972: 318)

six texts were transformed into cloze tests of approximately 650 words in length.<sup>1</sup> The first two or three sentences were left intact to lead the reader into the topic. A fixed deletion rate of every 6th word yielded a total number of 60 deletions for each of the tests.<sup>2</sup> Since the subjects in the pilot study would be asked to complete two of these tests each (see section 4.1.2.2), booklets containing different pairs of texts along with their instructions were prepared in advance to facilitate their application. The cloze test booklets in question are included in App.B.

#### 4.1.2.2 Cloze Test Application

The cloze tests were administered to a random sample of 30 English speaking students of biology and 30 English speaking students of psychology, most of whom were in their 2nd, 3rd or 4th year of study at the University of Edinburgh. Included in the sample were 3 psychology and 4 biology postgraduates. Thus, the main difference between the students who participated in this pilot study, and those who would participate in the main experiment in Mexico could be said to be the fact that the former were

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<sup>1</sup>Through previous trial applications it had been discovered that lengthier texts would require more volunteers' time than we could count on (i.e. more than 45 minutes).

<sup>2</sup>Oller (1979: 353) has pointed out that "a minimum of 50 blanks in a given cloze test ... will generally assure sufficient reliability."



native speakers of English while for the latter English would be a foreign language.

The cloze tests booklets were handed out personally by the experimenter, and the purpose of the experiment as well as the specific task were briefly explained to every participant. As mentioned above, each participant was asked to answer only two tests (of the three available per discipline), the intention being not to overtax the volunteers. The scheme of this application, parallel for both disciplines is shown in table 4.2. This scheme was designed so that each test would be taken by the same number of subjects on the one hand, and on the other, so that the order of presentation could be counterbalanced.

**Table 4.2** Scheme for cloze test administration to Edinburgh University students of biology and psychology.

Biology students n = 30	Biology cloze tests (A,B,C)	Psychology students n = 30	Psychology cloze tests (A',B',C')
5	A B	5	A' B'
5	B A	5	B' A'
5	B C	5	B' C'
5	C B	5	C' B'
5	A C	5	A' C'
5	C A	5	C' A'

#### 4.1.2.3 Scoring and Results

One point was given for each exact word recovery. It has been pointed out that this scoring procedure "is practical and efficient ... other methods providing less inter-marker reliability." (Davies, 1978: 218).<sup>1</sup> Therefore, the maximum score in each test would be 60 points.

The descriptive statistics for each of the tests are shown in table 4.3, and in figure 4.1 the results are compared graphically. The participants' scores in all tests are included in App.C.

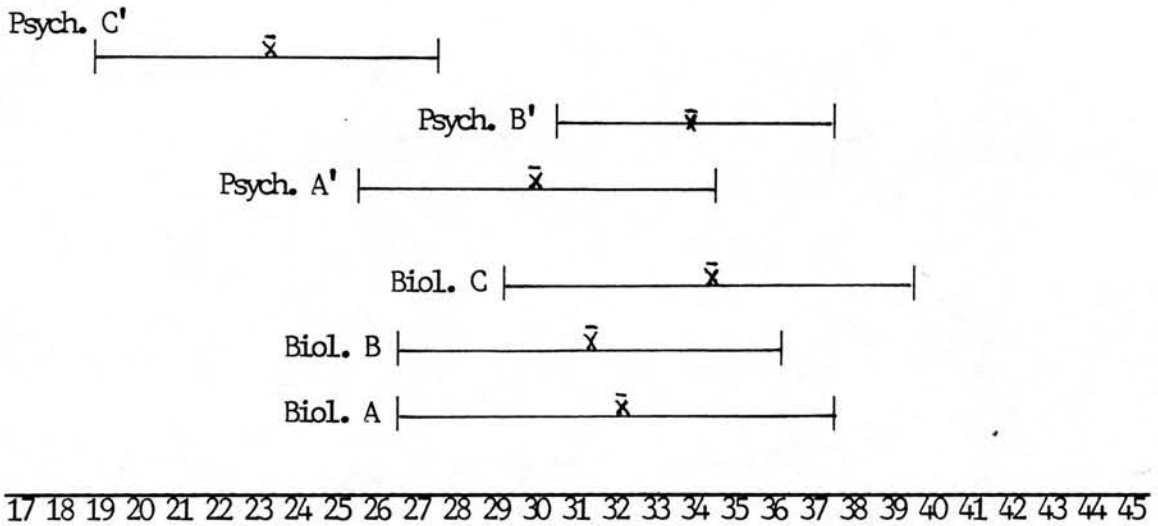
With these results to hand, the procedure indicated below was followed for the final selection of the two texts to be used in the experiment in Mexico.

**Table 4.3** Descriptive statistics for tests used in text selection: number of subjects taking each test (n), mean ( $\bar{x}$ ), standard deviation (SD) and length in words of complete original text.

Text		n	$\bar{x}$	SD	Length (in words)
Biology	A	20	32.15	5.17	1050
	B	21	31.19	4.74	1386
	C	20	34.65	5.26	1373
Psychology	A'	19	29.78	4.36	1125
	B'	20	33.85	3.45	1020
	C'	22	23.00	4.42	1012

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<sup>1</sup>Also see Nuttall, 1982: 28.



NB:	text	$\bar{x}$	SD	+1 SD	-1 SD
	Biol. A	32.15	5.17	37.32	26.98
	Biol. B	31.19	4.74	35.93	26.45
	Biol. C	34.65	5.26	39.91	29.39
	Psych. A'	29.78	4.36	34.14	25.42
	Psych. B'	33.85	3.45	37.3	30.4
	Psych. C'	23	4.42	27.42	18.58

**Fig. 4.1** Graph representing one SD above and one SD below the mean of each of the six cloze tests administered to biology and psychology students at the University of Edinburgh for purposes of text selection.

First of all, the mean scores of the six cloze tests were examined. It was observed that except for that of Psychology Text C', they had a similar level of difficulty. Therefore, Psychology Text C' was discarded from the selection process at this stage. The following pairs of texts appeared suitable regarding mean scores:

- Biology A ( $\bar{x} = 32.15$ ), and Psychology B' ( $\bar{x} = 33.85$ ).
- Biology C ( $\bar{x} = 34.65$ ), and Psychology B' ( $\bar{x} = 33.85$ ).
- Biology A ( $\bar{x} = 32.15$ ), and Psychology A' ( $\bar{x} = 29.78$ ).
- Biology B ( $\bar{x} = 31.19$ ), and Psychology A' ( $\bar{x} = 29.78$ ).

The next step was to take into consideration the spread of the scores of the texts as follows:

- Biology A (SD = 5.17), and Psychology B' (SD = 3.45).
- Biology C (SD = 5.26), and Psychology B' (SD = 3.45).
- Biology A (SD = 5.17), and Psychology A' (SD = 4.36).
- Biology B (SD = 4.74), and Psychology A' (SD = 4.36)

It was observed that the difference in spread between these texts was greater when the Psychology Text B' was involved. Accordingly, those pairs where this happened were discarded.

As a next step, the number of words of the texts involved in the two remaining pairs was taken into consideration:

- Biology A (1050 words), and Psychology A' (1125 words).
- Biology B (1386 words), and Psychology A' (1125 words).

The difference in number of words between the texts in the first pair (i.e., Biology A and Psychology A') was smaller than that observed in the second pair. However, before selecting this pair as one to be used in the experiment, it was decided to make sure that the difference in spread between them was not statistically significant. A variance-ratio test (F-test) was used for this purpose. The procedure used was that suggested by Robson (1973: 82-83), and the results of the test are shown in table 4.4.

**Table 4.4** Variance-ratio test (F-test) for Biology Text A and Psychology Text A'.

Text	SD	Variance (SD <sup>2</sup> )	d.f. (n-1)	<u>F</u>
Biology A	5.17	26.72	19	1.40(n.s.)
Psychology A'	4.36	19.00	18	

Since the observed value of F (F = 1.40) is smaller than the table value : F = 2.86 (cf. Robson, 1973: 150), it could be said that there is no significant

difference between these texts when their spread of scores is compared.

As a result of the foregoing considerations, Biology Text A ("Green Islands - nutrition, not predation..."), and Psychology Text A' ("National study of the effects of clients' socioeconomic status ...") were finally chosen to be used in the main experiment in Mexico. The information about these texts that provided the basis for their final selection is summarized in Table 4.5.

**Table 4.5** Texts selected to be used in the experiment at UNAM, Mexico.

	Biology	Psychology
Title	"Green islands - nutrition not predation - an alternative hypothesis."	"National study on the effect of clients' socioeconomic status on clinical psychologists' professional judgements."
No. of words	1050	1125
$\bar{x}$ in trial cloze	32.15 (out of 60)	29.78 (out of 60)
SD in trial cloze	5.17	4.36

## 4.2 Realization of the Experiment at the National University of Mexico.

### 4.2.1 Subjects

The experiment was carried out with biology and psychology undergraduates in the 2nd, 3rd and 4th year of their academic course of study at the National University of Mexico. By eliminating students in their first year from the experiment, it was expected that the required background knowledge on texts' subject matter would be present. If first year students had been included this guarantee would have been lessened.

### 4.2.2 Control of L2 Variable

The experimental design required that the subjects' level of proficiency in the foreign language should be controlled in order to reduce the effect that differences in this variable could have on reading comprehension performance.

In order to attain this control, the following procedure was used: all the experimental subjects (86 biology students and 85 psychology students) were given the 'short version' of the English language Battery Test (ELBA) (Ingram, 1975), i.e., the Grammar, Vocabulary and

Reading Comprehension section of the test.<sup>1</sup> The subjects' ELBA scores were then used as the basic criterion for obtaining the experimental groups, i.e., one group of biology students and one of psychology students, matched in L2 proficiency. The exact procedure of how these groups were constructed is described in section 4.2.4.

#### 4.2.3 The Reading Tests. Description and Application.

The reading tests consisted of the two complete articles ("Green islands ..." and "National study ...") which had been selected on the basis of the procedure described in section 4.1. Their abstracts were deleted, since (as has already been mentioned) they were to be used as the basic scoring criteria. Both tests and their corresponding instructions are included in App.D.

On the week following the administration of the ELBA test, the students were given the two reading tests. For this purpose, they were asked to attend on two occasions, with an interval of three or four days between them. On each of these occasions, they took either one of the two reading tests.

The subjects were asked to read the text in silence, at their own pace, using whatever reading strategy or style they preferred (e.g., re-reading if they

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<sup>1</sup>Time and other restrictions did not permit the administration of the complete battery which includes a rather lengthy Listening section.



wanted). Their instructions were to write a summary in Spanish containing the main ideas in the text, or, alternatively, if they found this task too difficult, a report of what they thought the text was about. No limit to the length of the summaries was set, but subjects knew they had a maximum of 90 minutes to finish the task. The great majority handed in their summaries within the hour. Dictionaries were not allowed.<sup>1</sup>

#### Order of application.

To counterbalance any advantage gained by reading the text of their own discipline first, or in general any learning effect, the order of application of the two reading tests was controlled. During the first session half of the class received the biology test and the other half received the psychology test; during the second session this order was reversed (see table 4.6).

Table 4.6/

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<sup>1</sup>This restriction was set with the purpose of further controlling the conditions since it would not have been possible to provide that every student had access to the same dictionary or to any at all. However, this proved to be a drawback from the motivational point of view as students realized they did not know many of the words in the texts.

**Table 4.6** Counterbalanced scheme of applications of the two reading tests.

	First session	Second session
Group of Biology students	"Green islands ..."	"National study ..."
	"National study ..."	"Green islands ..."
Group of Psychology students	"Green islands ..."	"National study ..."
	"National study ..."	"Green islands ..."

#### 4.2.4 Constructing the Experimental Groups

For various reasons, only 55 biology students and 48 psychology students from all those who had taken the ELBA test were able to complete also the two reading tests. The final experimental groups were now possible to set up on the basis of the ELBA scores.<sup>1</sup>

The following procedure was observed:

a) A t-test was applied to check whether the ELBA scores of the biology students and those of the psychology students could be said to come from the same population. If so, it would be appropriate to use the overall mean ( $\bar{x} = 24$ ) as the figure from which the experimental groups would be established. It was found that this was the case

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<sup>1</sup>At this stage one atypically high ELBA score was discarded thus leaving a group of 54 biology students and 48 psychology students.

since the observed value of  $t$  (.90 for 100 d.f.) did not exceed the table value (2.00) at the conventional .05 level of significance (Hatch and Farhady, 1982: 272). Table 4.7 shows the data used in the computation of  $t$ .

**Table 4.7** Data used in computation of  $t$  for psychology and biology groups (ELBA test).

	n	$\bar{x}$	S.D.
Psychology students	48	23.5	7.82
Biology students	54	25	9.05

b) The scores of the two groups were ranked separately (table 4.8).

c) Fifteen scores above and fifteen below the overall mean ( $\bar{x} = 24$ ) were taken from each ranked group of scores (see boxes in the same table).

These 60 students (30 psychology and 30 biology students) conform the two experimental groups. Their summaries of the psychology and of the biology reading tests comprise the corpus to be analysed. The corpus, then, contains 60 summaries of the text "Green islands ..." and 60 summaries of the text "National study ..."

The way in which these summaries were scored is described in the following section, and the statistical analysis of the results is presented in chapter 5.

**Table 4.8** Ranked ELBA scores of both psychology and biology students. In boxes, experimental groups (30 subjects in each). Overall mean score = 24.

ELBA Scores	Psychology students	Biology students
58		/ (1)
48	/ (1)	
44	/ (1)	
41	/ (1)	// (2)
38	/ (1)	
36		/ (1)
35		/// (3)
34		/ (1)
33	/ (1)	/ (1)
32		/// (3)
31	// (2)	// (2)
30	/ (1)	/// (3)
29	/// (3)	/// (3)
28	// (2)	// (2)
27	/ (1)	/ (1)
26	/ (1)	/// (3)
25		// (2)
24	/// (3)	
23	/// (3)	
22	<del>///</del> / (6)	<del>///</del> (5)
21	/// (3)	/// (4)
20		/ (1)
19	<del>///</del> / (6)	
18	/// (3)	/// (4)
17	/ (1)	/// (3)
16	//// (4)	/ (1)
15	/ (1)	/ (1)
14	// (2)	// (2)
13		/// (3)
11		/ (1)
10	/ (1)	/ (1)
Total	48	54

## 4.2.5 Scoring the Summaries

### 4.2.5.1 Criterion

As has been mentioned earlier, the author's abstract for each of the two articles was used as a basic guideline to identify 'idea units' that a proficient reader could be expected to recognise when reading the articles.

Basically on this criterion, two checklists were drawn for the scoring of the summaries. Some items in the list, however, are not drawn directly from the abstracts but from the texts themselves.

In what follows, the original abstracts and the corresponding checklists of crucial 'idea units' are presented, (the texts themselves are included in App.D).

#### Psychology

##### Abstract:

Members from the American Psychological Association's Clinical Psychology Division (Division 12) participated in an analogue study of the effects of clients' socio-economic status on clinical judgements. After reading a brief case history, 242 respondents filled out nine clinical rating scales, a demographic questionnaire, and a measure of sociopolitical values. The case history, identical in all other ways, varied across subjects by describing the client as a member of Social Class III, IV, or V (Hollingshead, 1957). When the client was described as a Class V member, he was seen as having a poorer prognosis and self-concept; psychologists were less interested in treating this client; and when professional psychotherapy was chosen, it was less likely to be insight-oriented psychotherapy.

## Checklist:

(i) The experiment concerns the effect that client's socioeconomic status may have on clinical judgement.

(ii) The subjects of the experiment were clinical psychologists.

(iii) The method includes:

(a) A prepared case history which was presented to psychologists, identical in all other ways but the hypothetical client's socioeconomic status.

(b) Use of a number of rating scales, and assessment of psychologists' sociopolitical values and socioeconomic status.

(iv) Results:

(a) Lower class members received poorer prognosis.

(b) Psychologists manifested less interest in treating them.

(c) Recommended psychotherapy was less insight oriented than that recommended for counterpart middle class clients.

## Biology

### Abstract:

Mountain birch trees are said to survive as "green islands" around nests of red ants in Finnish Lapland because the ants kill larvae which would defoliate trees during outbreaks of the moth O. Autumnata. An alternative hypothesis says that because the ants will concentrate soil nutrients (and possibly ameliorate soil moisture and temperature) in and around their nests, they provide a more favourable site for trees growing nearby. These trees are

therefore less stressed and a poorer source of food for defoliators at times of outbreaks. Few if any young O. Autumnata larvae survive on the trees which survive in green islands around nests.

Checklist:

(i) The article deals with a problem of deforestation/defoliation<sup>1</sup>.

(ii) Defoliation is caused by larvae of Oporinia Autumnata.

(iii) Birch trees/Betula Pubescens Tortuosa survive in 'green islands'.<sup>2</sup>

(iv) Surviving groups of trees are found around ant nests.

(v) Lowest altitudinal limits of tree defoliation coincide with upper limit of Formica A. distribution.

(vi) Hypothesis 1. - Ants kill larvae of Oporinia Autumnata thus preventing defoliation.

(vii) Hypothesis 2 (author's alternative hypothesis). - Soil near ant nests is enriched by nutrients and therefore stronger trees surrounding nests resist defoliators.

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<sup>1</sup>This item is not explicit in the abstract but is central to the text.

<sup>2</sup>This item was discarded for the statistical analysis of results due to its high index of difficulty and almost null discrimination.

#### 4.2.5.2 Trial Application of Scoring Criteria

Before the summaries in the corpus were marked, the scoring checklists for both reading tests were tried by marking summaries produced by a small number of 'experts':

In the case of the psychology article:

One Mexican graduate of psychology with a good command of English and a teacher of English at UNAM.

In the case of the biology article:

One Mexican doctoral student of biology (Forestry) at the University of Edinburgh and a teacher of English at UNAM.

The transcripts of these experts' summaries are presented in App.E.

The results of this trial application of the scoring checklist allowed the experimenter to verify that the scoring instrument was adequate in that the points in the checklist were present in the experts' summaries.

#### 4.2.5.3 Marking Scale

The actual scale used for scoring the summaries was as follows:

(2) The point is definitely included in the summary;

(1) The point is partially identifiable in the summary;



(0) No evidence of inclusion of the point can be found in the summary.

#### 4.2.5.4 Marking Procedure

The 120 summaries were scored according to the already mentioned 'abstract-based' checklists.

In order to achieve as much objectivity as possible during the scoring process, the name and other data through which the subject's discipline of study could have been identified were masked. (An independent person gave an identification number to the papers and the identification key was saved).

#### 4.2.5.5 Interjudge Reliability

To doublecheck the appropriateness of the scoring criteria, an independent judge scored the summaries using the same scoring checklist and scale (the scores awarded by this judge to the biology and psychology tests are included in App.F).

The agreement between the two sets of scores, i.e., those of the experimenter and those of the independent judge was found to be significant (see table 4.9).

**Table 4.9** Correlation between two judges in the scoring of biology and psychology tests.

	<u>r</u>	<u>p</u>
Psychology	.78	<.001
Biology	.61	<.001

#### 4.2.5.6 Conversion to Z Scores.

Since the marking scales for both reading tests differed (14 points maximum for the psychology test and 12 points maximum for the biology test), once both sets of summaries had been marked, the raw scores of these as well as those of the ELBA test were transformed to Z scores (see table 4.10) to allow necessary comparisons during the statistical analysis of the data (presented in chapter 5 of this thesis).

**Table 4.10** Scores on biology, psychology and ELBA tests  
(Z scores)

Subject Number	Biology test ("Green islands ...") Z scores	Psychology test ("National study ...") Z scores	ELBA test Z scores
1	.12	- .37	- .59
2	.12	- .37	-1.25
3	.12	- .60	.54
4	.46	.07	- .92
5	- .20	.75	.38
6	- .53	- .82	- .43
7	.46	- .60	.38
8	.46	- .82	-1.41
9	- .86	- .37	- .27
10	.12	- .60	- .21
11	- .86	.30	.71
12	- .53	.07	- .43
13	- .20	- .60	- .59
14	1.79	- .60	- .59
15	- .53	1.43	-1.25
16	- .53	1.66	- .59
17	.46	- .37	- .59
18	- .86	- .60	.87
19	- .53	1.43	2.51
20	- .53	1.43	- .59
21	- .86	- .37	- .10
22	.12	- .60	.38
23	- .53	- .60	- .76
24	- .86	- .82	.71
25	.79	1.43	- .27
26	- .86	1.21	- .59
27	- .53	- .82	- .59
28	.12	- .82	.87
29	.46	- .37	.05
30	3.11	- .14	- .10
31	2.78	1.49	3.0
32	- .86	- .37	-1.09
33	- .20	- .82	-1.25
34	1.79	- .82	- .76
35	.46	.75	.54
36	- .86	- .82	.38
37	- .53	2.11	- .43
38	1.12	2.34	.87
39	.79	2.34	.05
40	.12	.75	- .59

Cont/

41	- .20	- .82	.54
42	- .53	- .14	- .59
43	- .86	- .14	.54
44	- .53	- .82	- .76
45	- .53	- .37	- .59
46	- .20	1.89	3.65
47	- .86	- .37	- .76
48	- .53	- .82	.71
49	- .86	- .82	.05
50	- .53	- .82	.71
51	- .53	- .37	- .76
52	- .53	- .82	-1.25
53	- .86	- .82	.38
54	1.45	2.11	1.20
55	- .86	- .82	- .76
56	- .86	- .60	.54
57	2.12	1.66	2.01
58	- .86	- .82	- .43
59	.12	- .82	.05
60	3.11	- .60	- .76

CHAPTER 5

Statistical Analysis of the Data

## Chapter 5

### Statistical Analysis of the Data

#### 5.1 Introduction

Before proceeding to describe the various steps followed for the performance of the statistical analysis of the data, it might be pertinent to recall how this analysis stands in relation to the whole experimental design (cf. design outline in section 3.1).

The statistical analysis is intended to verify whether given the conditions described in section 3.2.2.1, texts on the subjects' own discipline of study were easier to understand than texts pertaining to the unrelated discipline, and if so, to what extent.

It should be recalled that within the framework of the present study, the statistical analysis was a prerequisite for what we have called the qualitative or interpretative analysis of the data. If the statistical analysis confirmed that texts on the subjects' own discipline appeared to be easier to process than texts on the unrelated discipline, i.e., if the results of the analysis led us to reject our initial null hypothesis

$H_0$ : Previous knowledge of subject matter (as represented by academic field) will not affect significantly the comprehension of a

reading text

then, it would be possible to proceed to the interpretative analysis of the corpus. However, if the results of the statistical analysis did not allow the rejection of the initial null hypothesis, a revision of the research project would be required.

## 5.2 Brief Outline of the Steps Followed for the Statistical Analysis

The whole statistical analysis consists of the following stages which allowed first, a rather general and subsequently, a more detailed picture of the significance of the tests' results, and thus of the relationships between the dependent variable and the independent ones.

(i) Correlational analysis between performance on the two tests.

- a) Both groups combined
- b) Each group separately.

(ii) The results of step (i) indicated the convenience of performing a chi square test to investigate whether there was a significant association among the variables involved: discipline of study (Field), text topic (Text) and Reading Comprehension Performance.

(iii) Given that a significant association was found among the above mentioned variables, a two way analysis of variance was finally performed to investigate

the degree to which subjects were performing better on their discipline and the extent to which superior performance could be attributed to each of the independent variables (or to the interaction of the two).

### 5.3 Correlational Analysis of Performance on Both Tests

Once the summaries had been marked (see the procedure described in section 4.2.5) and the scores transformed to Z scores, the first step of our analysis was to investigate the nature of the relationship between the performance of the two experimental groups on both tests.

In order to form an initial impression of their distribution, all the scores were plotted on a scattergram. In this scattergram each subject was identified both by key number and by discipline of study (see figure 5.1, in which the biology students are represented by green numbers, and the psychology students by red numbers). The compiled frequencies in each quadrant of the graph are presented in figure 5.2.

The scattergram does not reveal an evident systematic pattern between high and low scores on both tests. On the one hand, there appears to be a trend towards a moderate positive correlation: it can be noticed, for instance, that overall, psychology students performing well in the psychology test are not performing too badly in the biology test. Another indication of a



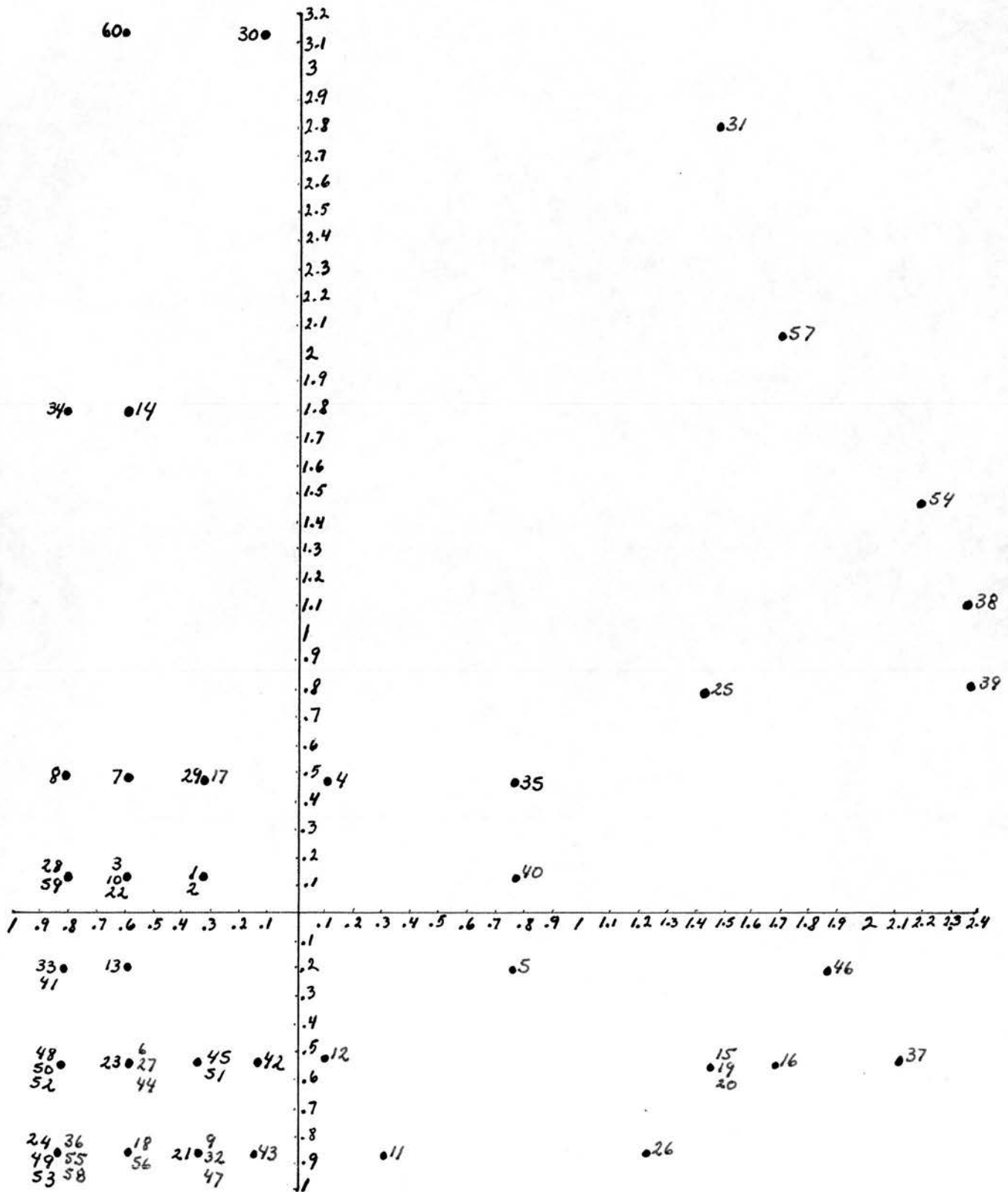


Fig. 5.1 Plotted scores of both experimental groups on the biology test (vertical axis) and the psychology test (horizontal axis).

Biology Test ("Green islands")		
II	n = 15 B = 14 P = 1	I
III	n = 26 B = 14 P = 12	IV
		Psychology test ("National study")

**Fig. 5.2** Compiled frequencies of scores falling in each of the four quadrants formed by the Biology test axis and the Psychology test axis. (B: biology students; P: psychology students).

possible trend towards a positive correlation are all the scores clustered in the third quadrant<sup>1</sup> which indicate that a rather high number of both biology students and psychology students are performing poorly on both tests. On the other hand, with reference to the performance of the biology students alone, their high number in quadrant II and their total absence in quadrant IV would point to a possible negative correlation.

As the picture provided by the scattergram was imprecise, it became necessary to obtain a more accurate quantitative measure of the relationship between performance on both tests. This measure was to be obtained by means of a Pearson product moment

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<sup>1</sup>Notice that quadrants are numbered anticlockwise, Quadrant I containing positive scores on both tests, Quadrant II positive scores on the biology test and negative scores on the psychology test, and so on.

correlational analysis. The null hypothesis for this analysis was:

$H_0$ : There is no significant correlation between the subjects' performance on the biology test and their performance on the psychology test.

If this null hypothesis were to be rejected, one of the following alternative hypotheses would be accepted:

$H_{a1}$ : There is a significant positive correlation between the subjects' performance on the biology test and their performance on the psychology test.

$H_{a2}$ : There is a significant negative correlation between the subjects' performance on the biology test and their performance on the psychology test.

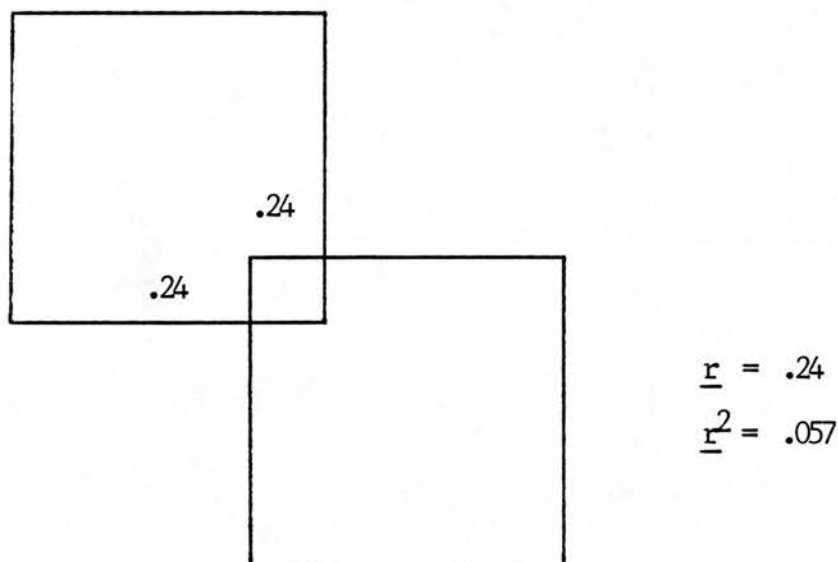
The product moment correlation coefficient was positive:  $r = .24$ , but did not reach significance at the conventional .05 level (cf. Hatch and Farhady, 1982: 277).<sup>1</sup>

The null hypothesis could not therefore be rejected.

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<sup>1</sup>The data for the Pearson product moment correlation coefficient are shown in table 4.10.

In terms of covariance (see fig. 5.3) our measurement indicates that performance in one test only slightly overlaps the other (from which we might infer that both tests require different knowledge or abilities).



**Fig 5.3** Variance overlap between performance on the biology test and performance on the psychology test :  $\underline{r}^2 = .057$

It was possible, however, that this non-significant correlation was due to the fact that the subjects came from two different groups which had been combined. It could be the case that relationship patterns of each group did not emerge as meaningful when the two groups were combined (cf. Hatch and Farhady, 1982: 208). Thus, in order to further clarify the significance of the general distribution of scores, it was necessary to investigate how each discipline group had performed on

both tests, The correlation coefficients between the scores on both tests were computed again, but now taking each group separately. The corresponding coefficients were:

Biology Group:

Correlation between performance on biology test ("Green Islands ...") and performance on psychology test ("National Study ...")

$$\underline{r} = .19 \text{ (n.s)}$$

Psychology group:

Correlation between performance on biology test ("Green Islands ...") and performance on psychology test ("National Study ...")

$$\underline{r} = .57 \quad p < .05$$

Tables 5.1 and 5.2 contain the scores of both groups on both tests, i.e., the data from which the above correlation indices were obtained.

**Table 5.1** Z scores and  $\underline{r}$  corresponding to the group of biology students on their performance on both tests.

Subject No	"Green islands ..."	"National study ..."
1	.12	- .37
2	.12	- .37
3	.12	- .60
4	.46	.07
7	.46	- .60
8	.46	- .82
10	.12	- .60
13	- .20	- .60
14	1.79	- .60
21	- .86	- .37
22	.12	- .60
23	- .53	- .60
24	- .86	- .82
28	.12	- .82
29	.46	- .37
30	3.11	- .14
33	- .20	- .82
34	1.79	- .82
35	.46	.75
41	- .20	- .82
42	- .53	- .14
45	- .53	- .37
48	- .53	- .82
49	- .86	- .82
50	- .53	- .82
51	- .53	- .37
52	- .53	- .82
53	- .86	- .82
59	.12	- .82
60	3.11	- .60

$\underline{r} = .19$  (n.s)

**Table 5.2** Z scores and  $\bar{r}$  corresponding to the group of psychology students on their performance on both tests.

Subject No	"Green islands ..."	"National study ..."
5	- .20	.75
6	- .53	- .82
9	- .86	- .37
11	- .86	.30
12	- .53	.07
15	- .53	1.43
16	- .53	1.66
17	.46	- .37
18	- .86	- .60
19	- .53	1.43
20	- .53	1.43
25	.79	1.43
26	- .86	1.21
27	- .53	- .82
31	2.78	1.49
32	- .86	- .37
36	- .86	- .82
37	- .53	2.11
38	1.12	2.34
39	.79	2.34
40	.12	.75
43	- .86	- .14
44	- .53	- .82
46	- .20	1.89
47	- .86	- .37
54	1.45	2.11
55	- .86	- .82
56	- .86	- .60
57	2.12	1.66
58	- .86	- .82

$\bar{r} = .57$

As can be seen, what these separate measures indicate, is that in the case of the biology group there is no significant correlation between the performances on

the two tests, whereas in the case of the psychology group there is a moderate positive correlation, i.e., overall, those psychology students that perform well in their own discipline, tend to perform well in the biology test, and those performing poorly in their own discipline tend to perform poorly in the biology test.

Thus, when taking the groups separately, the null hypothesis cannot be rejected regarding the performance of the biology group. For the psychology group the alternative  $H_{a1}$  is accepted.

If we now pause to consider what these results imply in terms of the general framework of the present study we can say that they do not contradict the basic supposition that readers perform better when reading texts in their own discipline. We may have, as the correlational analysis shows in the case of the psychology group, a considerable number of subjects performing well on both tests or poorly on both tests, but it will still be necessary to investigate whether the subjects are performing significantly better in their own discipline or not.

According to such reasoning, the ensuing steps of the analysis were planned as follows:

First, a chi square test would be used in order to test for mutual independence among the experimental variables. This step is presented in section 5.4. Then, if the results of this exploratory study of the relationships among the variables involved were to be



significant, a more precise test would be necessary. As will be seen later, this was the case, and a two way Analysis of Variance was used for the purpose. This 2 x 2 ANOVA is presented in section 5.5.

#### 5.4 Chi Square Test for Mutual Independence of the Variables

In order to test for mutual independence among the experimental variables, a chi square test (three way classification table) was performed, the variables under consideration being:

Dependent Variable:

Reading Comprehension Performance as measured by the two reading tests,

Independent Variables:

Field, or discipline of study of the reader, with two levels: biology and psychology,

Text, or subject matter content of the reading passage, with two levels: biology topic (represented by the text "Green Islands ...") and psychology topic (represented by the text "National Study ...").

The corresponding null hypothesis being:

H<sub>0</sub>: There is no significant relationship between the reader's Field of study, the topic of the Text he is reading and his Reading Comprehension Performance.

Given that the reading performance of the subjects had been measured as an interval variable (see section 4.2.5.3), for the purpose of the chi square test scores above the mean were labelled 'good' and scores below the mean were labelled 'poor'. Reading comprehension performance was thus changed to a nominal variable (cf. Hatch and Farhady, 1982: 165).

The computation of  $\chi^2$  was carried out according to the procedure suggested by Cohen and Manion (1986: 353), who emphasize the need to use the multidimensional format rather than summing over variables to reduce them to two dimensional formats whenever the data allows.

Tables 5.3 and 5.4 show the values corresponding to the observed and expected frequencies used as the basis for the computation of the value of  $\chi^2$ . (Appendix G. contains the steps followed in the computation of the expected frequencies shown in table 5.4).

With the observed and expected frequencies to hand,  $\chi^2$  was calculated using the formula in fig. 5.4.

**Table 5.3** Field, Text and Reading Comprehension Performance: A three-way classification table. (Observed frequencies).

		"Green Islands"		"National Study"	
		+	-	+	-
FIELD	Biology	16	14	2	28
	Psychology	8	22	17	13

**Table 5.4** Field, Text and Reading Comprehension Performance: A three-way classification table. (Expected frequencies).

		"Green Islands"		"National Study"	
		+	-	+	-
FIELD	Biology	10.8	19.2	10.8	19.2
	Psychology	10.8	19.2	10.8	19.2

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

**Fig. 5.4** Formula used for the computation of  $\chi^2$

The observed value of  $\chi^2$  was 47.67 for 4 degrees of freedom<sup>1</sup>. Since this value of  $\chi^2$  exceeds the corresponding value in the table ( $\chi^2 = 18.46$ ) at the .001 level of significance (cf. Hatch and Farhady, 1982: 279), the null hypothesis of mutual independence of the variables involved was rejected, i.e., there are significant associations between the variables. The question remains: which variable is causing the null hypothesis to be rejected?

Since the results of this chi square test were significant, it was now pertinent to proceed to the last stage of the statistical analysis, i.e., the Two Way ANOVA which would permit the use of the more detailed information that was available about the performance of the groups. We would be comparing the corresponding means and dispersion of scores. Thus, instead of using a nominal scale as in the  $\chi^2$  test, we could use the information provided by the interval scale that had been used for the scoring of both tests. In this way, we would be able to refine our understanding of the inter-relationships that the chi square test had revealed.

### 5.5 Two Way Analysis of Variance (ANOVA)

The set of hypotheses that were submitted to test by means of the analysis of variance are formulated below:

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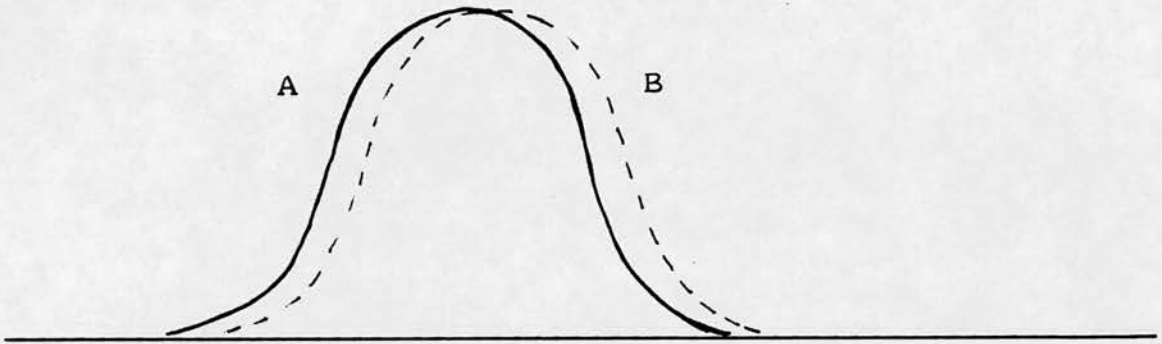
<sup>1</sup>The d.f. were computed according to the procedure suggested by Cohen and Manion (1980: 357).

- H<sub>01</sub>: There is no significant difference in reading comprehension performance between the two experimental groups (i.e., the group of biology students and the group of psychology students).
- H<sub>a1</sub>: There is a significant difference in reading comprehension performance between the two experimental groups so that one of them (either the group of biology students or the group of psychology students) will outperform the other.
- H<sub>02</sub>: There is no significant difference in reading comprehension performance when subjects read the biology text and when they read the psychology text.
- H<sub>a2</sub>: There is a significant difference in reading comprehension performance when subjects read the biology text and when they read the psychology text.
- H<sub>03</sub>: There is no significant difference in reading comprehension performance between reading a text of one's own field of study and reading a text unrelated to one's own field of study.

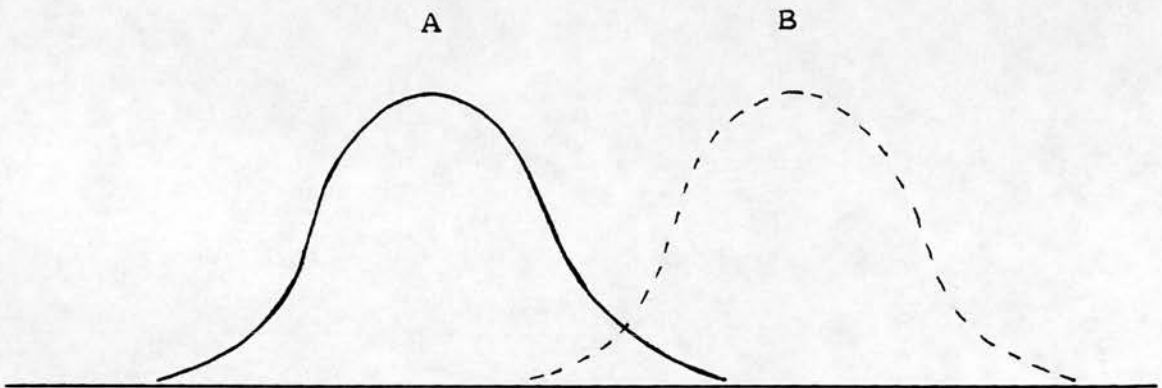
H<sub>a3</sub>: There is a significant difference in reading comprehension performance between reading a text of one's own field of study and reading a text unrelated to one's own field of study, so that the group of biology students will perform better on the biology test and the group of psychology students will perform better on the psychology test.

Figures 5.5 to 5.10 are graphic representations of possible distributions of scores for the above set of hypotheses.

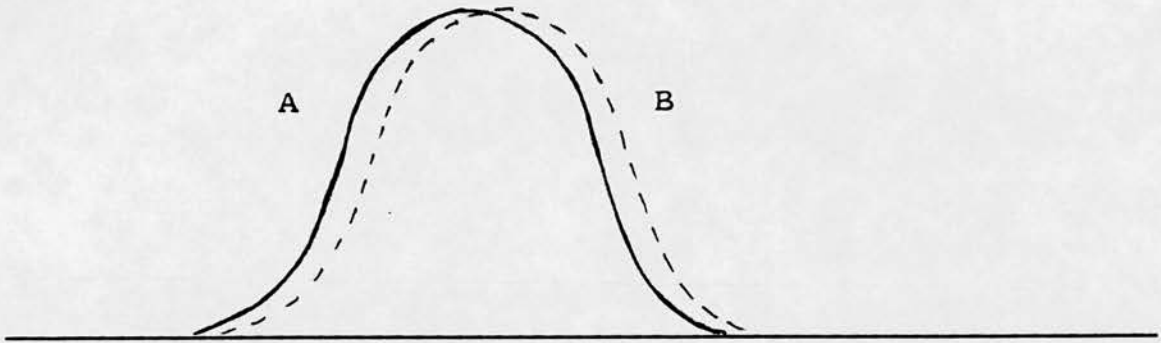
Fig. 5.5/



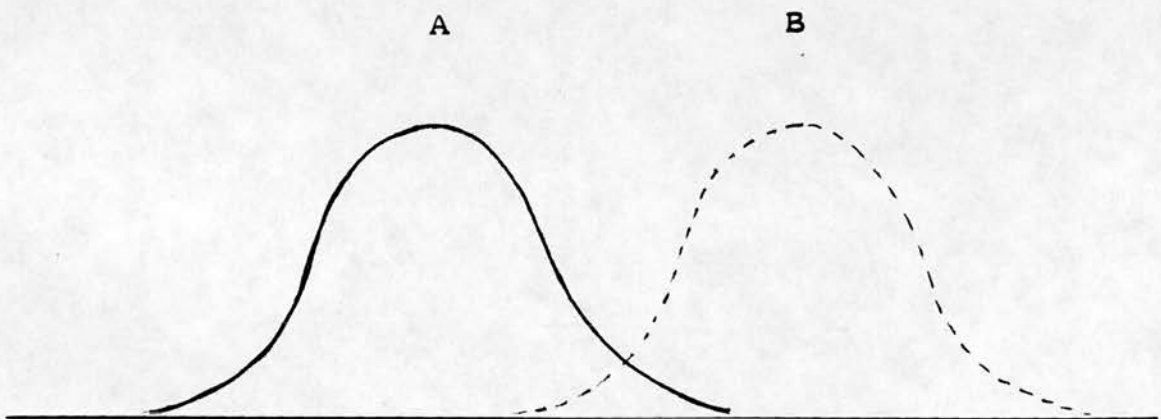
**Fig. 5.5** An illustration of a possible distribution of scores corresponding to hypothesis  $H_{01}$ .  
(A) performance of biology group on both tests;  
(B) performance of psychology group on both tests.



**Fig. 5.6** An illustration of a possible distribution of scores corresponding to hypothesis  $H_{a1}$ .  
(A) performance of one group on both tests;  
(B) performance of the other group on both tests.

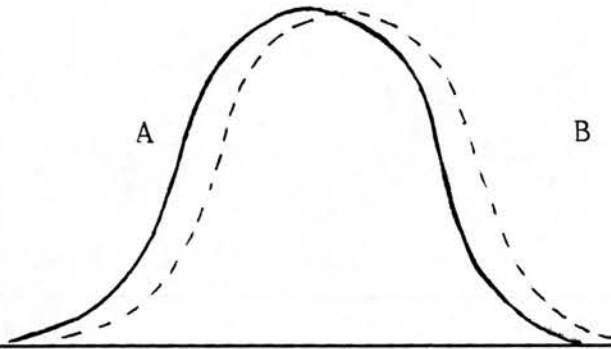


**Fig. 5.7** Illustration of a possible distribution of scores corresponding to hypothesis  $H_{02}$ .  
 (A) performance of both groups on the biology test;  
 (B) performance of both groups on the psychology test.

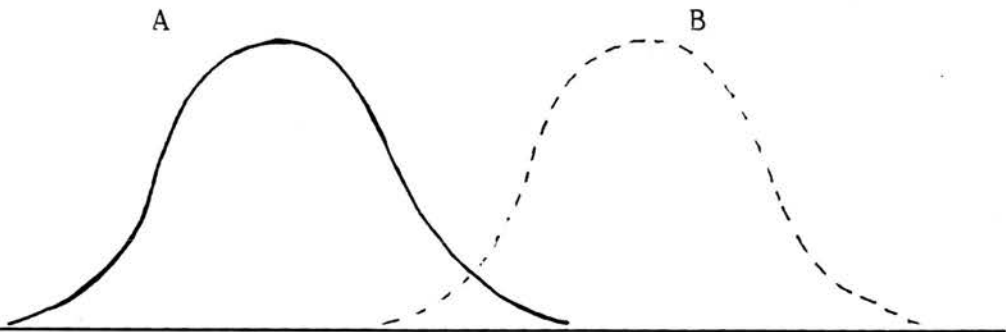


**Fig. 5.8** Illustration of a possible distribution of scores corresponding to hypothesis  $H_{a2}$ .  
 (A) performance of both groups on one test;  
 (B) performance of both groups on the other test.





**Fig. 5.9** Illustration of a possible distribution of scores corresponding to hypothesis  $H_{03}$  in which (A) would correspond to subjects from both groups reading texts of their own discipline, and (B) to subjects from both groups reading texts of the unrelated discipline.



**Fig.5.10** Illustration of a possible distribution of scores corresponding to hypothesis  $H_{a3}$  in which (A) would correspond to subjects reading a text of their own discipline, and (B) to subjects reading a text of the unrelated discipline.

The Two Way ANOVA would thus allow us to investigate the following different 'effects' on reading comprehension: the effect of Field, the effect of Text and the 'interaction' effect of Field X Text.

The data for the Two Way ANOVA calculations are presented in fig. 5.11.

	Biology test ("Green Islands...")	Psychology test ("National Study...")
Biology students	$n = 30$ $\sum X = 5.19$ $\sum X^2 = 31.95$ $\bar{X} = .17$	$n = 30$ $\sum X = -16.32$ $\sum X^2 = 12.37$ $\bar{X} = -.54$
Psychology students	$n = 30$ $\sum X = -5$ $\sum X^2 = 27.79$ $\bar{X} = -.1667$	$n = 30$ $\sum X = 16.60$ $\sum X^2 = 47.16$ $\bar{X} = .55$

Fig. 5.11 Data used for Two Way Analysis of Variance

A clearer picture of these data is provided by figures 5.12 to 5.15. Figure 5.12 corresponds to the results obtained by the biology group on both tests, and figure 5.13 to those of the psychology group. Figures 5.14 and 5.15 on the other hand, show the same results, but from a different perspective, i.e., considering each test at a time (first the "Green Islands..." test and then the "National Study ..." test). Since the reading scores are expressed in Z scores, the zero in the centre of the

horizontal axis corresponds to the overall mean (including both groups: biology students and psychology students). Thus, the graphs allow a comparison to be made between the overall mean in each test and that of the group to which each of the graphs corresponds. So, for example, in figure 5.12, the mean of the biology students in the "Green Islands ..." test is .17 above the overall mean while their mean in the "National Study ..." test falls to -.54 below the overall mean.

Fig. 5.12/

Biology group

(overall mean)

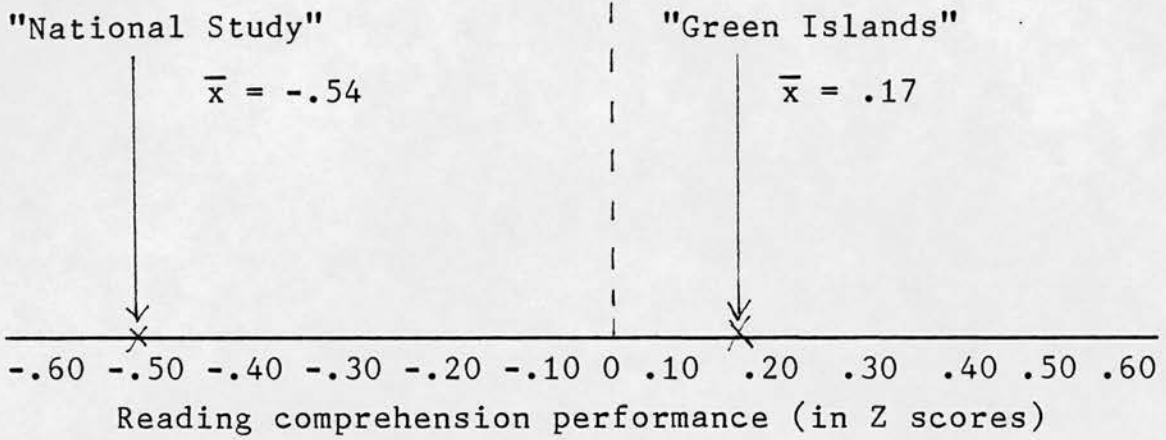


Fig. 5.12 Graphic representation of mean scores obtained by biology students in both tests.

Psychology group

(overall mean)

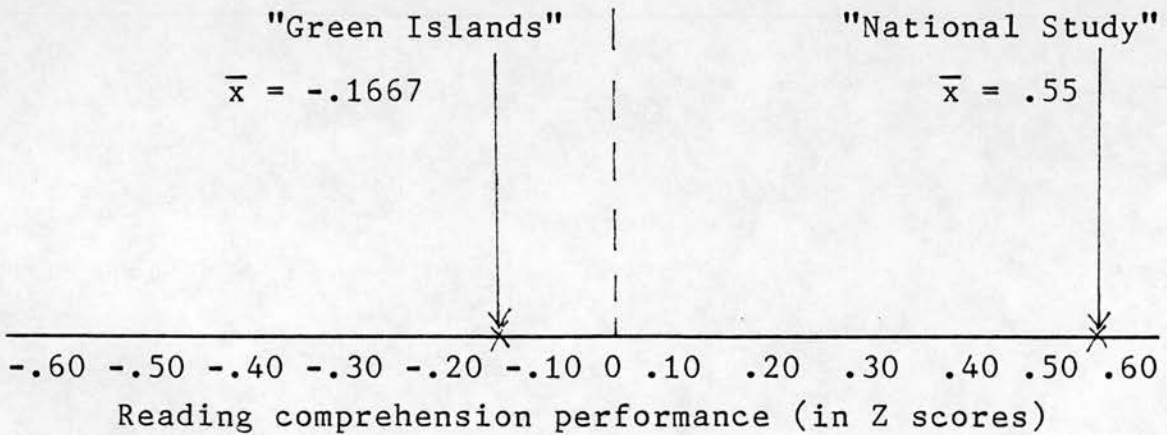
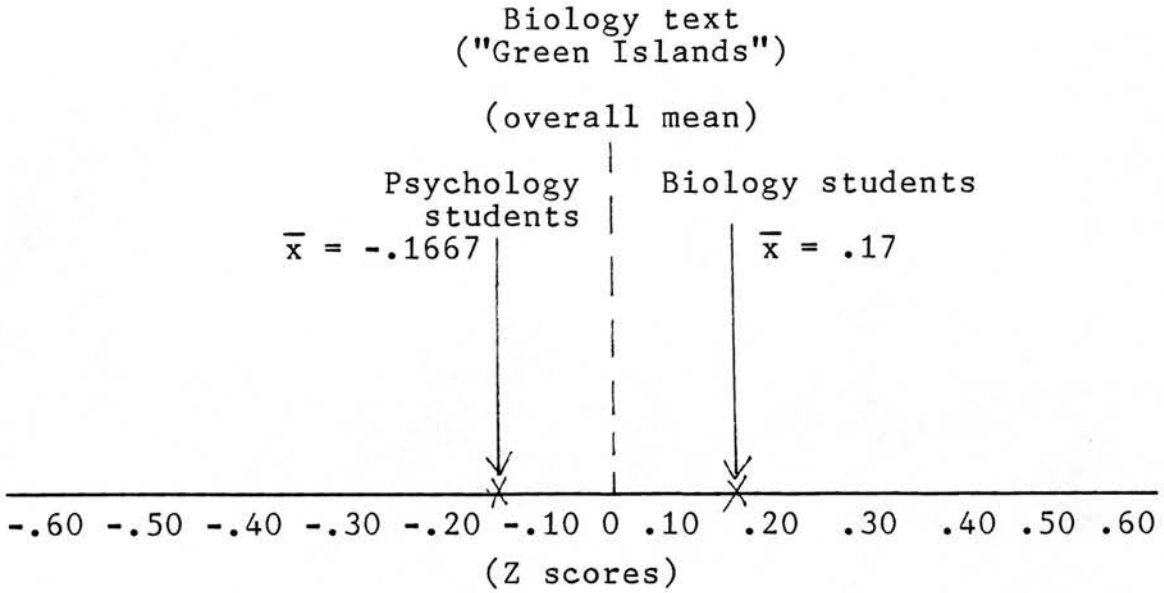
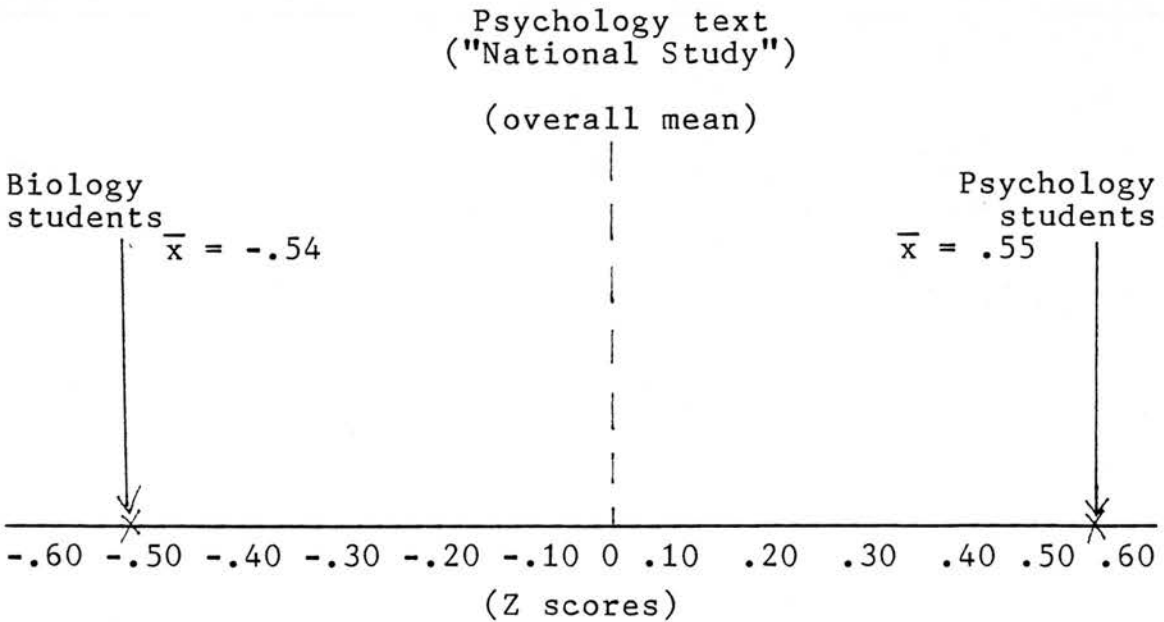


Fig. 5.13 Graphic representation of mean scores obtained by psychology students in both tests.

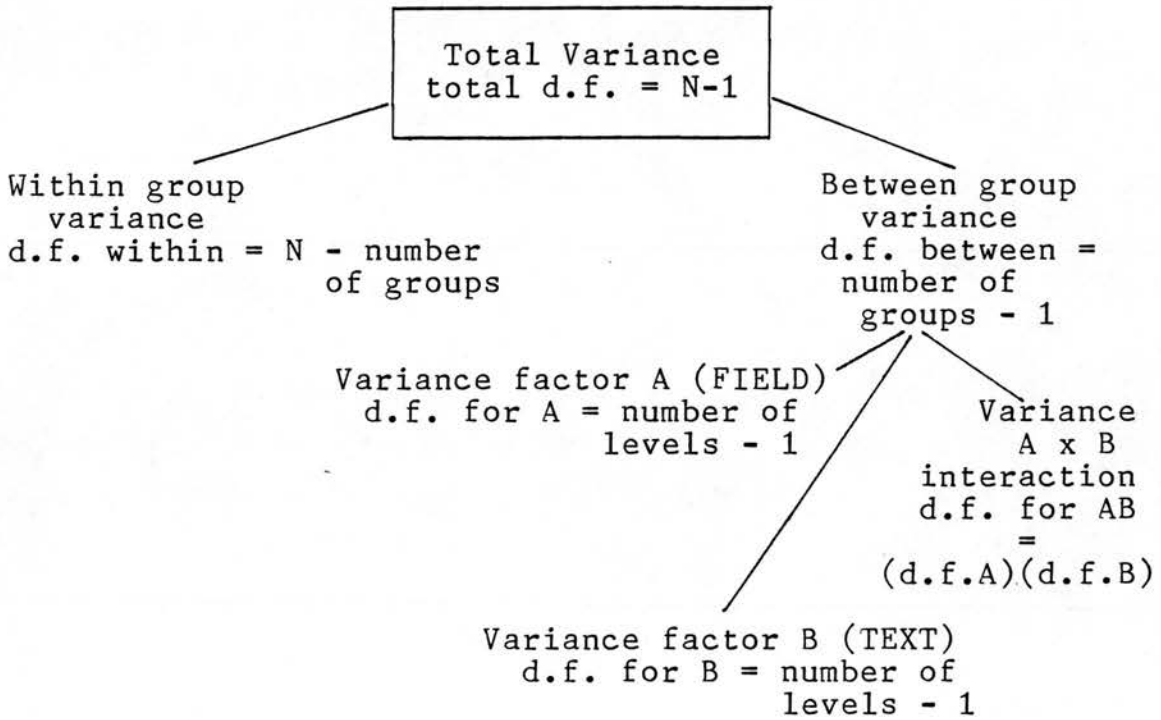


**Fig. 5.14** Graphic representation of mean scores obtained by both experimental groups on the biology test ("Green Islands ...").



**Fig. 5.15** Graphic representation of mean scores obtained by both experimental groups on the psychology test ("National Study ...").

The procedure to conduct the Analysis of Variance was the one suggested by Hatch and Farhady (1982: 153 - 158). Figures 5.16 and 5.17 show the way in which the degrees of freedom were obtained. The results of the analysis are displayed in table 5.5.



**Fig. 5.16** Degrees of freedom for each component in Two Way ANOVA.

d.f.	Total	=	120 - 1	=	119
d.f.	within	=	120 - 4	=	116
d.f.	for A	=	2 - 1	=	1
d.f.	for B	=	2 - 1	=	1
d.f.	for AB	=	1 x 1	=	1
(d.f.	between	=	4 - 1	=	3)

**Fig. 5.17** Degrees of freedom for each factor in the analysis.

**Table 5.5** ANOVA for differences in reading comprehension performance related to Field and Text factors<sup>1</sup>.

Source	Sum of squares	d.f	Mean squares (variance values)	F
Between groups	19.78	3		
Factor A (FIELD)	4.30	1	4.30	5.05*
Factor B (TEXT)	.002	1	.002	.0023 <sub>n.s</sub>
A X B	15.48	1	15.48	18.21**
Within groups	99.01	116	.85	
Total	118.79	119		

\* p<.05  
 \*\* p<.01

Hatch and Farhady (1982: 159-160) emphasize that the interpretation of the results of an ANOVA test "must focus on the interaction effect" if it is significant. This is what will be done in the case of the present analysis, since the interaction Field x Text was highly significant (p<.01) (cf., Rowntree, 1981: 118).

This interaction effect leads us to reject the third null hypothesis and to accept the alternative one. That is, that there is a significant difference in reading comprehension performance between reading a text of one's own field of study and reading a text unrelated to one's own field of study: the group of biology students performed better on the biology test and the group of psychology students performed better on the psychology

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<sup>1</sup>Appendix H contains the steps followed in the computation of the different sums of squares used in the ANOVA test.

test. This pattern of interaction can be clearly seen in figure 5.18.

This finding coincides with the underlying theory of the present study, i.e., the subjects' reading comprehension performance will be significantly better if text and field match (and significantly worse if they differ).

On the other hand, as far as the other effects in the ANOVA test are concerned (the so called 'main effects'), Hatch and Farhady (1982: 158) point out that "whenever we have a strong interaction effect we cannot consider the main effects as important. The interaction effect overrides the main effect." So, regarding factor A (Field), the fact that the overall performance of the group of psychology students was better than that of the group of biology students<sup>1</sup> is less important than the fact that both groups performed better when reading a text of their own field of studies. Regarding factor B (Text), the fact that this effect was not significant means that the texts, by themselves, did not have a significant effect on the performance of the groups.<sup>2</sup>

Taking into consideration the results of this analysis, it could be argued that in spite of the general

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<sup>1</sup>Table 5.5 shows that the effect of factor A (Field) exceeded the critical value of .05.

<sup>2</sup>This corroborates, on the other hand, that the choice of texts had been adequate (cf. section 4.1), i.e., neither text seems to have been significantly more difficult.



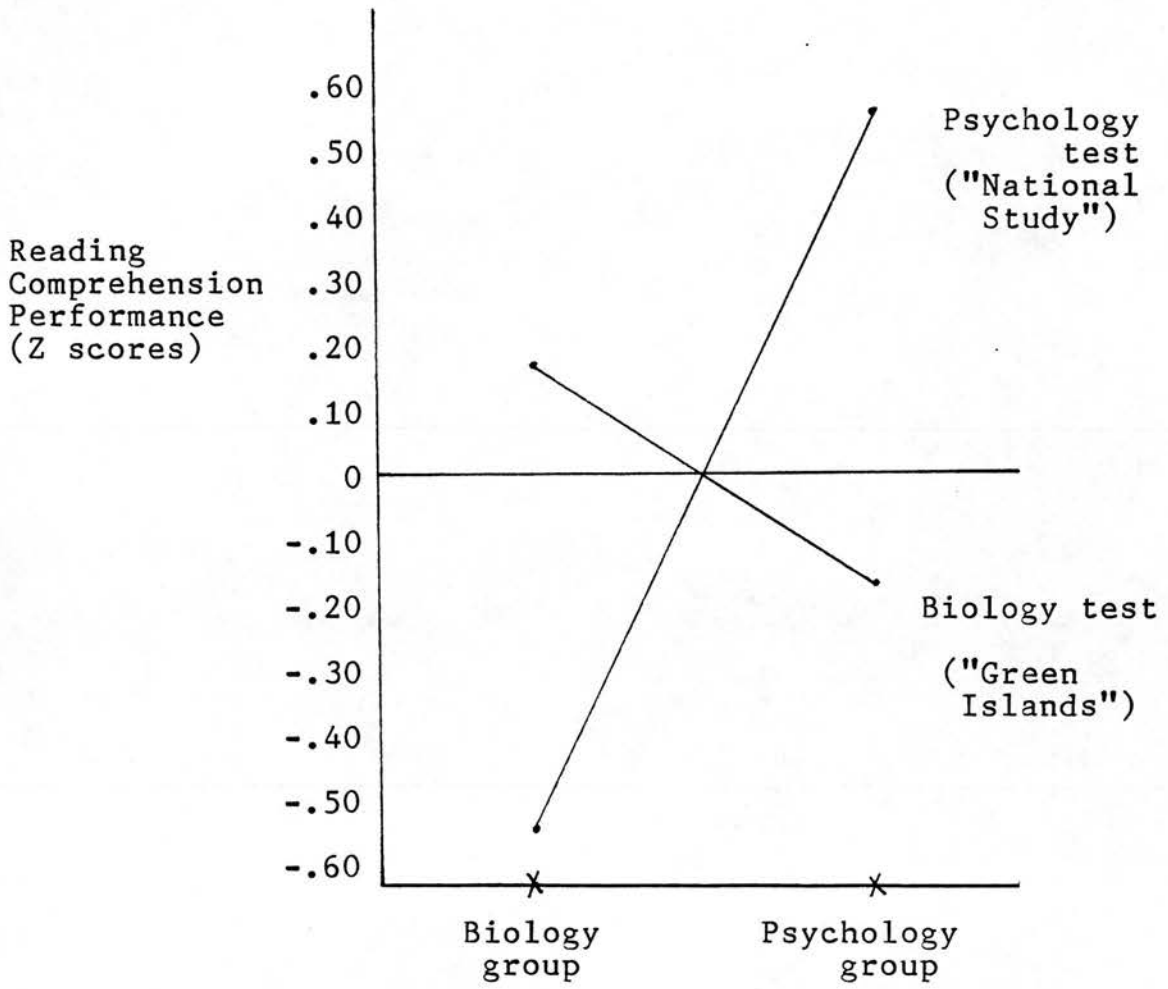


Fig. 5.18 Pattern of interaction between the two independent variables 'Field' and 'Text' (mean scores).

low level of proficiency in L2 (as measured by the ELBA test) when the subjects read a topic on their own discipline, the positive influence of background knowledge was evident and significant.

In the next chapter we shall offer an interpretative (i.e., qualitative) analysis of the data. This analysis consists of a search for surface evidence of processes through which background knowledge affects reading comprehension.

CHAPTER 6

Interpretative Analysis

## Chapter 6.

### Interpretative Analysis

#### 6.1 Introduction and General Plan for the Analysis

As has been stated earlier in this work, the present interpretative analysis was carried out with the purpose of locating and discussing, on the basis of a schema theoretic approach, specific evidence of the influence of prior knowledge observable in a situation in which the L2 reader is confronted with authentic texts of an expository nature.

The four reading comprehension phenomena on which the analysis is centered, and which were discussed in chapter 2, i.e., **prediction, selection, elaboration, and tolerance of vagueness** were profusely represented in the summaries produced by the experimental subjects. They appear to have occurred as the views presented in that chapter would suggest, i.e., intermingled in seemingly countless combinations, the occurrence of one leading to the occurrence of another.

It is pertinent to remember that the corpus submitted to analysis in the present study stands in contrast to numerous well known studies in which the analysis is based on specifically created and usually short texts). (Collis, Brown and Larkin, 1980; Rumelhart, 1984; Carrell, 1984, 1987). The texts which served as input for some of these experiments allow us to make clear and definite observations. The creation and utilization of such texts may in

fact be regarded as "tricks to get people to bring different schemata into play when reading text" (Anderson, 1977: 7). In contrast, as should be expected in any qualitative approach in which 'rich' and 'deep' data undergo an analysis, the corpus of the present study presented considerable obstacles in the way of its systematic handling, and some measures to counterbalance this problem were necessary. The role of previous knowledge is less obvious in our data than it is in those cases in which specially constructed texts have been used. However, a thorough scrutiny reveals the expected surface forms that support what the statistical analysis had indicated: differences in background knowledge (represented in this study by the subjects' field of specialization), significantly influence the interpretations provided by the two groups.

In the present chapter, specific instances of background knowledge influence will be discussed according to the following general plan:

First, some observations are made regarding a required internal model, as well as regarding discrepancies from such<sup>a</sup> model found in the corpus. Possible schemata involved in highly frequent interpretations are proposed.

Secondly, a series of brief examples are given which illustrate how a number of textual items are differently dealt with by the two experimental groups.

Thirdly, a more detailed description of the process that leads the specialist to perform better in his own discipline is attempted by means of the presentation of annotated examples. In these annotated examples special reference is made to the relationships between the four schema directed phenomena of our concern.

This plan will be followed first for the analysis of the psychology summaries (section 6.4) and then for the analysis of the biology summaries (section 6.5).

#### 6.1.1 The Focus of Attention

As has already been mentioned, the extension and depth of the corpus offered difficulties to the attainment of an acceptable degree of stringency in the analysis. In order to counteract such difficulties, a decision was taken that evidence of the four phenomena of our concern was to be sought mainly in relation to one of the central ideas in each of the two texts. The focus of attention would thus be narrowed.

The focal 'idea units' chosen from each of the two reading texts on which attention would be concentrated were, for the psychology text (i.e., "National Study..."):

The subjects of the study presented in this text were clinical psychologists. (See fig. 6.1 which corresponds to paragraph 3 of the original text, and contains the idea in question. Appendix D contains the complete

original text in which the same information reappears in various forms).

Method

Prospective subjects were 675 members from Division 12 (Clinical Psychology) selected randomly from the 1980 American Psychological Association Membership Register.

**Fig. 6.1** Paragraph 3 of the original psychology text ("National Study...").

The focal idea unit chosen from the biology text ("Green Islands...") was:

Groups of trees (Betula pubescens tortuosa) survive near ant nests while trees growing further away are defoliated and die. (See fig. 6.2 which contains the part of paragraph 1 of the original text in which the idea in question is introduced). The complete original text can be consulted in Appendix D.

Laine and Nimiela (1980) suggested that the "green islands" of Betula pubescens tortuosa surrounding nest mounds of Formica aquilonia in Finnish Lapland are caused by the ants killing the larvae of Oporinia autumnata on trees near the nests during the outbreaks of this geometrid. They thus prevent defoliation of the trees near the nest which are left alive while others are defoliated and killed.

**Fig. 6.2** Paragraph 1 of the original biology text ("Green Islands...").

Before proceeding with the interpretative analysis proper (sections 6.4 and 6.5), some of Bartlett's and Tannen's notions will be recalled (section 6.2) since these represent a fundamental frame of reference for the present study. Also, before discussing the data obtained from the two groups, a section will be included (6.3) in which general relationships between the four reading comprehension phenomena are proposed, and the conspicuousness of each in the corpus is discussed.

## 6.2 Bartlett's and Tannen's categorization of Transformations in Recall

### 6.2.1 Bartlett's Classification

As was pointed out in a previous chapter, Bartlett's work on recall (1932) has had an important influence on the wave of recent constructive approaches to the study of comprehension (Rumelhart, 1980; 1984; Spiro, 1977, 1980; Chafe, 1977; Tannen, 1979; Anderson and Pearson, 1984).

In ensuing sections of this chapter, Bartlett's categories of transformations in recall will certainly be a valuable frame of reference for the discussion of the reading comprehension mechanisms that will be treated in relation to features of the corpus.

Observing how his subjects rendered notably



altered versions of stories presented to them, Bartlett explains such changes by invoking the idea of schemata or mental frameworks into which his subjects seemed to have incorporated the new facts and ideas contained in the narratives. The mechanisms through which modifications seemed to have taken effect are listed by Bartlett:

(i) By a series of omissions, (ii) by the provision of links between one part of the story and another, and of reasons for some of the occurrences; that is to say, by continued rationalization; (iii) by the transformation of minor detail.

Although Bartlett's research is focused on recall and the present research refers to encoding<sup>1</sup> of information, it is relevant to refer to the above enumerated mechanisms on the assumption that "it is likely that most distortions occur because prior knowledge influences the way in which stimulus material is comprehended and stored in memory" (Eysenck, 1984:127).

If the interpretative analysis of the corpus were to be carried out only on the basis of Bartlett's classification, the questions for such an analysis would be:

What is being omitted? (and how can omissions be explained?); what manifestations can be found of ration-

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<sup>1</sup>Here and in subsequent cases, the term 'encode' is used as is traditional in cognitive psychology and not as some psycholinguists like F. Smith have used it, i.e., transferring information into the oral or written code.

alization? what is being transformed? (and for what purposes?).

Bartlett's classification however, as has been pointed out, will only be taken as a basic and most general frame of reference, a starting point for the performance of the interpretative analysis to be presented in this chapter.

#### 6.2.2. Tannen's Taxonomy. Types of Evidence of Structures of Expectations

As has also been mentioned, Tannen's taxonomy of surface evidence of 'structures of expectations' (1979), was another important source of inspiration for the present interpretative analysis (see General Introduction, p. 5).

The categories in Tannen's taxonomy that most definitely coincide with the aspects that will be emphasized in the present analysis are: 'omission', 'inexact statements', 'generalization', 'inference', 'interpretation', 'incorrect statements', 'addition', and 'false starts' (Tannen, 1979:167-177). Tannen's remaining categories would have very limited application, or would not apply at all, due mainly to the differences between her data and the data that will be analysed here, i.e., oral reports on a film in the case of Tannen's research, versus summaries of a scientific article in the present study.

The following are those of Tannen's categories that seem closer to the framework of the present interpretative analysis. Though this will not be based on these categories but on the phenomena that were discussed in chapter 2 that is, **prediction, selection, elaboration, and tolerance of vagueness**, Tannen's description might be enlightening at some point of the discussion.

#### Omission

"A narrator cannot recall every detail. Some things are necessarily omitted. However, omissions can indicate expectations, especially when contrasted with what is included by other speakers..."<sup>1</sup>

#### Inexact statements

"Inexact statements...relate to what is in fact shown in the film, but they do not report events precisely as they occurred. Rather, they are fuzzy or slightly altered..."

#### Generalization

"Closely related to inexact statements is the process of generalization or multiplication by which one object or action is reported as more than one... a single instance is understood to represent multiple instances. It is furthermore intriguing to speculate that the phenomenon supports Bartlett's hypothesis of constructive

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<sup>1</sup>In the film watched by Tannen's subjects, a man passes with a goat. All American subjects reporting the event referred to the goat but only 3 of the 14 Greeks mentioned it. According to Tannen the goat is reportable in the Americans' version because it was unexpected -the Greeks' omission on the other hand, reveals something about their 'structures of expectations'.

memory, by which memory is seen as a process of storing individual images and recalling them as representative of numerous instances, based on structures of expectations..."

#### Inferences

Inferences are statements which could not be known simply from observation of the film, as for example when subjects report character's thoughts, motivations and feelings... In general speakers state inferences as categorically as they state things they actually saw. In other words, they believe they saw what they expected to have been the case..."

#### Interpretation

"Interpretation is similar to evaluation and inference, but it is a bit further removed from the events depicted in the film... Interpretive naming is the process by which a name is used for a character or object which represents more information than the film presented... if the speaker calls the man who is picking pears simply 'a man' she is not imposing any more information about him than that which is obvious to anyone. However, if she calls him a 'farmer' or 'worker' she is imposing the knowledge of the world and expectations about picking activities and the people who engage in fruit picking..."

#### Incorrect statements

"Incorrect statements represent false recollections. For example, one Greek subject refers to the boy among the threesome who is the tallest. In fact he is not the tallest. Her incorrect recall seems to reflect her preconception about leaders..."

#### Addition

"The most extreme evidence of a speaker's expectations lies in the process of addition: the mention of a character or episode that was not in the film at all..."

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<sup>1</sup>Tannen's subjects were young American and Greek women.

False starts<sup>1</sup>

"There are a number of types of false starts; the most significant in terms of discovering frames is a type I have dubbed "contentful". That is an instance of a statement being made or begun and then immediately repudiated or changed..."

6.3 Initial Observations Regarding the Occurrence of Prediction, Selection, Elaboration and Tolerance OF Vagueness in the Corpus

The diagram in figure 6.3 is an attempt to depict the pattern of interrelationships among the schema directed phenomena of **prediction, selection, elaboration, and tolerance of vagueness** which is assumed to have occurred during the production of a great number of instances in the corpus. The product of these interrelated operations constitutes the final mental representation achieved by the reader, and is assumed to be expressed in the summaries.

Fig. 6.3/

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<sup>1</sup>Though this category is coined by Tannen to refer to hesitations in oral productions, it may be useful in the interpretation of some cases of crossing out of words or phrases that were found in the corpus.

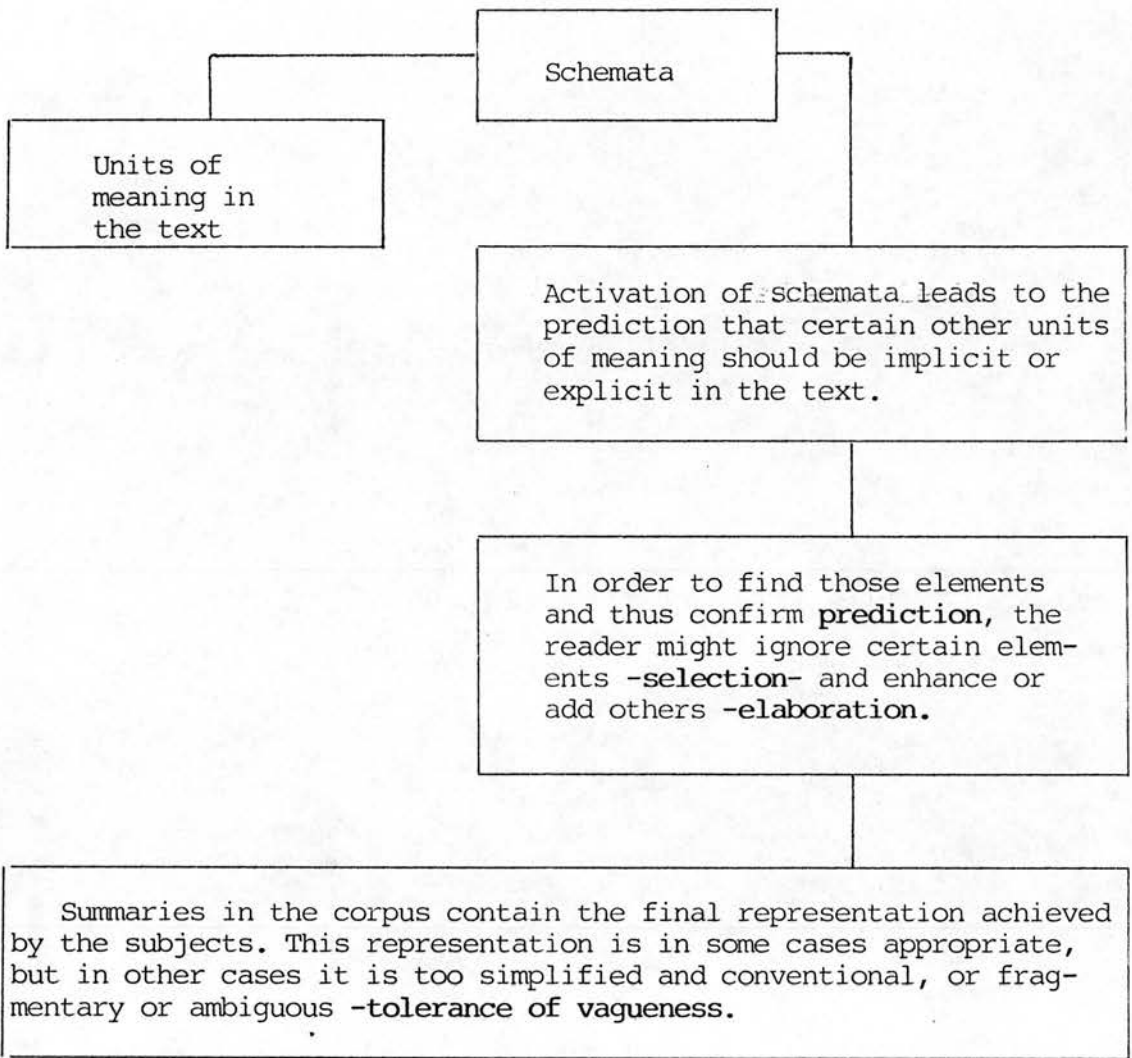


Fig. 6.3 Proposed pattern of interaction among the four phenomena discussed, and resultant summary production.

### 6.3.1 Conspicuousness of These Phenomena in the Corpus

There are differences regarding the conspicuousness of each of these four phenomena in the corpus.

Elaboration is actually the most overt, most salient of the four.

When the summaries were compared with the original text, cases of **elaboration**, i.e., of obvious enhancement or addition of information were not difficult to find. Elaborations were present in a great number of summaries, more evidently so in the cases where the subjects were performing poorly as a consequence of what appeared to be an equivocal initial hypothesis, and were less evident in those cases where the reader remained closer to the original meaning.

In the following example (S11), it can be seen how the roles of the psychologists and patients (or experimental subjects) are made to conform to the reader's own expectations. It seems that, in accordance with Bartlett's words (Bartlett, 1932:193-194), S11 has formed a general impression of the content of the article and furnishes the details which he builds from previous knowledge.

"...El estudio examina los efectos del estatus socioeconómico bajo, y cómo los psicólogos clínicos evalúan esos efectos.

Método.

Fueron 675 miembros de una clínica de psicología. Una historia fué preparada para tres clases sociales donde cada participante recibió una versión del caso para responder a un cuestionario. Los psicólogos leyeron el caso (historia) primero para que los participantes contestaran un cuestionario demográfico..."

"...The study examines the effects of low socioeconomic status and how clinical psychologists evaluate these effects.

Method.

There were 675 members of a psychology clinic.

One history<sup>1</sup> was prepared for three social classes where each participant received one version of the case to answer a questionnaire. The psychologists read the case (history) first so that the participants would answer a demographic questionnaire.

In the example above, it can be observed how the psychologists are given an active or leading role: they evaluate the effects of socioeconomic status, they prepare tests, they read (possibly aloud) to patients -or experimental subjects. Patients, on the other hand, are seen in a rather passive role: they are divided into groups according to their social class, they receive the tests and fill out the questionnaire. It is worth noting how the introduction of the conjunction 'y' ('and') in line 2, the preposition 'para' ('for') in line 5, and the prepositional phrase 'para que' ('so that') in line 10, represent convenient links which allow the coexistence of textual information with the reader's own expectations (represented in the clauses these items introduce).

**Prediction, selection, and tolerance of vagueness** as defined in chapter 2 of this thesis, can be said to be inferable from the corpus, but they undoubtedly have a much less objective status than **elaboration**.

Regarding prominence in the corpus, cases of

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<sup>1</sup>Here, as well as 4 lines below, this subject seems to be interpreting 'history' as 'story'. The Spanish spelling does not differentiate between the two meanings.



selection can be said to come next to elaboration. We can quite easily see what the subject has 'decided' to include in the summary. On the other hand, however, we cannot be certain what the reasons for leaving something out might have been. We may hypothesize that a subject leaves something out because:

- a) He realizes it is not important,
- b) he does not realize it is important.

Both cases, a) and b) can be seen as schema directed operations. In a) appropriate knowledge allows the subject to eliminate what is not contextually indispensable, whereas, in case b) it is a lack of appropriate knowledge that leads him to overlook the relevance of a piece of textual information that was intended as relevant by the writer.<sup>1</sup>

In the case of L2 reading something may also be left out of the summary not as a result of prior knowledge of topic influencing comprehension, but as an avoidance strategy<sup>2</sup> (with varying levels of awareness), consisting in not dealing with linguistically unfamiliar items.

Regarding **tolerance of vagueness**, we may also infer that the subject fully or partially realizes that

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<sup>1</sup>See for example all cases regarding the treatment of Latin names and of the term 'defoliation' in 6.5.2.1 and 6.5.2.2, and also S46 in 6.4.3.2.

<sup>2</sup>Cf. Corder, 1981: 103-106.

his comprehension and/or his writing of the summary are inconsistent, ambiguous or fragmentary, but, on the available evidence, that is, on the basis of the summaries alone, we cannot be certain to what extent the subject is actually tolerating a vague representation, holding precision of meaning in abeyance. It may be the case that for him, his interpretation of the text is not inconsistent, ambiguous, nor fragmentary.<sup>1</sup>

The least observable phenomenon in the data provided by the summaries is **prediction**. We may only hypothesize that the prediction strategy was employed, and that confirmatory or disconfirmatory cues were found by the subject. We may in fact hypothesize, on the basis of certain mistakes in the summaries, that an equivocal hypothesis was assumed by the subject, and our supposition may be correct, but the occurrence of predictions is definitely only inferable from the corpus rather than observable. Such would be the case of S11 presented above, in which one may quite safely assume that the subject's elaborations stem from an equivocal hypothesis about the text topic, namely, that it will describe a situation in which psychologists study (test, classify, diagnose) patients.

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<sup>1</sup>See for example the treatment of the term 'psychologists' in section 6.4.2.3.

#### 6.4 Analysis of Summaries of the Psychology Text.

##### 6.4.1 Required Internal Model and Some Important Discrepancies Observed.

The ensuing discussion is, to a great extent, based on the assumption that concomitantly with the correct identification of the 'idea unit' on which the analysis is focused, i.e., that the subjects of the experiment presented in the article were clinical psychologists, a proficient reader would need to reach, at some point in his reading, the following mental model of the situation depicted in the psychology text:

(i) The article reports an experimental study in which (ii) a sample of clinical psychologists (selected from the APA register) were the subjects of the experiment. (iii) These psychologists were required (among other things) to give their clinical judgement on hypothetical patients of different social classes whose prefabricated case histories were presented to them.

After a thorough scrutiny of the summaries, the following general aspects regarding the enumerated points were evident in a great number of summaries:

(i) The fact that the authors of the article are reporting an experiment did not represent any problems for our subjects. The issue seems to have matched perfectly with knowledge derived from their previous experience. One hun-

dred per cent of the subjects got this idea right. They no doubt had the necessary 'content' and 'formal' schemata (Carrell, 1984; 1987) to assimilate this information, that is, they were familiar with the situation of reporting experiments as well as with the particular formal characteristics of articles reporting experiments in specialized journals. In the summarization protocols expressions revealing that the reader realizes the text will refer to an experiment, proliferate:

(S1) "Este estudio sellevó a cabo con pacientes de estratos socioeconómicos bajos comparándolos con pacientes de clase media..."

This study was carried out with patients of low socioeconomic strata comparing them with middle class patients..."<sup>1</sup>

(S5) "La investigación pretende mostrar...los efectos del estatus económico de los clientes sobre los juicios de ..."

The investigation attempts to show the effects of clients' economic status on the judgement of ..."

(ii) In contrast, the circumstance that it was psychologists who were the subjects of the experiment, resulted highly unacceptable to most of our readers in spite of the transparency of the sentence in which this information is presented in the text (see figure 6.4).

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<sup>1</sup>This and subsequent translations from the original summaries are mine.

#### Method

Prospective subjects were 675 members from Division 12 (Clinical Psychology) selected randomly from the 1980 American Psychological Association Membership Register. Responses were received from 36% (n=242). Another sample was drawn from the same register to determine if those who elected to participate were representative of the original population, and no significant differences were found on the demographic variables.

Fig. 6.4 Paragraph 3 of the original psychology text ("National Study...").

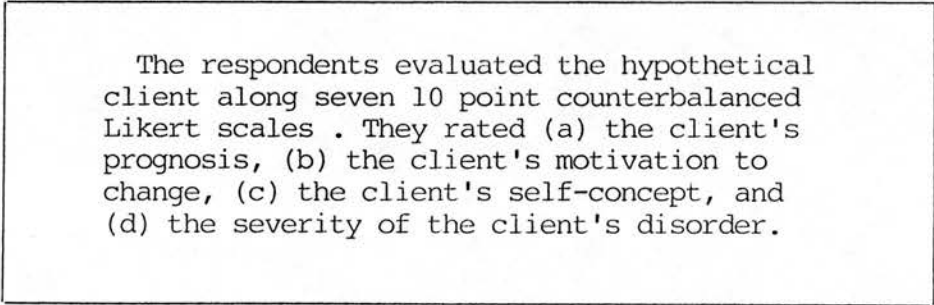
Significantly, out of 60 subjects, only 12 (all of them psychology students) discerned this idea clearly. It seems to be the case that this idea caused so many problems because it conflicts with the previous experience and expectations of most of the subjects. In other words, a very considerable number of readers seem to have lacked the appropriate knowledge structure on which to map the input the text offered, that is, professional psychologists in the role of experimental subjects.

The fact that 12 psychology students did comprehend this piece of information leads one to suppose that due to the previous experience of these subjects in their field of studies, they had a somewhat more 'sophisticated' view of the possible role of psychologists in a research study (i.e., that psychologists need not necessarily play the role of experimenters but may in fact be the subjects of a study) whereas none of the biology students seem to

have been able to consider such a possibility.

According to the theoretical views that support the present analysis (section 1.5.1) we may claim, following Norman and Bobrow, that the processing limitations observed in this case are attributable to 'memory-data limits', that is, that the bottleneck resulted from "the quality of the representation in the stored paradigm" (Norman and Bobrow, 1975: 47).

Similarly, regarding point (iii) above, the issue of the 'hypothetical clients' was certainly problematic. Evaluating a hypothetical client on the basis of a pre-fabricated case history seems to have been a very remote possibility, and was very rarely considered in spite of the highly transparent term 'hypothetical' (Spanish: hipotético), with which the 'clients' are qualified in the article (see fig. 6.5 which contains the relevant fragment of the original).



The respondents evaluated the hypothetical client along seven 10 point counterbalanced Likert scales . They rated (a) the client's prognosis, (b) the client's motivation to change, (c) the client's self-concept, and (d) the severity of the client's disorder.

**Fig. 6.5** Excerpt from paragraph 7 of the original text in which the idea of 'hypothetical clients' is introduced.

On the other hand, the frequency of the terms 'psychologists', 'client' and 'clients' most probably, and quite understandably, led readers to activate a certain **clinical study** schema in which such a pair has a typical distribution: it is real clients or patients that are subjects, not 'hypothetical clients'.

#### 6.4.1.1 Possible Schemata Involved

In this section, general schemata will be propounded onto which subjects seem to have mapped the pieces of information discussed above. These schemata would be:

- (i) an **experimental study** schema,
- (ii) a **clinical study** schema

(or a combination of both).

Figures 6.6 and 6.7 are an attempt to represent these schemata graphically.

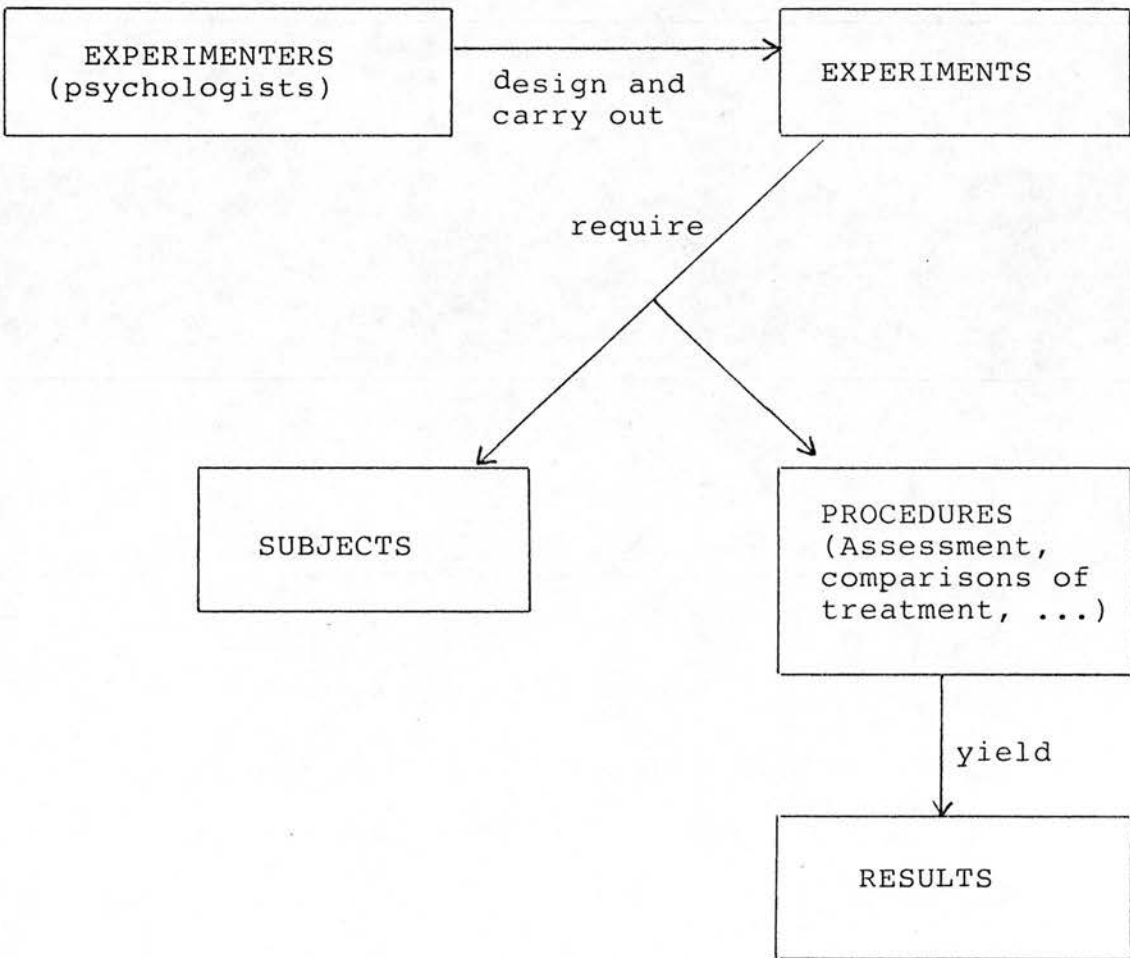
One has to be fully aware though, that any attempt to represent stored knowledge tends to become too *sui generis*<sup>1</sup>. Certainly, in the present case our diagrams are simplified. The 'actual' schemata involved in the comprehension of the text should no doubt contain subordinate and collateral elements (links, nodes, pointers, etc.) which have not been considered here.

By propounding these hypothetical schemata it is

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<sup>1</sup>Actually, schema representations in extant literature tend to be as varied as the imaginations of their authors (cf. Mackworth, 1987: 443-444).

presumed that many subjects actually chose appropriate schemata (e.g., the **experimental study** schema) but met serious obstacles when they tried to assign elements in the passage to variables or 'slots' in their schema. (Cf. Anderson and Pearson's second type of inferences in section 2.4.2).



**Fig. 6.6** The experimental study schema



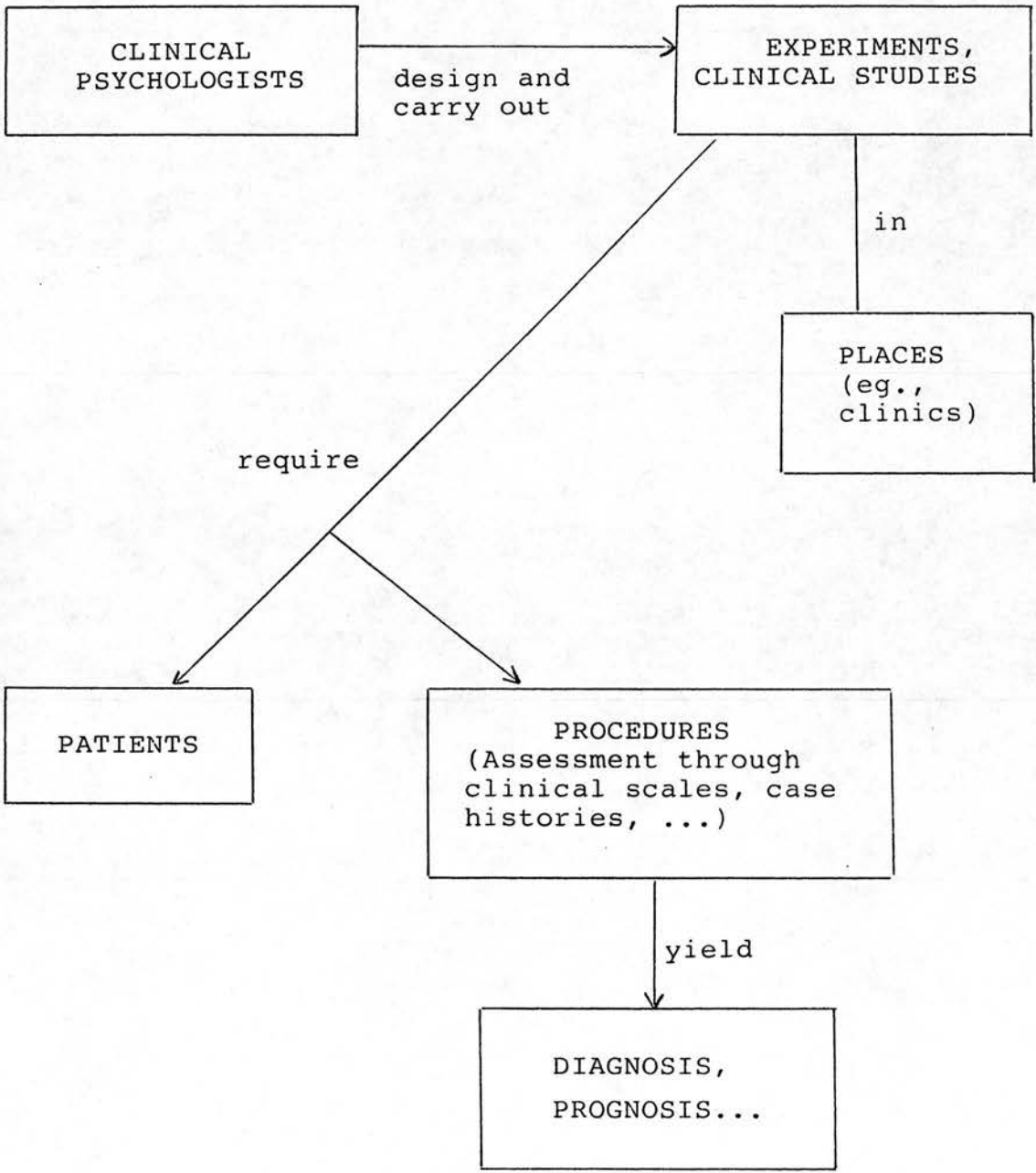


Fig. 6.7 The clinical study schema

It might finally be pertinent to indicate that there were a few cases in which subjects seem to have in fact modified the restrictions imposed by their previous schemata so that information in the text could be bound to such existing schemata. On the basis provided by the manuscript versions of these subjects' summaries (which allow the observation of modifications such as those in S46 and S57 below) we may hypothesize that the reading of the text motivated the type of learning that Rumelhart and Norman call 'tuning':

Learning through tuning... involves actual changes in the very categories we use for interpreting new information... these categories presumably undergo continual tuning or minor modification to bring them more in congruence with the functional demands placed on these categories. (Rumelhart and Norman, 1979: 39).

So, S46 and S57 seem to have modified their initial interpretation of textual content by 'tuning':

S46 changes from:

"A todos se les envió un caso clínico" (all were sent a clinical case), to: "A todos se les envió el mismo caso clínico" (all were sent the same clinical case);

S57 changes from:

"Tres variantes de clase social de la historia de caso fueron preparadas" (three variations of social class of the case history were prepared), to: "Tres variantes de clase social de la misma historia de caso fueron preparadas" (three variations of social class of the same case history were prepared).

6.4.2. A Series of Examples Illustrating the Proposed Schema Directed Differences in Text Interpretations.

The following section presents a series of examples of appropriate and inappropriate interpretation of the information contained in the text. The underlying assumption is that the observed differences in text interpretation are attributable to the effect of adequate or inadequate background knowledge of the two experimental groups.

All the examples selected to be included in this series regard vocabulary items though the corpus would have provided items from other levels, for instance, grammatical forms which could have been submitted to a similar analysis.

6.4.2.1 'Clinical psychologists' interpreted as 'clinics of psychology'

The corpus provides convincing evidence that the **clinical study** schema which apparently was employed by a great number of subjects, was activated when the phrase 'clinical psychologists' was interpreted as 'clinics of psychology'. This transformation allowed the instantiation of the PLACE variable in an existent schema (cf. fig. 6.7)).

Once activated, the **clinical study** schema would be used for the interpretation of subsequent parts of the text.

Within the frame of the present analysis it is worth noting that out of 21 cases in which this operation took place (i.e., in which 'clinical psychologists' was rendered as 'clinics of psychology'), 16 came from biology students and 5 from the group of psychology students ( $X^2 = 4.76$ ,  $p < .05$ ).<sup>1</sup>

The data thus supports the assumption that the unmatched prior knowledge of both groups determines significant differences in text interpretation: among the group of biology students 'clinic' seems to have been a necessary location for psychological studies to take place whereas such an assumption was not shared by the psychology students.

In the following examples it can be observed how the initial interpretation of 'clinical psychologists' as 'clinics of psychology' causes that subsequent information be made to conform to the already activated **clinical study** schema:

(S49) "Es un artículo de una revista la cual trata de un estudio nacional de los efectos de personas en un estado socioeconómico en una clínica de psicólogos profesionales. Se escribe un reportaje acerca de los estudios realiza-

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<sup>1</sup>It should be noted here that in this and subsequent examples of this series chi square analyses were performed considering the cases in which the phenomenon occurs; all those cases in which no account is found of the item are not considered since in doing so the significance of the differences would be unduly heightened.

dos en esa clínica y los comparan con otros estudios que hicieron otros investigadores... se tomaron 3 categorías... psicosis, neurosis y personalidad desordenada y a estas clases de personas se les aplica una psicoterapia.

It is a journal article about a national study on the effects of persons of a socioeconomic status in a clinic of professional psychologists. A report is written about the studies carried out in that clinic and these studies are compared with other studies carried out by other researchers... 3 categories were taken... psychosis, neurosis and personality disorders and these kinds of persons were given psychotherapy.

- (S10) "Estudio Nacional de los Efectos de Reglas Socioeconómicas de Clientes en Clínicas Psicológicas Profesionales.  
Estudios previos muestran que clientes que acuden a clínicas psicológicas no son evaluados adecuadamente, y son pocos los efectuados."

National Study of the Effects of Socioeconomic Rules of Clients in Professional Psychological Clinics.

Previous studies show that the clients that attend psychological clinics are not properly evaluated, and there are few studies performed

- (S7) Estudio Nacional de los Efectos Socioeconómicos en Clínicas de Psicología..  
El presente estudio trata del efecto de los clientes del SES y cómo los psicólogos con experiencia moderan estos efectos. Se seleccionaron clientes de acuerdo a su clase... Cada clase recibió varios exámenes... Los psicólogos también obtuvieron datos personales como sexo, raza, experiencia en la clínica y clase social.

National Study of the Socieconomic Effects in Psychology Clinics.

The present study deals with the effect of the SES clients and with how experienced psychologists moderate these effects. Clients were selected according to their class... Each class got several exams... The psychologists also obtained personal data such as sex, race, experience in the clinic and social class.

#### 6.4.2.2 Erroneous Rendering of 'Case History'

Evidence of background knowledge influencing the correct or incorrect interpretations of the text was found with reference to the noun phrase 'case history'. Erroneous rendering of this item such as 'historia' (history or story), or 'caso histórico' (historic case), may reveal or lead to vague or unintegrated representations of related portions of the text. On the other hand, when 'case history' is correctly identified as 'historia de caso', this appropriate recognition seems to aid comprehension of the related text.

The differences in the interpretation of such a seemingly straightforward item between the two experimental groups are noteworthy: 12 psychology students identified it correctly while only one biology student did so; on the other hand, 10 biology and 7 psychology students misinterpreted this item<sup>1</sup>. ( $\chi^2 = 5.52, p < 0.05$ ).

The following list illustrates cases of correct (psychology students: S57, S39 and S20) and incorrect (biology students S1, S2 and S4) interpretations of the item in question. It will be noticed that incorrect interpretations tend to occur within an incoherent or ungrammatical environment.

From the point of view of the present analysis this fact would seem to indicate a vague representation

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<sup>1</sup>The remaining 30 subjects do not give any account of the item.

of the situation depicted in the text and would certainly require a significant degree of tolerance of vagueness.

S57 "Tres variantes de clase social de la misma<sup>1</sup> historia de caso fueron preparadas. El mismo cliente fué identificado a) como un artista comercial... b) como encargado en jefe operador con educación de high school (preparatoria) o ... c) como un desempleado con educación del 7o grado. Cada respondente (psicólogo clínico) recibió una versión de la historia de caso en carta cerrada con instrucciones detalladas para contestar..."

Three social class variations of the same case history were prepared. The same client was identified as a commercial artist, b) as a head operator with high school instruction or ... c) as an unemployed person with 7 years of instruction. Each respondent (clinical psychologist) received one version of the case history in a sealed letter with instructions to answer...

S39 "Se manejaron 3 variaciones de la clase social debidamente preparadas: clase a), b) y c) de un mismo caso" a) comercial con 3 años de estudio universitario, b) operador de buldozer con una alta educación c) desempleado con un 7o grado de educación. Cada respondiente (de los 675) recibió una versión del caso para contestar una cuestionario.

Three social class variations were used duly prepared: class a), b) and c) of the same case. a) commercial with three years of university studies, b) bulldozer operator with high instruction, c) unemployed with the 7th grade. Each respondent (from the 675) received one version of the case history to answer a questionnaire.

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<sup>1</sup>Underlined in the original

<sup>2</sup>Idem

S20 "Se trabajó con 3 clases sociales... Se preparó la misma historia clínica, ... El mismo cliente fué identificado como: a) artista comercial... b) operador... c) empleado... Los psicólogos leían el caso clínico, el cual describía al cliente con un desorden en su personalidad y tenían que evaluar al cliente otorgando puntos tomando en cuenta: el pronóstico, la motivación para cambiar..."

Three social classes were taken up... The same clinical history was prepared... The same client was identified as: a) commercial artist... b) operator... c) employee... The psychologists read the clinical case, which described the client with a personality disorder and had to evaluate the client giving points taking into account: prognosis, motivation to change...

S1 "Se les dieron ciertas instrucciones para que respondieran; se les dieron escalas clínicas y un cuestionario demográfico y una escala de valuación democrática y una lectura de histórica."

[The patients] were given certain instructions to answer: they were given clinical scales and a demographic questionnaire and a scale of democratic evaluation and a reading of historic.

S2 "Tres clases sociales variaron de algún caso historial fué preparada y relativamente establecido... Se contestó una versión de los casos históricos, preguntas demográficas,,, Los \*psicólogos leyeron primero cada caso historial y se obtuvo una escala clínica."

Three social classes varied of some historial case was prepared and relatively established... One version of the historic cases was answered, demographic questions... The psychologists read each historial case first and a clinical scale was obtained.



S4 "Tres variaciones de clases sociales el mismo caso de historia fué preparado y establecido... Cada uno recibe una versión de la historia respondiendo, siguiendo y detalladamente las instrucciones."

Three variations of social classes the same history case was prepared and established....Each one receives one version of the history answering following and the instructions in detail.

6.4.2.3 The Rendering of 'Psychologists' as 'Psicólogos' or as '\*Psicologistas'.

Regarding this lexical item one could safely assume that for the parent population (that is, biology and psychology students at the National University of Mexico), the use of the term 'psicólogo' is a matter of course.<sup>1</sup>

However, in the corpus two distinct tendencies are evident corresponding to the performance of the two experimental groups: From all those subjects who dealt with the item in question, 10 psychology students produced the correct Spanish equivalent: 'psicólogos' whereas only one biology student did so. Among the group of biology students a tendency was found to produce the anomalous form '\*psicologistas', which apparently was directly derived

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<sup>1</sup>In a brief post hoc experiment among biology students of the National University, this assumption was decisively confirmed.

from the English 'psychologists'. Six biology students produced this form but only one psychology student did so.

Though this might seem to be a 'minor' error of translation, its significant difference in distribution ( $X^2 = 7.59$ ,  $p < .010$ ) leads us to believe that, in the context of the article, the referent itself was vaguer for the biology students. It thus may be argued that the occurrence of the unacceptable for \*'psychologistas' is one example of the phenomenon that has earlier been discussed as **tolerance of vagueness**. The written summaries thus, provide evidence of more inaccurate encoding among the group of biology students reading the psychology text.

The following examples illustrate the cases just described. Subjects S11, S12, and S20 are psychology students rendering adequate equivalents of the term while S2, S4, and S51 are biology students using the form 'psicologistas'.

S11 "Estudio Nacional de los Efectos Socioeconómicos en los Psicólogos Clínicos.

El estudio examina los efectos del estatus socioeconómico bajo y cómo los psicólogos valúan estos efectos... Los psicólogos leyeron el caso (historia) primero para que los participantes contestaran un cuestionario..."

National Study on the Socioeconomic Effects on Clinical Psychologists.

The study examines the effects of low socioeconomic status and how clinical psychologists evaluate these effects....The psychologists read the case (history) first so that the participants would answer the questionnaire...

S12 "Estudio Nacional de los Efectos del Nivel Socioeconómico en las Evaluaciones en Psicólogos Clínicos.  
Este estudio trata de ver los efectos que tiene el nivel socioeconómico en las evaluaciones del psicólogo clínico y cómo se tratan de moderar estos efectos... no explica que los psicólogos tengan menos interés en las clases bajas..."

National Study of the Effects of Socioeconomic Level on Clinical Psychologists' Evaluations.

This study attempts to regard the effects that socioeconomic level has on the evaluations of the clinical psychologist and how these effects may be moderated... it does not explain [the fact] that psychologists have less interest in low [social] classes..."

S20 "Estudio Nacional de los Efectos que Tiene el Nivel Socioeconómico en el Juicio Profesional de los Psicólogos.

...se lleva a cabo una investigación para examinar los efectos del bajo nivel socioeconómico en el juicio clínico y cómo la experiencia, los valores sociopolíticos de los psicólogos clínicos ...moderan estos efectos. Los psicólogos leían el caso clínico el cual describía a un cliente con un desorden en su personalidad..."

National Study of the Effects that Socioeconomic Status Has on the Professional Judgement of Psychologists.

...research is carried out to examine the effects that low socioeconomic status has on clinical judgement and how the experience, the sociopolitical values of the clinical psychologists ... moderate these effects....The psychologists read the clinical case which described a client with a personality disorder..."

S2 "El presente estudio examinó el efecto de niveles socioeconómicos juzgando clínicamente y de experiencias clínicas de psicólogos y evaluación sociopolítica moderando estos efectos. Fueron 675 prospectos divididos en 12 (clínicas psicólogos)... Los psicólogos leyeron primero cada caso historial y se obtuvo una

escala clínica."

The present study examined the effect of socioeconomic levels judging clinically, and of psychologists' clinical experiences and sociopolitical evaluation moderating these effects... There were 675 prospects divided by 12 (psychological clinics) ... The psychologists first read each historical case and a clinical scale was obtained.

S4

"El presente estudio examinó los efectos de clientes SES nivel sobre su juicio clínico y cómo psicólogos clínicos la experiencia, valor sociopolítico y también determina e identifica a clientes como clase IV o clase V hechas las diferencias por un juicio clínico."

The present study examined the effects of SES clients level on their clinical judgement and how clinical psychologists the experience, sociopolitical value and also determines and identifies clients as class IV or class V the differences made by a clinical judgement.

S51

"En el estudio se examinó el efecto de los clientes del SES en la clínica de psicólogos .... El personal psicólogo mostró los mismos resultados: fué menos interesante el tratamiento en el cliente de la clase V."

The study examines the effect of the SES clients in the psychologists' clinic.... The psychology personnel showed the same results: the treatment in the classV client was less interesting.

6.4.3/

### 6.4.3 Annotated Examples from the Psychology Text Summaries

In section 6.4.2 a series of items were presented as specific instances of the effect that adequate or inadequate previous knowledge of topic had on the readers' interpretations of the psychology text.

According to the general plan presented in section 6.1, the next stage of the analysis, consisting of what has been called 'annotated examples', should bring to light fuller and more detailed evidence of the complex process through which background knowledge influenced text comprehension among the experimental subjects of the study. With this purpose in mind, special attention will be paid during this part of the analysis to indications of the interaction of the four phenomena that were discussed in chapter 2 and diagrammed in figure 6.3.

Formally, this stage of the analysis complements the picture provided by the previous one in that, instead of numerous brief examples, we will now have a much shorter number of examples treated in a more comprehensive manner.

As should be remembered, the statistical analysis carried out in chapter 5 revealed that, overall, each group of specialists performed better in their own discipline. The scheme that will be followed during this stage of our interpretative analysis coincides with such a

finding. Two annotated examples will be presented first: one produced by a biology student performing poorly on the psychology text, and one psychology student performing well on the same text; the converse situation, that is, a psychology student performing poorly on the biology text and one biology student performing well, will be presented in section 6.5.3. Thus the main trends of performance yielded by the study are typified in the selection of the excerpts to be examined.

The following sequence of steps will be observed for the presentation of each one of the annotated examples:

(i) A transcript of the original Spanish fragment or fragments in which the focal idea is dealt with by the subject.<sup>1</sup>

(ii) My translation into English of such fragment or fragments.

(iii) Commentaries on the subject's performance particularly regarding instances of **prediction, selection elaboration, and tolerance of vagueness.**

As has been done before, subjects will be identified by the same number they were given for the statistical analysis presented in chapter 5, and their discipline of study and performance in the text will be indicated.

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<sup>1</sup>Transcripts of the corresponding complete summaries are included in Appendix I.

6.4.3.1 S1 (Biology student performing poorly on the psychology text)

(i)

"Este estudio se llevó a cabo con pacientes de estratos socioeconómicos bajos comparándolos con pacientes de clase media. Los pacientes se identificaron como clase IV o clase V marcando una cierta diferencia en el número de variables psicológicas. ... Se les dieron ciertas instrucciones para que respondieran; se les dieron escalas clínicas y un cuestionario demográfico y una escala de valuación democrática, y una lectura de histórica. La suma de todo daba la evaluación de cada uno.... La evaluación de respuestas de los pacientes son 10 puntos que contribuyen a la escala Likert. La adición de las escalas continuas aportan la diagnosis de las categorías de psicosis, neurosis o personalidad desordenada. En base a los resultados se trata de buscar un tipo de psicoterapia para cada individuo. ..."

(ii)

This study was carried out with patients of low socioeconomic strata comparing them with middle class patients. The patients were identified as class IV or class V indicating a certain difference in the number of psychological variables. ... They were given certain instructions so that they could answer; they were given clinical scales, and a demographic questionnaire and a scale of democratic evaluation and a reading of [\*/] historic. The sum of all gave the evaluation of each one... The evaluation of the answers of the patients are 10 points that contribute to the Likert scale. The addition of the continuous scales gives the diagnosis of the categories of psychosis, neurosis or personality disorder. On the basis of the results a type of psychotherapy is selected for each individual...

(iii)

Regarding **prediction**, the first sentence in this summary can be said to represent the subject's initial hypothesis which in fact sets the line of interpretation that will be followed in the rest of the summary.

S1 thus, seems to be a distinct case of premature commitment to an initial hypothesis: the evaluation and comparison of real subjects (patients) carried out by psychologists.

Very closely related to this initial hypothesis we find manifestations of the other three reading phenomena which represent the schema theoretic perspective adopted in this study: **selection, elaboration, and tolerance of vagueness.**

#### **Selection.**

The examination of the summary reveals clearly that from all the available information in the text, S1 continuously selects what fits with his initial hypothesis, that is, he selects what most adequately fills the 'slots' in the schema he has called into play. At the same time, what does not conform to it, what hinders its completion, is excluded.

In Tannen's words, "omissions can indicate expectations, especially when contrasted with what is included by other speakers" (Tannen, 1979: 167). In the present case, what S1 omits contrasts notoriously with what S46 (our psychology student performing well in the psychology test) will include. It is worth noting for instance, that while in the original version the term 'client' appears 31 times, 'patient' occurs only twice at the end of the text. However, S1 consistently opts for 'patients' which appears to conform better with his clin-



ical study schema.

This may be seen as a straightforward case of **selection**, but it may also be regarded as a case of what Tannen calls 'interpretive naming', that is, a process by which a name is used which represents more information than is in the original text. S1 thus, would impose added information which comes from his own expectations about the role that subjects engaged in a psychological (or clinical) study should play.

S1's treatment of this term (i.e., the transformation of 'clients' into 'patients'), coincides with a general trend among the group of biology students and contrasts with the interpretations provided by the group of psychology students who notoriously preferred 'clients'.

Another case of selective input from the available textual stimuli would be the way in which 'social class' is dealt with. This item is treated in a way that makes it compatible with the (comparative) **clinical study** schema that has been assumed. The 'patients' participate in the study according to a dichotomous distinction: patients of low socioeconomic status ('estratos socioeconómicos bajos') and middle class patients ('clase media'). Without any precise indication of a classification procedure (see **tolerance of vagueness** below), these two social classes are said to have been 'identified' as class IV and class V. Thus, from the original three social classes of hypothetical clients mentioned in the text,

the summary reveals the encoding of a socioeconomically determined 2 group comparison. In order to achieve this representation, information from paragraph 2 regarding the labelling class IV/ class V becomes more prominent while a great deal of important information in paragraph 4 is ignored (see figures 6.8 and 6.9).

The present study ... will also determine if identifying a client as class IV or class V makes a difference in clinical judgement. Previous studies on social class bias have lumped classes IV and V into a common category called lower class, but it is "misleading" as Lorion... has put it, to treat these two groups identically because class IV and V clients behave differently on a number of psychological variables.

Fig.6.8 Paragraph 2 of the original psychology text.

Three social class variations of the same case history were prepared, and reliability was established. The same client was identified (a) as a commercial artist with 3 years of college, that is, class III on the Two Factor Index (Hollingshead, 1957); (b) as a bulldozer operator with a high school education (class IV); or (c) as an unemployed welfare recipient with a seventh grade education (class V).

Fig.6.9 Paragraph 4 of the original psychology text.

So we see a goal-directed and orderly strategy in operation which consists of downgrading or ignoring what does not correspond to the reader's expectations while focusing and enhancing information that does correspond to them. These simultaneous operations illustrate what has been referred to as **selection**, and will in turn determine **elaborations** required to complement the reader's 'activated' schemata. To sum up (and in accordance with the discussion presented in 2.3.3), if something is recognized as relevant to purpose, it is given processing priority. In this case, we have seen how S1's previous knowledge -revealed by his initial hypothesis- has been decisive to determine what is important in the text, and should therefore be included in the summary.

#### **Elaboration**

On the basis of the selective intake just discussed, a truly constructive process takes place. The rather small number of selected items enter into a series of elaborations that will make them conform to the reader's own expectations. We can ask for instance, where the first sentence of the summary comes from:

"This study was carried out with patients of low socioeconomic strata, comparing them with middle class patients."

We have seen already how the two groups of patients have been brought to the fore. These two groups are now to be related. The necessary link between them

is provided by means of the introduction of 'comparándo-  
los' ('comparing them'). This word has very possibly  
been picked out from the second sentence in which  
'compared' is used:

"When compared to the study of race and sex  
bias, however, social class bias has been  
neglected."

If this was in fact the case, the rest of the sentence  
has been ignored. Bartlett's notion of a pervading pro-  
cess of rationalization seems very pertinent here. It  
looks as if this subject, on the basis of his initial  
hypothesis (a comparative clinical study) locates the 2  
terms of the comparison (low and middle class patients)  
and provides the logical link by de-contextualizing and  
transforming one single word from subsequent text:

Compare ---- comparing them ('comparándolos')

The handling of the information contained in  
paragraphs 5 and 7 can also be considered a vivid and  
reliable example of the process of **elaboration**. (See  
figures 6.10 and 6.11). 'Psychologists' in "Psychol-  
ogists were asked to read the case history first..." has  
been blatantly omitted. As subject of the sentence it  
seems to have been a great hindrance for the smooth se-  
quence of confirmatory cues required by the reader's  
internal model, and thus, it was made to disappear al-  
together. 'Case history' has become 'a reading of a  
historic' (very possibly intended as 'a reading of a

Original paragraph 5	S1's version
<p>Each respondent received one version of the case history, a cover letter with detailed instructions for responding, a set of nine clinical scales to rate, a demographic questionnaire, and the Lerner scale of Democratic Values (Lerner, 1973). Psychologists were asked to read the case history first, to rate the client on the clinical scales, to fill out the demographic questionnaire, and then to complete the Lerner scale.</p>	<p>"...Se les dieron ciertas instrucciones para que respondieran; se les dieron escalas clínicas y un cuestionario demográfico y una escala de valoración democrática, y una lectura de histórica..."</p>

**Fig. 6.10** Original paragraph 5 and corresponding student's version.

story'). This 'reading of a story' fits into the series of evaluation procedures which, according to the subject's interpretation, were used to assess the patients.

In paragraph 7 (see fig. 6.11), a combined operation of omission plus elaboration can be observed:

'Hypothetical' in "The respondents evaluated the hypothetical client along seven, 10-point counter-balanced Likert scales" has been removed, while the evaluation procedure itself (an activity assumed to be typical of psychologists) remains prominent: "The assessment of the patients' answers are 10 points..."

The final rounding out of this summary is achieved via the addition of the phrase "On the basis of

the results" which is introduced (Cf. Bartlett's 'provision of logical links') to allow the 'normal', expected ending: the selection of an appropriate therapy for each individual.

Original paragraph 7	S1's version
<p>The respondents evaluated the hypothetical client along seven, 10-point counterbalanced Likert scales. They rated (a) the client's prognosis, (b) the client's motivation to change, (c) the client's self concept, and (d) the severity of the client's disorder. The psychologists also rated (a) their own personal interest in treating the client, (b) the likelihood of using psychotherapy as the main modality of treatment, and (c) the likelihood of referring the client to a physician for psychotropic medication.</p>	<p>La suma de todo daba la evaluación de cada uno para el caso de historia -600 palabras describían a un paciente con personalidad desordenada. La evaluación de respuestas de los pacientes son 10 puntos que contribuyen a la escala Likert. La adición de las escalas continuas aportan la diagnosis de las categorías de psicosis, neurrosis o personalidad desordenada. En base a los resultados se trata de buscar un tipo de psicoterapia para cada individuo.</p>

Fig. 6.11 Original paragraph 7 and corresponding student's version.

From the previous discussion we may assume that the following unambiguous and unbroken line of interpretation took place in the mind of this reader via the interaction of selective input and elaborative operations:<sup>1</sup>

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<sup>1</sup>I have included in brackets what seems implicit in this subject's summary

In this [Comparative] study, patients of low and middle class were assessed by means of the following instruments: clinical scales, demographic questionnaire scale of democratic evaluation and reading of a story. The sum of [the results yielded by] all these gives [The experimenters] the evaluation of each [patient]. On the basis of the results a type of psychotherapy is selected.

This coherent but equivocal interpretation seems to have been decisively guided by the reader's previous schemata. The 'top-down', conceptually driven flow is evident. No sign can be observed of word by word, text-based interpretation. On the contrary, textual elements are utilized only to the extent that they match a previous schema. In Goodman's terms (1967) they are truly 'sampled'.

Commentaries to this finding will be included in chapter 7 (section 7.3.2.2).

### **Tolerance of vagueness**

It has been assumed that the reader's basic intention is to obtain a coherent mental representation from the textual input. However, as was discussed in chapter 2 (section 2.5), a certain degree of **tolerance of vagueness** may become necessary as the reader progresses in the construction of this internal representation and does not find sufficient confirmations for his hypothesis. It has also been assumed that **tolerance of vagueness** is a normal phenomenon, a strategic procedure in reading comprehension and that it ought to increase in the L2 situation in which confirmatory or disconfirmatory units are more

difficult to discover given the numerous unknown items confronted by the reader.

The first sentence in the summary of S1 is straightforward enough and corresponds, as we have seen, to his initial hypothesis:

This study was carried out with patients of low socioeconomic strata comparing them with middle class patients.

In his second sentence he seemingly proceeds to support and expand this first statement, but the sentence lacks accuracy:

"Los pacientes se identificaron como clase IV o clase V marcando una cierta diferencia en el número de variables psicológicas"

The patients were identified as class IV or class V indicating a certain difference in the number of psychological variables.

It has already been pointed out that the criteria for 'class identification' is left unspecified in the summary. In the context of this sentence, the introduction of the Spanish passive<sup>1</sup> 'se identificaron' allows a degree of unspecificity. Also within the context of this sentence, the gerund 'marcando' seems an unusual lexical and syntactic choice, and it can be said to violate stylistic restrictions. According to the discussion presented in section 6.5.2.2, unacceptable forms may reveal vague representations, and thus, this second part of the sentence leads us to believe that the reader is uncertain about the information he is encoding. The introduction

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<sup>1</sup>realized in the reflexive form.



of 'una cierta' in 'una cierta diferencia' ('a certain difference') adds to our belief. It might in fact be conjectured that at this stage the reader is becoming aware of the vagueness of his own interpretation.

This second part of the sentence may be seen as an attempt to strengthen the two group distinction that has been assumed. Such a distinction is emphasized by the use of the word 'diferencia' which seems to have been imported (along with 'variables psicológicas') from the end of the original paragraph 2:

"...class IV and V clients behave differently on a number of psychological variables."

The chain of operations just described yields an ambiguous proposition which would in turn require a considerable degree of **tolerance of vagueness** to be left as part of the summary.

Another example of **tolerance of vagueness** can be found in the handling of the original phrase 'case history' (cf. section 6.5.2.2 in which it was discussed how this item caused a significant number of errors, notably among the group of biology students). The transformation of "to read the case history" into "\*una lectura de histórica" ( \*a reading of historic) may be explained with reference to the notion that the more demanding the processing task, the more possible it becomes that some parts of textual information are left unattended. It can be argued that evidence of this phen-

nomenon is present in this case: most probably, our reader has spent attentional resources at the rhetoric and semantic levels (for instance, in the identification of the 'series of evaluation instruments' and in the assignment of meaning to items such as 'read' (= 'the reading'), 'history' (= 'story'), etc., and is now unable to produce a grammatically correct form for his Spanish version. He allows the anomalous '\*una lectura de histórica' which no proficient speaker of the language would accept.

6.4.3.2 S46 (Psychology student performing well on the psychology text).

(i)

"En estudios previos se ha visto que los clientes de nivel socioeconómico más bajo tienden a ser evaluados en forma mas negativa que los de mejor nivel por los especialistas. En este estudio el propósito es observar si efectivamente ocurre lo anterior, para lo cual se seleccionó una muestra al azar de la División 12 de la lista de miembros de la Asociación Psicológica Americana de 675 psicólogos clínicos. A todos se les envió el mismo caso clínico, pero con variaciones en la clase social del supuesto cliente..."

(ii)

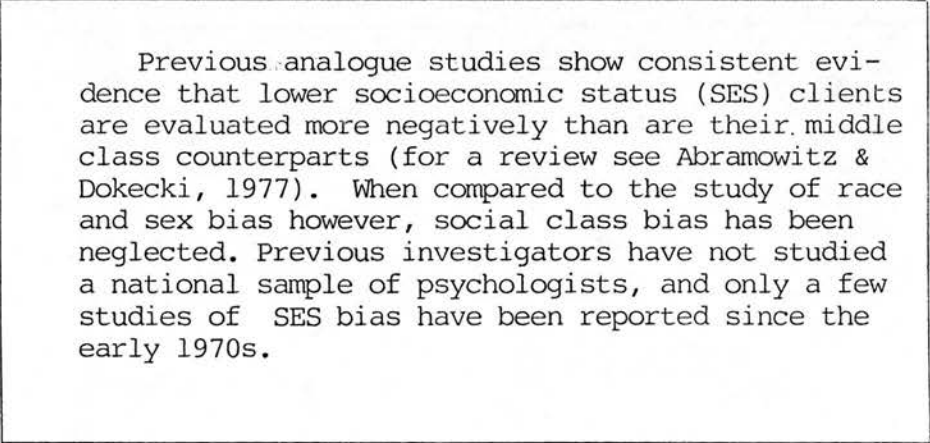
In previous studies it has been seen that clients of lower socioeconomic level tend to be evaluated by the specialists in a more negative form than those of a better level. In this study the purpose is to observe if in fact that is the case, for which a sample of 675 clinical psychologists was randomly selected from Division 12 of the register of members of the American Psychological Association. All were sent the same clinical case but with variations in the social class of the hypothetical client...

(iii)

As can be seen in this fragment (and more so in the complete transcript of the summary presented in App. I), if this subject departs from the author's intended message it is within reasonable limits. She actually attains a quite acceptable and coherent interpretation of the article's content.

In what follows, we will observe the interaction of the schema directed phenomena of our concern, particularly, **prediction, selection, and elaboration**, which in this case seem to have been guided by reasonably appropriate prior knowledge of topic.

To a great extent, S46 seems to derive her mental representation from the correct identification of the background presented in the first four lines of the text (see figure 6.12)



Previous analogue studies show consistent evidence that lower socioeconomic status (SES) clients are evaluated more negatively than are their middle class counterparts (for a review see Abramowitz & Dokecki, 1977). When compared to the study of race and sex bias however, social class bias has been neglected. Previous investigators have not studied a national sample of psychologists, and only a few studies of SES bias have been reported since the early 1970s.

Fig. 6.12 Paragraph 1 of the original psychology text ("National Study...").

The fact that psychologists' clinical judgment may be influenced by clients' social class does not seem to have been an unfamiliar notion for this subject. In fact, the ensuing line of interpretation appears to have remained closely connected with the identification of this piece of information. In other words, the correct comprehension of this initial sentence determines subsequent predictions and confirmations.

It might be pertinent to point out that topic selection might also have been influenced by the realization of the relevance of the proposition in lines 1 to 4, which, by the mere fact of being at the beginning of the text has been given prominence by the authors. (Cf. Meyer 1977:182 -Height of information in the content structure- and also, 'sources for the attribution of relevance' in section 2.3 of this work).

With regard to selection also, but from the point of view of what is omitted rather than what is included in the summary, it can be observed that S46 fails to realize the authors' intention of carrying out a study on SES bias with a national sample of psychologists. The subject's strategy to deal with the problem of constructing a coherent interpretation from what she has understood and in spite of what she has missed, is suggested in figure 6.13. In it, boxes 1, 2 and 3 represent a sequence of informational units as given in the original text; the route indicated by broken lines represents S46's interpretation of these portions of text.

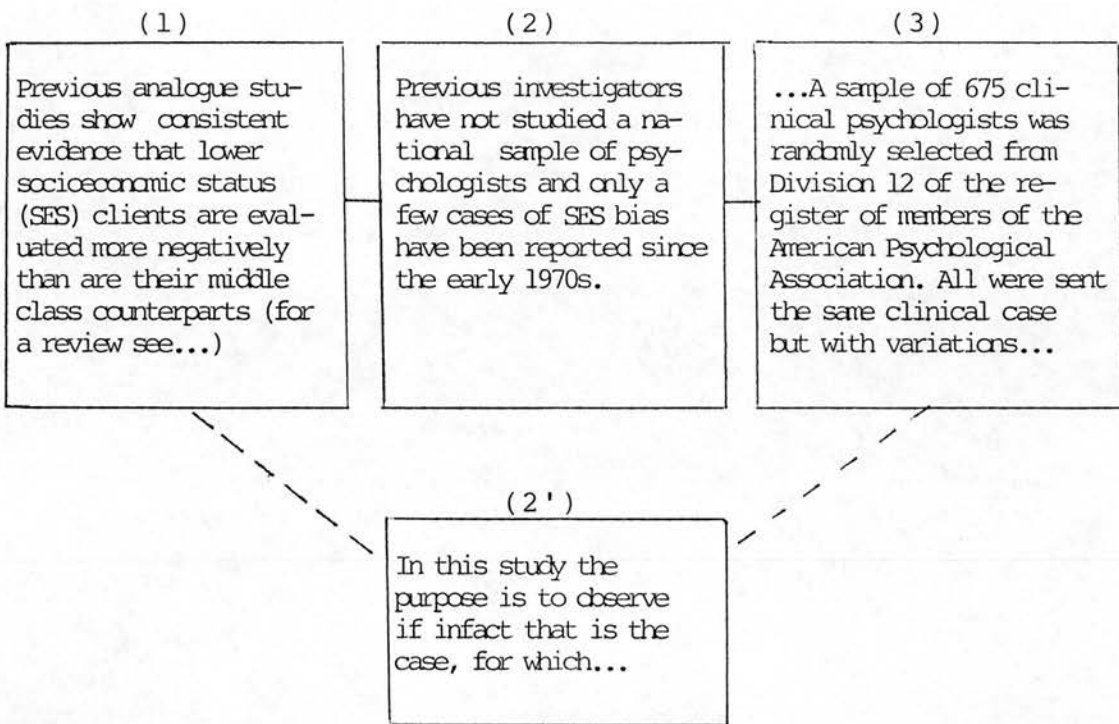


Fig. 6.13 Sequence of units of information in original text and alternative route followed by S46.

The reader gathers all or most of the information in box 1, but fails to recognize the implied necessity to carry out a study with a national sample of psychologists (box 2), which should in turn lead to the choice of experimental subjects according to the modality indicated in box 3. What S46 does, then, is to supply a logical link (box 2') to produce her own coherent sequence. She needs to match what she has already understood with what she assumes the article might present. Her omission, thus, leads her to a straightforward case of elaboration.

It may be suggested that the impact of her initial hypothesis about the article's contents is so strong

that it leads our reader to overlook information regarding the nationwide aspect of the study. This information reappears in an implicit form in paragraph 3, and again, it is not realized by the reader:

"Prospective subjects were 675 members from Division 12 (Clinical Psychology) selected randomly from the 1980 American Psychological Association Membership Register."

In mentioning the APA register, the writer relies on a body of shared knowledge with his audience: the nationwide aspect of the study is implicit in the choice of experimental subjects from this register. However, since our reader does not share the author's knowledge about the APA, she does not process this piece of implicit information.

In spite of this particular case of 'fixed hypothesis', it ought to be stressed that in general, the subject's previous knowledge successfully guides her predictions and aids the recognition of numerous confirmatory cues. A good example of this can be found in the treatment of the lexical item 'clinical psychologists'. Contrariwise to all those subjects quoted in section 6.5.2.1 who had problems in identifying the referent of this item, S46 seems confident with the term and seems in possession of a rich associated semantic field. Throughout the summary we find various within-the-text synonyms regarding the item in question:<sup>1</sup> 'psicólogos clínicos' (line 7), 'especialistas' (line 3), 'psicólogos' (line 16), \*respondentes (line

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<sup>1</sup>See complete transcript in Appendix I.

19), 'profesionales de la salud' (line 33), 'clínicos' (line 38).

### Tolerance of Vagueness

In agreement with the general trend that was mentioned in 6.1.4.1, that is, that readers performing well in a test do not tend to produce abundant elaborations, nor do they need to extend their tolerance of vagueness, this summary reveals this last phenomenon only very sporadically. For example, in line 19 of the complete summary (see Appendix I) we find:

"\*Los respondentes evaluaron al cliente..."

\*'Respondentes' is not a Spanish word, but the reader's direct rendering from the English form.

The EAP reading situation which we have described as expensive in attentional resources seems to have favoured the creation of non-existent words directly derived from the English text. This phenomenon was observed repeatedly in the corpus. It seems to be the case that this direct transfer proved to be a more economical mechanism than the search for an equivalent Spanish form. However, the extent to which the subject realizes the anomalousness of the form produced would require further research.

Concerning the performance of S46, it can be concluded that in spite of her mistakes, she reveals herself as a rather competent EAP reader. Her strategies are much closer

to those of a proficient L1 reader than the strategies of S1:

(i) Adequate prior knowledge is utilized for the recognition of relevant pieces of textual information.

(ii) Such prior knowledge guides her predictions and aids the recognition of multiple confirmatory cues.

(iii) In contrast with S1, her selection strategies lead her to disregard what could be considered secondary information, but the most essential information is captured in the summary. Though the picture of the situation described in the text is not complete, it does not deviate radically from the intended message.

(iv) Overall on the right track, this subject does not produce excessive elaborations and does not require extended tolerance of vagueness.

The comparison of the two previous 'annotated examples' would lead us to conclude that both efficient and inefficient L2 reading are schema directed. The same processes are manifest in the two summaries that have been analyzed. However, this is only an apparent paradox.- x  
Schema directed operations differ in the direction to which they take the reader. While S1, based on his previous (inappropriate) knowledge, departs from the author's message, S46, the psychology specialist, gets much closer to the original message via the generation of more adequate predictions, the selection of important pieces of information, fewer elaborations, and minimal use



of tolerance of vagueness.

Given the L2 context in which the reading tests were applied, the schema theoretic approach that has been adopted here does not lead us to find absolute, unequivocal distinctions between the efficient and the inefficient reader, but we certainly may say that significant differences were found in the final representations obtained by the two subjects.

## 6.5 Analysis of Summaries of the Biology Text.

The steps followed for this analysis parallel those of the analysis of the psychology text summaries.

First, in section 6.5.1 a brief description is provided of the mental representation we assume a proficient reader should attain at a certain stage of his reading, and of the main discrepancies between this ideal representation, and those representations that can be inferred from the summaries produced by the experimental subjects. This description includes what seems to have been the schemata employed by a great number of subjects (section 6.5.1.1).

Secondly, section 6.5.2 comprises a series of brief examples from the corpus which are intended to illustrate how a number of specific textual items were dealt with differently by the two groups of specialists.

Finally, section 6.5.3 includes the annotated examples corresponding to one psychology student performing poorly on the biology test, and one biology student performing well. The processes that lead the specialist to perform better in his own discipline, and the non specialist to perform poorly, are discussed with particular reference to the interaction of the phenomena previously defined as prediction, selection, elaboration and tolerance of vagueness.

6.5.1. Required Internal Model and Some Discrepancies Observed in the Summaries

A proficient reader should have evolved at some stage of his reading something like the following internal model of the situation depicted by the biology text:

(i) Clumps of trees (*Betula pubescens tortuosa*) have been observed to grow near ant nests, while trees away from ant nests are damaged by defoliators.

(ii) It has been suggested (hypothesis 1) that these 'islands' are caused by the ants killing the larvae of the defoliators.

(iii) An alternative hypothesis is provided: because ants concentrate nutrients, soil ameliorates and trees grow stronger and less susceptible to defoliation.

This 'mental model' can be represented as in figure 6.14.

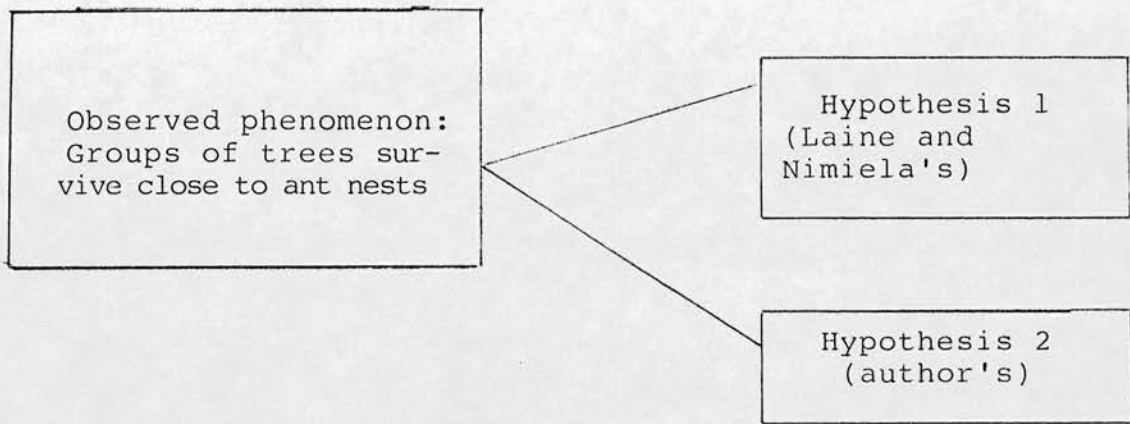


Fig. 6.14 Two alternative hypotheses are proposed for an observed phenomenon: one by previous researchers and one by the author of the article.

On an impressionistic basis, the first thing that was observed regarding the summaries of the biology text was that, overall, they seemed more fragmentary than those of the psychology text. Although many readers correctly identified a certain number of pieces of information, it seems to have been extremely difficult for them to establish necessary relations such as contrast, or cause-effect among the main parts of the text. Actually, only 5 of the 60 subjects were able to evolve the 'required model' proposed above<sup>1</sup>.

It is conceivable that the fragmentary representations that were obtained originated through the activation of a somewhat too general **forestal problem** schema (in which there is usually one problem caused by one agent), or

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<sup>1</sup>In terms of the taxonomy developed by Biggs and Collis (1982) to analyse the structure of learning outcomes these summaries seem to lack a relating concept or principle that would make the different pieces of information contained in them hang together. Such a taxonomy has been used to assess reading comprehension in L1 and L2 (Galicia-Ortega, 1988).

through the activation of a number of more particularized schemata that remained somewhat disconnected with each other (for instance, the predator-predated species schema, the pest control by use of predator species schema, the insect high protein requirement schema). In either case, important pieces of information offered by the text could not be accounted for, that is, the activated schemata were insufficient to incorporate highly relevant information, notably, the consideration of the two alternative hypotheses explaining the phenomenon of the 'green islands'.

One of the greatest obstacles for the attainment of an adequate representation seems to have been the phrase 'green islands' which the reader encounters initially in the title, and then in the opening lines of the first paragraph (fig. 6.15):

Green Islands -nutrition not predation-  
an alternative hypothesis.

Laine and Niemela (1980) suggested that  
the "green islands" of *Betula pubescens*  
*tortuosa* surrounding nest mounds of...

Fig. 6.15 Title and opening lines of the original biology text.

This phrase seems to have had an extraordinarily diverting effect: the great majority of readers (both biology and psychology students) who refer to 'green is-

lands' do so by interpreting the expression as the name of an actual location in which some kind of pest caused forestal problem is occurring. Expressions like the following were abundant in the corpus:

"En una zona de las Islas Verdes se está presentando actualmente un fenómeno de deterioro en la naturaleza de ese lugar..." (S27)

In a zone of the Green Islands a phenomenon of environmental damage is occurring at present...

Laine y Niemela (1980) sugirieron que la flora de las islas verdes era dañada por la cantidad de hormigas que existen en ese lugar" (S25)

Laine and Niemela (1980) suggested that the flora of the green islands was being damaged by the numbers of ants existing in that place.

"Laine y Niemela realizaron un trabajo en Isla Verde en 1980 en la especie *Betula pubecens tortuosa*" (S23)

Laine and Niemela carried out a research work in Green Island (1980) on the species *Betula pubecens tortuosa*.

(See also S19 in section 6.5.3.1 which provides a typical example of this misinterpretation).

Very possibly the impact of the title and the consequent instantiation of the PLACE variable in an existing forestal problem schema was so decisive, that readers disregarded numerous succeeding cues that clearly indicated the figurative use of the phrase, for example:

"Clearly these green islands are a reality and have been reported before..."  
(beginning of paragraph 3)

"It seems likely that the cause of the green islands in the Finnish mountain birch forests is the same"  
(first sentence in paragraph 6)

"Trees with their roots in the less harsh environment of ant mounds...are likely to survive as green islands".  
(concluding sentence).

The figurative use of 'green islands' which had been intended by the author to highlight the particular phenomenon he was to present was grasped only occasionally. Only 3 of the 60 experimental subjects seem to have been aware of the metaphorical use of this expression. This inability to discover the intended meaning of the phrase in question caused the comprehension of the main point of the article to be delayed. That is, if the point at issue was at all identified, it was identified not at the beginning of the reading task but much later, on the basis of other textual cues.<sup>1</sup>

#### 6.5.1.1 Possible Schemata Involved

Figure 6.16 represents the general forestal **problem** schema that seems to have been used by a great number of subjects. In this schema, the variable **PROBLEM**

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<sup>1</sup>The phenomenon just described should lead us to be cautious about the inclusion of metaphoric language in EAP texts. On the basis of our observations it may be hypothesized that the L2 reader will tend to remain close to factual information. It is possible that figurative expressions require an expenditure of processing effort that the L2 reader will hardly be able to afford.

was often appropriately instantiated by 'trees being damaged', while the variables PLACE and AGENT were assigned the values 'Green Islands' and 'pest' (variably identified with one or more of the following: 'invertebrate herbivores', 'larvae', 'spiders' or 'ants').

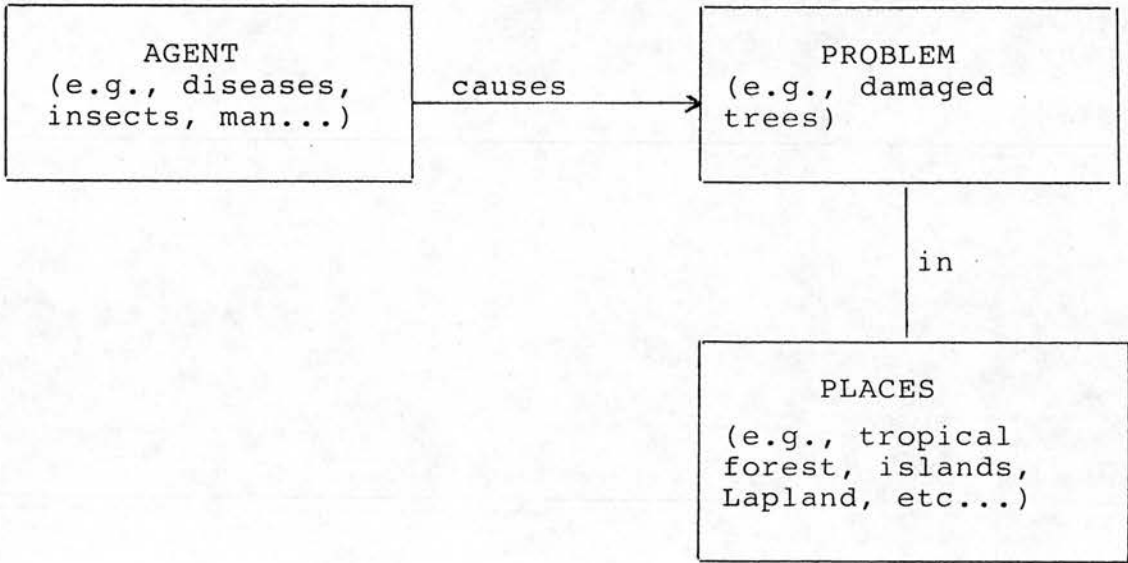


Fig. 6.16 General Forestal problem schema.

Though both groups seem to have made extensive use of the schema depicted in figure 6.16, in the long run more biology students were able to understand that ant mounds provide a more favourable site for trees growing nearby. (Cf. section 6.5.2.3).

6.5.2 /

### 6.5.2 A Series of Examples Illustrating the Proposed Schema Directed Differences in Text Interpretation

As was the case with the psychology text, the summaries of the biology article ("Green Islands...") provide numerous cases which clearly indicate differences in the interpretation of textual information attributable to the influence of differing background knowledge in the two groups.

Some remarkable differences were found with regard to the items included in Table 6.1 which will be discussed and illustrated below.

**Table 6.1** Items Illustrating the Proposed Schema Directed Differences in Text Interpretation.

Item	Biology students	Psychol. students	Section
1. Appropriate rendering of the term 'defoliation'	18	6	6.5.2.1
2. Explicit identification of one or more of the species mentioned in the text.	30	8	6.5.2.2
3. Understanding of the association between healthy trees and ants.	12	3	6.5.2.3
4. Overrating of familiar information: High protein diet requirements of insect colonies.	14	7	6.5.2.4



#### 6.5.2.1 Appropriate and Inappropriate Rendering of the Term 'Defoliation'.

The identification of the forestal problem depicted in the text seems to be more accurate in those summaries in which explicit use is made of the term 'defoliación' (defoliation). This is the case of 18 summaries produced by biology students, but only of 6 summaries produced by psychology students ( $\chi^2 = 5.04$ ,  $p < .025$ ).

For these biology students the problem seems to be defined by the term itself, whereas among the psychology students the problems evoked tend to be vaguer, more varied or of a more general kind.

The difference becomes more striking if we consider that the terms involved, i.e., 'defoliation' and 'defoliación' are so similar. We have a case of true cognates that would not be expected to cause comprehension problems. The observed differences in interpretation must then be due to the unmatched background knowledge of the two groups. In other words, whereas the psychology students tend to be unable to identify the specific problem, comprehension among the biology students reveals a much closer match between the message and the reader's expectations. Biology students seem to have a quite definite referent regarding the forestal problem in question.

The following examples illustrate cases of correct and incorrect interpretations of the term 'defoliation'. S30

S34 and S7 are biology students using the term appropriately; S11, S25, S15 and S20, are psychology students using various inappropriate terms.

S30 "...porque los árboles que no presentan defoliación se encuentran cercanos a los nidos de las hormigas... a menor altitud a la que los árboles son defoliados."

...because trees not presenting defoliation are close to the ants' nests... at less altitude than that in which the trees are defoliated."

S34 "Sugiere que la vegetación (árboles) presenta menor defoliación cuando hay núcleos de hormigas Formica aquilonia... encontrándose zonas susceptibles de defoliación dependiendo de ello."

He suggests that vegetation (trees) shows less defoliation when there are colonies of ants Formica aquilonia... zones susceptible to defoliation are found depending on it.

S7 "Existieron árboles que no se dañaron (vigorosos y foliados) ...los árboles que más fueron dañados (defoliación) estaban a la misma altitud que el límite de distribución de las hormigas..."

There were undamaged trees (strong and foliated) ...the most damaged trees (defoliation) were at the same altitude than the limit of distribution of ants...

S11 "Habla de la deforestación de árboles en la Isla Verde causada por hormigas..."

It deals with the tree deforestation in Green Island, caused by ants..."

S25/

S25 Laine y Niemela (1980) sugirieron que la flora de las islas verdes era dañada por la cantidad de hormigas que existen en ese lugar. Ellos dijeron que para prevenir la desfloración se tenía que exterminar a las hormigas..."

Laine and Niemela suggested that the flora in the green islands was damaged by the [great] amount of ants that exist in that place. They said that in order to prevent flower despoilment ants had to be exterminated...

S15 "Se asume que en las islas Green insectos como las hormigas ...son abundantes y ocasionan daño a la ecología del lugar, concretamente a una extensión de árboles ya viejos ocasionándoles la muerte."

It is assumed that in Green Islands insects like ants... are abundant and cause damage to the ecology of the place, specially to an extension of already old trees, causing them to perish."

S20 Laine and Niemela sugirieron que en la Islas Verdes las hormigas asesinas estaban acabando con los árboles de la región..."

Laine and Niemela suggested that in Green Islands murderous ants were doing away with the trees of the place...

#### 6.5.2.2 Explicit Identification of One or More of the Species Mentioned in the Text

Significant differences were observed regarding the identification of the three species whose Latin names are mentioned in the text and which are key elements in the description of the particular forestal problem under discussion: the birch *Betula pubescens tortuosa*, the moth

larvae of *Oporinia autumnata* and the ant *Formica aquilonia*.

Though the Latin nomenclature offered problems to both experimental groups, a careful examination of the corpus leads us to realize that psychology students tend to avoid the use of the Latin names whereas biology students seem much more at ease with them. An overall count of explicitly identified items in one and another group yields differences worth of notice: among the group of biology students there were 30 cases of explicit identification of a species, whereas , among the psychology students there were only 8 explicitly identified items ( $\chi^2 = 11.60, p < .001$ ).

The relevance of nomenclature identification relates to the assumption that the greater the number of species correctly identified, the more complete should the comprehension of the problem be. The following examples illustrate cases of correct identification (of one or more species) achieved by biology students (S35, S60, and S10), and cases in which -as was frequent- psychology students produce an erroneous identification of a species (S1), an incomplete version of the Latin name (S7, S16) or avoid all use of the technical nomenclature (S25).

S35 "Laine y Niemela (1980) sugieren: las islas verdes de *Betula pubescens tortuosa* rodeadas de *Formica aquilonia* son causadas por la muerte de la larva de *Oporinia autumnata*..."

Laine and Niemela (1980) suggest: the green islands of *Betula pubescens tortuosa* surrounded by *Formica aquilonia* are caused by the death of the larvae of *Oporinia autumnata*.

S60 "... las 'green islands' de *Betula pubescens tortuosa* que rodean los nidos de *Formica aquilonia* en Finnish Lapland fueron causadas por..."

The 'green islands' of *Betula pubescens tortuosa* surrounding the nests of *Formica aquilonia* in Finnish Lapland were caused by...

S10 *Oporinia autumnata* es un invertebrado herbívoro que ocasiona daños a los árboles hasta la muerte"

*Oporinia autumnata* is a herbivorous invertebrate that damages trees until they die.

S1 Laine and Niemela (1980) sugieren que las especies de plantas *Betula pubescens tortuosa* y *Formica aquilonia* presentaban daño en sus hojas..."

Laine and Niemela (1980) suggest that the plant species *Betula pubescens tortuosa* and *Formica aquilonia* presented damage in their leaves...

S7 "Los árboles que más fueron dañados ...estaban - a la misma altitud que el límite de distribución de las hormigas (*Formica*) y por lo tanto no podían ..."

The most damaged trees ...were at the same altitude than the distribution limit of the ants (*Formica*) and therefore they could not...

S16 "Habla sobre una larva que daña a los árboles ... la altitud... coincide con el límite de altitud de distribución de *Formica*..."

It deals about a larva that damages the trees ... the altitude ...coincides with the altitudinal limit of the distribution of *Formica*...

"Laine y Niemela sugirieron que la flora de las islas verdes era dañada por la cantidad de hormigas que existen en ese lugar. Ellos dijeron que para prevenir la desfloración se tenía que exterminar a las hormigas. Realizaron investigaciones para conocer de qué manera afectaban a la flora no solo las hormigas sino los insectos herbívoros que están en ese lugar."

Laine and Niemela suggested that the flora in the green islands was damaged by the great amount of ants that exist in that place. They said that in order to prevent flower despoilment ants had to be exterminated. They carried out research to learn in what way the flora was attacked not only by ants but by the herbivorous insects of the place.

#### 6.5.2.3 Understanding the Association between Ants and Healthy Trees.

There were significant differences between the two experimental groups regarding the realization of this crucial issue presented in the article.

A much higher number of biology students were able to realize that the trees obtain some sort of benefit from their association with ants. On the other hand, psychology students tended to assign the ants the negative traits of a pest.

The most plausible explanation of this difference in text interpretation is that the specialized background knowledge of the group of biology students allows for the possibility of a beneficial association between plants and

insects, whereas, the more general knowledge of the group of psychology students seems to lead them to an equivocal interpretation in the direction of assigning the insects a harmful role.

Explicit forms indicating that the association between ants and healthy trees had been realized by the reader were found in 13 summaries produced by biology students but only in three summaries of psychology students ( $X^2 = 5.6, p < .025$ ).

The differences mentioned above will be exemplified in the following excerpts from the summaries.

S11, S12 and S20 are psychology students attributing negative characteristics to ants. In the examples produced by biology students it will be noticed that the degree of comprehension of the phenomenon varies: It may simply be mentioned that healthy trees grow near ant nests (e.g., S60, S13 and S30) or a fuller explanation may be provided regarding the actual cause of the benefit (e.g., S34 and S48)

S11 "Habla de la deforestación de árboles en la Isla Verde causada por hormigas."

It deals with the tree deforestation in Green Island, caused by ants.

S12 "Varios autores han observado que los nidos de las hormigas para crecer fuertes y vigorosos necesitan consumir los nutrientes que les proveen los árboles.... Cuando las hormigas no son abundantes, las hojas de los árboles quedan intactas."

Several authors have observed that in order to grow strong and vigorous ant nests need to use nutrients provided by trees.... When ants are not abundant tree leaves remain intact.

S20 Laine and Niemela (1980) sugirieron que en las Islas Verdes las hormigas asesinas estaban acabando con los árboles de la región."

Laine and Niemela (1980) suggested that in Green Islands murderous ants were finishing the trees of the place.

S60 Existen árboles más vigorosos en asociación con nidos de hormigas y persisten más que otros cuando hay dispersión de defoliadores."

There are more vigorous trees in association with ant nests and persist more than others when dispersion of defoliators occurs.

S13 "...que cuando este árbol se encuentra relacionado o en asociación con la hormiga... el árbol crece más vigoroso ya que la hormiga ayuda al árbol...y también ayuda a que su defoliación sea menor..."

...that when this tree is related or in association with the ant...the tree grows more vigorous because the ant helps the tree...and also contributes that defoliation be less...

S30 "Pero existe un tipo de hormigas que matan a dicha larva y así protegen a los árboles. Esto se ha demostrado.... Adlung (1966) demostró que los árboles con hojas más vigorosas son aquellos que se encuentran asociados con nidos de hormigas."

But there is a type of ants that kill such larvae and thus protect the trees. This has been demonstrated... Adlung (1966) showed that the trees with more vigorous leaves are those that can be found associated with ant nests.



S34 "Sugiere que la vegetación (árboles) presenta menor defoliación cuando hay núcleos de hormigas *Formica aquilonia* en árboles *Betula pubescens tortuosa*....se establece otra teoría en la que suministran nutrientes para la vigorización de los árboles.... También reporta pruebas de este fenómeno en otros lugares con termitas."

He suggests that vegetation (trees) presents less defoliation when there are colonies of ants *Formica aquilonia* in trees of *Betula pubescens tortuosa*....another theory is established in which [the trees] provide nutrients for the vigorousness of the trees.... [The article] also reports proof of this phenomenon in other places, with termites.

S48 "La nidación de hormigas puede llegar a proveer a los árboles de una mayor cantidad de nutrientes y mantener un poco más alta la temperatura del suelo y reforzar los tejidos para que así se pueda resistir un poco más a la defoliación... y así se permita la mayor sobrevivencia de los árboles en estos sitios."

Ants' nesting may provide the trees with a greater amount of nutrients and maintain soil temperature a bit higher and reinforce tissues so that they can resist defoliation a bit better ... and thus trees in these places are allowed to survive.

#### 6.5.2.4 Overrating of Familiar Information: High Protein Diet Required by Insect Colony.

A highly frequent phenomenon in the corpus was the immoderate effect of background knowledge for the reportability of an event. A hierarchically 'low' proposition of the text (Meyer, 1977) appears notoriously heightened in the summary due to its familiar content or form. Information that in the original text could be considered secondary or supporting detail, acquires undue

prominence in the subject's summary.

In the biology article, the proposition 'high levels of protein are essential for the maintainment of a large and vigorous colony of insects' is only a rather minor part of an elaborate argumentation to support the author's hypothesis. However, a considerable number of cases are found in the corpus showing that this proposition has been enhanced even to the extent of becoming a paragraph in itself.

A plausible explanation of this phenomenon would be that the sentence in question contains a high number of familiar terms (frequent or cognate): 'high', 'levels', 'large'; 'protein', 'essential', 'larvae', 'maintain', 'vigorous' and 'colony'. These familiar words act as cues which lead the reader to reconstruct the event in terms of his or her own prior knowledge, while a great deal of related information offered by the original text is ignored.

In the present case, the phenomenon was certainly more pronounced among the biology students: it occurred 17 times in summaries produced by this group, and 6 times in summaries produced by psychology students ( $X^2 = 4.34$ ,  $p < 0.05$ ).

In the following examples (all biology students), it can be seen how the information is recognized and reported as an isolated statement rather than as part of a more complex argumentation.

S14 " También habla de que los altos niveles de proteína son esenciales para el crecimiento de las larvas y para mantener una colonia grande y vigorosa."

It also mentions that the high levels of protein are essential for the growth of larvae and to maintain a strong and vigorous colony.

S1 " Las proteínas son esenciales para el mantenimiento y vigor de una colonia de larvas."

Proteins are essential for the maintainment and vigour of a larvae colony.

S29 " Los herbivoros son mayores mientras se encuentran en un estado larval porque necesitan proteínas para un crecimiento rápido y para formar una colonia vigorosa."

Herbivores are larger while they are in a larval state because they need protein for a rapid growth and in order to become a vigorous colony.

### 6.5.3 Annotated Examples from the Summaries of the Biology Text

6.5.3.1 S19 (Psychology student performing poorly on the biology test)

(i)

Los autores dan una hipótesis alternativa para explicar el fenómeno de la deforestación de islas verdes. Sugieren que cerca de los árboles afectados se cría una larva proveniente de una especie de hormiga. Este tipo de hormiga sobrevive gracias a los nutrientes que roba a los árboles; estos nutrientes proveen gran cantidad de proteínas que fortalecen a la colonia de hormigas pero que debi-

litan a los árboles. Comúnmente se refugian en las raíces de los árboles por encontrar proteínas en mayor grado... las hormigas escogen los árboles más vigorosos que son los más ricos en proteínas convirtiéndolos en árboles débiles y por lo tanto presas fáciles de cualquier enfermedad.

(ii)

The authors give an alternative hypothesis to explain the deforestation phenomenon in green islands. They suggest that near the damaged trees a kind of larvae exists that comes from an ant species. This kind of ant survives on the nutrients it steals from the trees; these nutrients provide a great amount of protein which strengthens the ant colony but weakens the trees. They usually find stronghold in the roots of the trees because they find protein in a greater quantity ... the ants choose the more vigorous trees which are the richest in protein, turning them into weak trees and therefore easy prey of any disease.

(iii)

This summary is one of the many cases in which the specific topic the author intends to present cannot be said to have been identified by the reader.

A number of elements in the text seem to have made the reader evoke a rather general **pest caused forestal problem** schema which in turn was employed to interpret the information offered by the text.

In the production of the summary, a great deal of actually prominent textual material is omitted while attention is centered on pieces of information that might fit the general schema that has been activated. A complementary mechanism by means of which ele-

ments are provided that complete the generated model can also be noted. Thus, by avoiding inconvenient cues and supplying links and supporting detail for the selected ones, this subject manages to build an idiosyncratic (and remarkably coherent) final product.

We see here that if comprehending a message is "to place a construction upon it which provides a coherent formulation of its contents" (Anderson, 1977:4) the same applies to such a straightforward case of text miscomprehension as the present one. S19 seems to be looking for the "one to one correspondence between the slots in the schema and the 'givens' in the message" (ibid), and successfully cancelling every chunk that does not match her schema.

The final representation of the passage content becomes both 'simplified' and 'conventional' (Bartlett, 1932: 182). Various subthemes dealt with by the author are not taken into consideration. A single theme is maintained: It includes one problem (deforestation), and one cause (ants damaging trees by nourishing from roots).

Following are some more specific observations on how the final representation might have been achieved mostly through the operation of the schema directed processes of **selection** and **elaboration**.

### Selection

Some textual elements that seem to have been readily selected and which were probably used as the basis for the activation of the (pest caused) forestal problem schema are: 'defoliation', 'damaged trees', 'herbivores', 'larvae', 'ants', 'tree roots', and 'sites of improved nutrition'. The defoliation phenomenon was actually rendered as 'deforestation'. (A current man-created problem in Mexico, 'deforestation' might have been more familiar to this subject).

Once the issue of 'deforestation' was established, the cause was promptly (or simultaneously) identified in the several occurrences of 'larvae' and 'ants'. From these, the subject chooses 'ants', possibly because of its more frequent reappearance.

### Elaboration

Once 'ants' are assigned the role of a pernicious species, that is, once they are identified as the cause of the central problem of defoliation, their assumed destructive behaviour is reinforced by the introduction of supporting detail. A rather complete and colourful description is introduced about the activities of this 'plague' in which threatening aspects of the species are made more real through specific lexical choices (see underlined words in the following examples):

(i) An interpretation is given of the ants' nourishing activities: Not only do they feed from the tree roots, but they 'steal' nutrients (cf. Tannen's 'interpretive naming' presented in section 6.2.2):

"This type of ant survives on the nutrients it steals from the trees"

(ii) In relation to their place of dwelling, it may be realized that some sort of intentionality or tactical planning seems to be imputed to the ants:

"They usually find stronghold in the roots of the trees..."

"The ants choose the more vigorous trees..."

(iii) Regarding the consequences of their parasitic behaviour we find:

"Trees are weakened and become easy prey of any disease"

#### **Tolerance of Vagueness**

Regarding the phenomenon that has been referred to as **tolerance of vagueness**, it can be said that given the general strategy followed by this subject which consisted mainly in a highly selective input of information combined with the provision of supporting detail (**elaborations**), extensive **tolerance of vagueness** did not become necessary. The reader did not have to maintain two or more contradictory hypotheses but merely to support one throughout the course of the process of information encoding. Though incorrect, the summary can

be said to be notoriously consistent.

Two possible cases of **tolerance of vagueness**, though may be suggested, and it should be noted that both occur at the beginning of the summary, before the unique configuration of the text meaning has been established:

(i) The subject seems hesitant about the noxious agent. This indeterminateness is reflected in lines 4 and 5:

"...near the damaged trees a kind of larvae exists <sup>1</sup> that comes from an ant species. This kind of ant survives..."

The repeated use of the modifier 'kind of' ('a kind of larvae', 'this kind of ant'), as well as the indefinite article in 'an ant species' give ground to infer a certain degree of **tolerance of vagueness**. However, as has already been stated, the subject soon decides for 'ants' and will adhere to this particular configuration in which 'ants' is given the role of AGENT in the **forestal problem** schema.

A second, though somewhat more uncertain case of **tolerance of vagueness** can be found in the inclusion of the phrase 'an alternative hypothesis' in the first sentence of the summary. This phrase would imply the assumption of another explanation with which our subject

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<sup>1</sup>In this context, the Spanish form 'se cría' is itself odd, and reveals a certain lack of precision.



does not deal with at all. If this were the case we would have a situation of **tolerance of vagueness**. It is possible however, that the modifier 'alternative' is used simply because it is a notorious cognate term in this text, that is, its inclusion might be merely accessory. If this was in fact the case, that is, if the subject did not realize the implied first hypothesis, then this is not a case of **tolerance of vagueness**.

6.5.3.2 S60. (Biology student performing well on the biology test).<sup>1</sup>

(1)

En 1980 los investigadores Laine y Nimiela sugirieron que las "islas verdes" "green Islands" de Betula pubecens tortuosa que rodean los nidos de ~~la~~ hormiga Formica aquilonia en Finnish Lapland fueron causadas por la muerte de la hormiga larva de la hormiga Oporinia autumnata en los nidos de los árboles durante la dispersión de este geometrido.... Existen árboles más vigorosos en asociación con nidos de hormigas y persisten más que otros cuando hay dispersión de defoliadores. Esto quiere decir que hay un beneficio para los árboles que crecen cerca del nido de las hormigas. Sin embargo hay poca evidencia de esto.... Parece que el caso de las "Green Islands" es el mismo. Los árboles cerca de los nidos de Formica podrían tener sus raíces en una fuente de alta concentración de nutrientes. Como resultado podrían ser más vigorosos... y por lo tanto son más resistentes a la defoliación.

(ii)

In 1980 the researchers Laine and Nimiela suggested that the "~~islas verdes~~" "green Islands" of Betula pubecens tortuosa that surround the nests

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<sup>1</sup>Words crossed out by the subject have been retained in this transcription because they are assumed to represent hesitations related to changes in the ongoing process of interpretation.

of the ant Formica aquilonia in Finnish Lapland were caused by the death of the ant larvae of the ant Oporinia autumnata in the nests of the trees during the dispersion of this geometrid. .... More vigorous trees exist in association with ant nests which persist more than others when there is dispersion of defoliators. This means that there is a benefit for the trees growing near the ants' nest. However, there is not much evidence of this... It seems that the case of the Green Islands is the same [than that of the termites]. Trees near nests of Formica could have their roots in a source of high concentration of nutrients. As a result they could be more vigorous... and therefore they are more resistant to defoliation.

(iii)

The examination of this summary reveals not an incoherent or basically erroneous interpretation, but an incomplete one. If we compare this summary with the ideal representation suggested in section 6.5.1 (and repeated in fig. 6.17 below), what we will notice is that both the central problem and the 'alternative' hypothesis have been successfully identified. On the other hand, the identification of hypothesis 1 is very dubious.

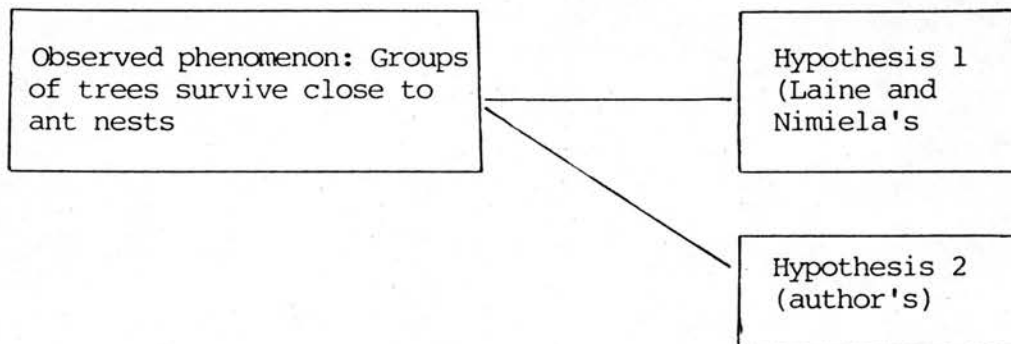


Fig. 6.17 Two alternative hypotheses for an observed phenomenon: one by previous researchers, one by author of the article.

The reader seems quite certain about the observed phenomenon of healthier trees growing near ant nests and about ants providing improved soil conditions for nearby trees, and brings both pieces of information together in a very satisfactory manner. The association of vigorous trees and ant nests is explicitly mentioned three times in the summary:

"Existen árboles más vigorosos en asociación con nidos de hormigas"

More vigorous trees exist in association with ant nests.

"Esto quiere decir que hay un beneficio para los árboles que crecen cerca del nido de las hormigas"

This means that there is a benefit for the trees growing near the ants' nest.

"Los árboles cerca de los nidos de Formica podrían tener sus raíces en una fuente de alta concentración de nutrientes. Como resultado podrían ser más vigorosos"

The trees near the nests of Formica could have their roots in a source of high concentration of nutrients. As a result they could be more vigorous.

A specific supporting explanation for hypothesis 2 is also included:

"De acuerdo a White (1984) los nutrientes de nitrógeno para herbívoros es menos disponible en los tejidos de árboles más vigorosos y por lo tanto son más resistentes a la defoliación."

According to White (1984) nitrogen nutrients for herbivores is less available in the tissues

of more vigorous trees and therefore they are more resistant to defoliation.

### **Selection**

These relevant pieces of information seem to have been gathered from various places in the text, most probably through the intervention of appropriate previous knowledge. At the same time, a great deal of subsidiary information and information relative to hypothesis 1 was disregarded. Precedence of attention was thus granted either to those parts that matched previous knowledge of topic, or to information that contributed to the internal model that was being built.

The summary thus can be seen as the result of a highly selective input of information. Only initially does the reader attempt a word by word comprehension of the text -as is revealed by the first paragraph of his summary- but very soon he quits this ineffectual approach. He possibly realizes the many difficulties posed by the dense and lengthy first paragraph and opts for a more economical deployment of attention. In doing so, he gives up most of the information offered in this paragraph (including hypothesis 1). This abandonment which as has been seen very possibly took place in view of the numerous unfamiliar items contained in paragraph 1, may be regarded as a **selection** operation.

Following are some terms used by the subject on which he seems to have based great part of his interpretation and which suggest the influence of previous knowledge related to his specialism. Of course, these are merely informal observations, since claiming any significance regarding the occurrence of these terms would require a more strict comparison between their occurrence in this summary and the corresponding use made by non specialists. The following items are worth mentioning though:

1) defoliation-----→ defoliación

As was mentioned in section 6.5.2.1, the selection of this term aids the circumscription of the specific problem presented in the text. It may reveal the existence of the correct referent in the mind of the reader (cf. S19 who changes this term for the more general one 'deforestation').

2) outbreak -----→ dispersión

The idea of breaking forth is grasped by the reader and related to the spread of organisms to new areas known in biology as 'dispersal' ('dispersión').

3) geometrid -----→ geométrido

In contrast with the non specialists' tendency to render this technical term as 'geométrico' (geometric), this subject has adequately identified the referent as the moth's larvae: geometrid (measuring worm).

4) termitaria -----> termitarios

A semi-technical term. In the corpus, the non specialists tended to avoid making reference to the termites nest, or used non technical expressions (eg., 'nidos de las termitas')<sup>1</sup>. S60 identifies the referent and uses the appropriate term.

5) forest soil -----> suelo forestal

A non specialist would probably have used 'suelo del bosque'.

6) The Latin nomenclature concerning the various species mentioned in the article were written in italics in this summary. As was mentioned in 6.5.2.2, this appropriate rendering indicates knowledge of the formal conventions to refer to biological species, and suggests a more accurate identification of the referent.

#### **Tolerance of Vagueness**

In this summary, **tolerance of vagueness** is basically observable in relation to the non recognition of hypothesis 1.

The first sentence of the summary reveals the very imprecise initial picture that the subject had of the event depicted in the text. As can be seen, the reader

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<sup>1</sup>Nine biology students correctly identified this item whereas only two psychology students did so ( $X^2=4.54$   $p<.05$ )

crosses out "islas verdes" and writes "green Islands". He certainly seems to have been quite undecided about the referent of 'green islands'. It might be a place, as the option for the English form and capitalization of 'Islands' suggests, but it also might be the actual phenomenon referred to by the author as the ensuing part suggests:

...the "~~islas verdes~~" "green Islands" of Betula pubescens tortuosa that surround the nests of...

Very possibly thus, this is a truly ambiguous interpretation of the phrase 'green islands' (Cf. coexistence of discordant propositions during the processing of text in section 2.5 -fig. 2.1).

Something similar occurs with his initial uncertainty about the kind of defoliating insects:

...caused by the death of the ~~ant~~ larvae of the ant Oporinia autumnata in the nests of the trees.

The reader moves forward though, leaving these pieces of information ambiguous. As has been pointed out, he eventually identifies the defoliators by using later textual cues. (In general, his configuration of the events depicted in the article becomes clearer as he progresses through his reading).

#### Elaboration

As was mentioned in section 6.4.1, the phenomenon of elaboration was much less noticeable in those summaries

that remained closer to the author's intended message than in those diverging from it.

The interpretation represented by this summary may be said to be an incomplete one, but, as has been indicated, it is still reasonably close to the original message. No obvious instances of elaboration were found for discussion.

## 6.6 Final Remarks

The evidence that has been presented throughout various sections of this chapter coincides with the expected outcome of the analysis. In agreement with what had been hypothesized, the comparison of the summaries written by the two experimental groups allowed us to verify that existing mental structures -determined by field of study- were decisive for the contrasting interpretations found in the two groups.

In addition to such an expected outcome, two important aspects deserve to be commented upon in this closing section of the chapter.

The first one refers to the ubiquitousness of the processing strategies of our concern (prediction, selection, etc). In the 'annotated examples' we could see how the four readers to a greater or lesser extent, were using the same strategic approaches.



The second aspect concerns the uniqueness of the representations obtained by the subjects, from which we may conclude that the influence of the individual experience of the readers is not inconsequential.

Though these two phenomena (i.e., the universality of the strategies employed and the uniqueness of the representations obtained) could be thought to be contradictory, they actually complement each other.

It is the interaction of general strategies and individual previous knowledge that yields the unique configuration of text meaning found in each summary.

**Prediction, selection, elaboration, and tolerance of vagueness** occur on the basis of each reader's prior knowledge. The subject's knowledge, whether of a specific term or of a general concept determines what is selected for processing, what relations are established among text components and what inferences are made.

We see for instance, that our four readers treat textual cues as hypotheses to be tested out as the passage evolves; in this respect we have to agree with Goodman when he proposes that universal strategies (eg., prediction, confirmation/disconfirmation) are used by both competent and beginning readers (Goodman, 1973). But we have observed how each reader arrives at notably different interpretations of the text. While S46 and S60's initial

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<sup>1</sup>As should be remembered these subjects were chosen as representative of the performance tendencies found in the sample.

hypotheses do not hinder the assimilation of important subsequent pieces of information, S1 and S19 remain within the limitations set up by their own preconceptions (clinical study schema and forestal problem schema respectively) and this impedes what could have been the new imports from the text.

As regards to **selection**, we have seen how both S19 and S60 (the psychology student performing poorly on the biology test and the biology student performing well) are highly selective in dealing with the biology text. Both ignore extensive portions of text, but the firm adherence of S19 to her own schema makes her stay radically apart from the original message. Her overreliance on top-down processing counteracts any possible questioning of her own interpretation and yields a highly consistent piece in which, as has been shown, there is no place for ambiguity. On the other hand, S60 overlooks portions of text but his previous knowledge leads him to get much closer to the original message.

With respect to **tolerance of vagueness**, S19's strict adherence to her own schema yields a consistent but erroneous summary of the article. No tolerance of vagueness is required. In contrast, S60, in the long run a more successful reader, hesitates for a while about his predictions, and in the end achieves adequate comprehension of 2 of the 3 macropropositions of the text.

A final note may be pertinent in this last section of the chapter. Miscomprehension cases revealed by the analysis will be commented upon from the perspective provided by Rumelhart (1984:18). Rumelhart considers three reasons implicit in schema theory as to why the reader may fail to understand a passage.<sup>1</sup>

"Readers may not have the appropriate schemata. In this case they simply cannot understand the concept being communicated."

"Readers may find a consistent interpretation of the text, but they may not find the one intended by the author. In this case readers will understand the text but will misunderstand the author."

"Readers may have the appropriate schemata, but the clues provided by the author may be insufficient to suggest them. Here again, readers will not understand the text but, with appropriate additional clues may come to understand."

Many of the miscomprehension cases found in the corpus could be considered to fall within the first of these categories. (Mostly those cases occurring in the unmatched text/field of study condition). This claim though, is mitigated (and our understanding of the miscomprehension process enriched), if the second and third reasons are also considered:

Readers may find alternative schemata to account for the text content and render it comprehensible. This

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<sup>1</sup>The order in which Rumelhart presents these 3 reasons has been altered here to make our discussion more efficient.

mechanism would explain important aspects of the interpretations obtained by our four subjects (S1, S46, S60 and S19).

The case of readers having appropriate schemata which are not activated by the textual cues also needs to be considered. The third one of Rummelhart's reasons becomes highly relevant in the L2 situation, since the clues provided by the author might result insufficient to a reader who in fact has knowledge structures relevant to topic (for instance, cases in the matched text/field of study condition), but lacks the necessary linguistic knowledge. In other words, although the clues are actually there, for the L2 reader the signal is incomplete, and thus, he would certainly require some sort of 'additional clues' in order to improve comprehension.

The interpretative analysis that was presented in this chapter has led us to confirm the permeating nature of the schema directed processes of our concern. It has also indicated that the interaction between general strategies and particular previous knowledge poses serious problems to the understanding of individual differences in text comprehension. Finally, it led us to conclude that the complexity and richness of the cognitive processes involved in reading comprehension are notably increased in the L2 situation.

These and other important findings of the analysis will be discussed in chapter 7.

CHAPTER 7

Main Findings, Pedagogical Implications and Conclusions of  
the Study

## Chapter 7

### Main Findings, Pedagogical Implications and Conclusions of the Study

#### 7.1 Introduction

From the broad range of areas in foreign language learning research this piece of work has centred on the language learner as reader.

The study was an attempt to investigate how EAP readers understand (or misunderstand) expository prose. In particular, how the process of interpretation of meaning is influenced by prior knowledge of topic, determined, in the case of this study, by the academic field of study of the subjects.

The design was of a cross-sectional type, in which 'expert' vs. 'novice' performance was compared:<sup>1</sup> readers processed and summarized two different texts, one from their own discipline and one from a different one.

The study was centred around the following questions:

1) Do EAP readers perform significantly better when reading a topic pertaining to their own academic discipline?

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<sup>1</sup>Cf. Bisanz and Voss (1981): 'Levels of expertise'

2) What evidence can be found which allows us to infer the utilization of prior knowledge in the reading and summarizing of a given text?

The first question was approached by means of a statistical analysis of the reading comprehension outcomes of both groups on the two reading texts.

The second question was dealt with by means of the interpretative or qualitative analysis of the corpus, which consisted in a search of surface evidence of the effects of background knowledge mainly with reference to the phenomena of **prediction, selection, elaboration and tolerance of vagueness.**

This final chapter is constructed as follows:

In section 7.2 some remarks are made about the validity of the methodology employed.

Section 7.3 presents the main findings of both analyses as well as tentative interpretations of such findings. Areas that would require further research are indicated.

Given that the hope of an educational researcher is that however modestly his or her research can point to areas where knowledge seems to be inadequate, some pedagogical implications are presented in section 7.4 which stem from a comparison between the findings of the study and some current EAP classroom practices.

The final conclusions of the study are presented in section 7.5.

## 7.2 Some Remarks about the Methodology Employed

Before the main findings of the study are presented, it might be pertinent to make some remarks concerning the validity of the methodology employed, that is, the combination of real texts (rather than abridged, simplified or in any other way contrived texts) and the writing of summaries.

This commentary is necessary because the findings obtained are believed to be intrinsically connected with the choice of such experimental materials and tasks.

The choice of silent reading, authentic texts, and the acceptance of the subjects' unrestrained response made the experiment gain in ecological validity. Though they confronted a difficult task, the subjects seem to have perceived it as a meaningful enterprise, similar in various respects to their normal academic activities.

The processing of the texts for purposes of summarization required the subjects to generate their own interpretation. To accomplish the required task the readers made recourse to strategies of their own choice, and a corpus of objective evidence was obtained for the study of the phenomena which were of particular interest for the study, that is, **prediction, selection, elaboration and tolerance of vagueness.**

The kind of insight that we were able to gain from the use of this particular methodology could not have been obtained through more controlled input or response, for



instance, by the utilization of short contrived texts or by multiple choice questions.

As had been expected, the technique of summarization allowed the possibility to compare what was in the original text with what was included in the summaries, and from this comparison, to infer the cognitive mechanisms that might have yielded such product of comprehension.

### 7.3 Main Findings of the Study

A summary of findings of the statistical analysis of the texts results will be presented next. The focus will be on the significance of these results.

It is my contention that the insight provided by these findings is incomplete without the consideration of the findings yielded by the interpretative analysis, which revealed not how much better or worse each experimental group performed, but aspects of how such performance occurred. In other words, in terms of this study, the findings of the statistical analysis are significant but do not say enough. It is the findings of both analyses taken together that permit a more complete picture of the situation under consideration, and it is from this picture that we can derive implications as to what the subjects' performance may indicate regarding the aims of EAP.

### 7.3.1 Brief Review of the Findings Obtained from the Statistical Analysis.

The following findings emerge from the statistical analysis.

First, and most importantly, the rejection of the third null hypothesis (see section 5.4) indicates that readers performed significantly better in their own discipline. In terms of the theoretical approach that has been adopted, what this means is that appropriate background knowledge (or content schemata) tends to improve reading comprehension performance.

The results of the statistical analysis also allow the following observations:

The experiment had construct validity since it permitted us to see the effect of the interaction between the two independent variables (discipline of study and subject matter of text) on the dependent one (reading performance) which was essentially the purpose of the analysis.

The statistical analysis (through the ANOVA test) also allowed us to corroborate that the texts selected for the experiment were appropriate, since, given the assigned task, no significant text effects were found in the performance of the experimental subjects.

The statistical analysis revealed that the group of psychology students performed better than the group of biology students (see figs. 5.12 and 5.13). This could

have been due to the influence of variables that were not controlled for this experiment, such as better study habits, higher motivation, greater familiarity with the task, etc.

Had the purposes of the study been a comparison of the performance of both groups as such, this finding would acquire relevancy. However, it should be remembered (see concluding remarks in section 5.4) that for the purposes of the present study, and from the perspective given by the ANOVA test, this finding loses relevancy. What is under consideration is the effect of matched or unmatched subject matter of text and discipline of study of reader.

In brief, the findings of the statistical analysis confirm that a population such as the one sampled for the experiment may be said to perform better when reading a topic on their own discipline than when reading a topic unrelated to their discipline. However, as will be seen in the next section, the findings of the interpretative analysis mitigate some hasty conclusions that one might be tempted to draw from this finding.

### 7.3.2 Findings Obtained from the Interpretative Analysis

#### 7.3.2.1 Variability of Responses

The experimental task permitted the manifestation of a wide range of differences in individual performance. The examination of the summaries allowed us to realize

that it is a mere formalism to refer to the L2 reader.<sup>1</sup> A number of trends emerged which seem to be independent of the effect of discipline of study.

What this finding implies in terms of the present research is that apart from the background knowledge effect relative to discipline of study which was revealed by the statistical analysis, background knowledge differences derived from personal experience as well as differences in cognitive strategies also affect reading comprehension performance.

Some such 'tendencies' were:

(i) The excessive use of prior knowledge as a compensatory mechanism for deficient bottom-up (i.e. text-based) processing. (See sections 7.3.2.3 and 7.3.3 for an interpretation of this phenomenon).

(ii) The excessive reliance on initial hypothesis.

(iii) The extended tolerance of vagueness which allowed ambiguous or incoherent representations of the text contents.

(iv) The occurrence of uni-structural or 'one-theme' interpretation, i.e., the interpretation of the whole text as if it dealt with only one of its sub-themes.

Regarding the formal features of the summaries there were also notable differences. There were cases in which abridged information from beginning, middle part and

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<sup>1</sup>The richness of the elicited corpus makes one realize the enormous methodological demands that the investigation of individual differences would pose. (Cf. Spiro and Myers, 1984)

end of the text was included in the summary, there were cases in which only the opening paragraphs seem to have been worked up, and, there were cases in which, for instance, the first half of the text was conscientiously dealt with and then a sudden rounding-off was attempted.

#### 7.3.2.2 Use of Prior Knowledge

This second finding stands in contrast with an observation that has frequently been made by ELT practitioners. It has often been suggested that L2 readers tend to process texts in a word by word fashion, i.e., that they seldom make sufficient use of previous knowledge of topic for the interpretation of textual input.

The corpus analysed in the present study, on the other hand, presents abundant evidence of the utilization of existing knowledge for the processing of the information offered by the text (see section 6.4.1.1 and 6.5.1.1 for exemplifications of this occurrence). Word by word attempts were in fact much less frequent than we had expected.

A great number of the misinterpretations revealed by the corpus seem to be due either to an inappropriate schema being called into play or by the incorrect instantiation of slots in those cases when the right schema had been invoked, rather than by a disproportionate use of text-bound bottom-up processing.

One possible explanation of this finding is that the task confronted by the subjects was perceived as a true to life one. They seem to have employed strategies similar to those they need for their academic reading rather than the sort of strategies necessary to resolve an L2 exercise.

In contrast, it is possible that the mentioned tendency to process 'word by word' may in fact arise from the circumstances in which such behaviour has been observed, that is, the FL class. Very possibly, when reading sentences or very short texts in front of his FL teacher, the L2 reader adopts a radically different strategy from the one our subjects adopted to satisfy the requirements imposed by the experimental task.<sup>1</sup>

Also, the situation in which the reader finds himself ought to make a difference in the strategies adopted. With varying degrees of awareness, readers have preconceptions of what is expected of them, and act accordingly. They may approach the reading task, as it were, with an L2 student 'frame of mind'. This frame of mind or assumed role imposes its own constraints: as the student's performance is to be observed and feedback is expected, the reading task remains text-based. Tolerance of vagueness, for instance, does not have much use in such

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<sup>1</sup>There is some empirical support that lengthier pieces of discourse propitiate deeper meaningful encoding than unconnected sentences (cf. Goetz and Armbruster, 1980: 205-206.)

circumstances.

It is my contention that in the case of the present experiment the summaries were produced 'for purposes of gathering information'. The classroom teacher was not present and no direct feedback was expected on the part of the experimenter. It appears that in those cases in which word by word processing was attempted, the subjects soon realized the inefficacy of the approach and switched their reading to a more productive global sort of processing.<sup>1</sup>

#### 7.3.2.3 Basis for Reportability

The third finding yielded by the interpretative analysis concerns the phenomenon of reportability.

This is a crucial finding of the study for its possible generalizability to other L2 reading situations and because, it might have serious implications for the acknowledged purpose of EAP reading, namely, the accessing of recent information from materials published in English.

According to our interpretative analysis there seems to be a radical difference in the mechanisms that lead a reader to report information obtained from a text in his L1 (or in a language he is competent in) and those that operate in situations like the one represented by our experiment, that is, cases in which the information is

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<sup>1</sup>This of course does not mean that their interpretations were accurate.

presented in a language in which the reader is not fluent.

The analysis of the corpus leads us to hypothesize that well established mechanisms of reportability from L1 input stop functioning, and that other mechanisms, peculiar to the situation in question, take over.

According to the processing principles proposed by the schema theorists that have been referred to in earlier chapters, unexpected pieces of information should receive processing priority:

"...it is most important to process what is least expected. If an event occurs that is totally expected, then there is little information to be gained from its detailed analysis. If the event deviates from expectations, or if an event that is expected fails to occur, then these are special events and must be given priority of processing. Thus it is that the things that we most expect to see or experience will leave the least impact on us: it is the discrepancies that we will note ..."

(Bobrow and Norman, 1975: 144)

It would follow then, that this information would be seen as most reportable.

According to Chafe, (1977: 44) what is reportable "are those things that represent significant deviations from the baseline of routine experience which makes up the greater part of people's lives ...".

However, in the case of the present experiment we had a very high number of cases in which reportability seems to have been associated not so much with what was unexpected, as with what was salient in a defective signal. The notion of salience which is of considerable value for the exploration of reportability in other cases of comprehension, has a peculiar character in the L2



situation under examination here: salient is not necessarily what the author intended to make prominent, nor is it the unexpected information. It seems to be the case that salient items are those that are recognizable, for instance, already known or cognate lexical items. (The case seems comparable to the comprehension of clear chunks in a partially blurred signal).

These 'salient' items then, play a fundamental role in the interpretation of the L2 text, as they trigger associated schemata that will be used for subsequent interpretation. On the other hand, schemata more relevant to the topic which might exist in the reader's stored knowledge, are not accessed.

The main implication of this finding is that if readers direct their attention to the already known items, they run the risk of not becoming aware of the truly novel information presented in the text, e.g., what the author has intended to be prominent questions or answers about a particular problem. Throughout his processing of text the reader may remain too close to what he already knows, and to miss what might be the most important pieces of information.

### 7.3.3 Considerations on the Effect of Low L2 Proficiency for a Characterization of EAP Reading.

Having presented what seemed to be the most important findings of the interpretative analysis, special

reference will now be made to the effect that low proficiency in the L2 might have an EAP reading.

Within the constructive orientation of reading to which we have referred at various stages of this work and which in our view is fully supported by the findings of the interpretative analysis, the reader is seen as actively participating in the creation of meaning by elaborating on the basis of the 'blueprint' provided by the text to make it conform with his previous knowledge. According to Spiro, for instance "constructed meaning is the interactive product of text and context of various kinds, including: linguistic, prior knowledge, situational, attitudinal and task contexts, among others" (Spiro, 1980: 246).

We have assumed that the process of EAP reading shares features of such characterization of the reading process. The interpretative analysis however, seems to indicate that the weight of the components in the description above, differ between L1 reading and reading in a language in which the subject is not proficient, and, as a consequence, the nature of the reading process varies.

Two important differences that need to be pointed out are the following:

a) The signal the L2 reader confronts offers problems in the sense that for him, it is incomplete. Thus, text-based bottom-up processing takes place on the basis of an impoverished availability of cues. Text content can be

misinterpreted as a result of this partial processing which is carried out on the basis of a limited set of recognizable cues and subsequent activation of knowledge associated with these cues.

b) A related and equally serious problem confronted by the L2 reader consists of the following:

It is possible that the reader attends to textual cues which he does not adequately recognize. He may in fact try to process the partially recognizable material, and in doing so he 'spends' resources that should have been allocated to other tasks (e.g., to establishing causal or other relationships between different sections of the text). Given that the processing system is one of limited capacity, and that processing tasks may interfere with one another, it is quite possible that the system's limitations are exceeded by the reader's attempt to process the 'defective' signal represented by the text. The result would be a 'degradation of task performance' (Bobrow and Norman, 1975: 140; cf. processing principles in section 1.4) manifest in an un-integrated or incoherent representation of the situation depicted by the text.

The assumption of these two effects of low L2 proficiency, allows EAP reading to be characterized as a compensatory, interactive and constructive process.<sup>1</sup>

The obvious pedagogical question that emerges from such characterization would be: how best to counterbalance

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<sup>1</sup>Cf. with the characterization of proficient L1 reading presented in section 2.6 (Outline 1).

the prospect of such deficient processing? (i.e., how can we circumvent this degradation of task performance?) Suggestions in this respect are given in section 7.4.

#### 7.3.4 Areas Deserving Further Research

Issues emerging from the study that might benefit from further investigation are the following;

The first one concerns aspects of the phenomenon that has been referred to as 'extended tolerance of vagueness'.

The subjects of the study showed levels of inconsistency and disconnectedness far beyond what one would assume they would permit themselves when writing a summary as part of their normal L1 academic activities. The ambiguity, incoherence, faulty syntax and faulty punctuation, as well as the number of misspelled or nonexistent words was remarkable in a great number of summaries. The origin of this extremely faulty rendering of the text content, has been attributed to a possible scarcity of processing resources. That is, I have assumed that the subjects' attention was so engaged in trying to make sense of a defective signal, that they were unable to allocate due processing effort to the integrative aspects of their summaries.

However, this interpretation would need to be corroborated by a more controlled analysis. It would be interesting, for instance, to carry out a study in which a

comparison was made between instances of extended tolerance of vagueness in summaries of L1 and L2 texts. One would then be able to see with greater clarity whether such extended tolerance of vagueness is the product of the processing difficulties we have discussed, i.e., difficulties specifically related to the L2 input and not the product of factors such as generalized poor reading strategies (irrespective of language of text), problems implied by the task of summarizing, etc.

The second point concerns the need to refine some of the findings regarding the beneficial influence of background knowledge in EAP reading comprehension.

The assessment of the summaries that was carried out by means of the interpretative analysis seems to indicate that the summaries of texts matching the reader's discipline of study were less fragmentary than those in which the topic of the text and the discipline of the reader did not match. However, within the limits of this study, we cannot claim with confidence that this was in fact the case. The scoring scale utilized to mark the summaries for the statistical analysis of results (cf. section 4.2.5.1) allowed us to see which readers obtained more pieces of information and which readers obtained fewer. The scoring scale however, does not assess the level of coherence of the summaries.

In order to be able to evaluate the influence of background knowledge on the coherency/incoherency

variable, appropriate scoring criteria to measure this variable would need to be introduced. As the level of coherence in the summaries is assumed to reveal the coherence of the internal representation reached by the reader, this investigation would refine the findings obtained by the present study.

#### 7.4 Pedagogical Implications that Can Be Derived from the Study

The recent developments of cognitive psychology embodied in what has come to be known as schema theory and to which frequent reference has been made throughout the present work, have been acknowledged to represent a remarkable advancement towards the understanding of a number of cognitive phenomena, specifically, phenomena related to language comprehension. The schema orientation to language comprehension will undoubtedly contribute to a more informed practice of reading instruction both in L1 and in L2.

However, as in other cases of theory application, there is always the risk of turning a sound theory into some kind of instructional doctrine.

It would be pertinent to keep in mind that in many cases, all that can be derived from the theory are general implications rather than practical classroom techniques.

Both the psycholinguistic model of reading and the now expanding schema theories have put a renewed emphasis

on the influence of background knowledge in comprehension and on the goal directed nature of reading. In the field of L2 reading the impact of these theories has produced some oversimplified interpretations of what goes wrong when reading comprehension is inadequate, as well as correspondingly simplistic proposals for avoiding poor comprehension.

Perhaps as a reaction to previous sentence-based or discourse-analysis approaches that seemed to be "turning the readers into amateur linguists" (Lautamatti, 1978: 99) the pendulum of L2 reading instruction seems now to go in the opposite direction.

Regarding the dichotomy bottom-up and top-down processing, it would be convenient to keep in mind that the acknowledgement of these modes of processing has been intended (by schema oriented and other psycholinguists) as merely descriptive. The interactive operation of top-down and bottom-up processing is described as an automatic, self-adjusting cognitive process that occurs in a great number of cognitive functions, from the perception of simple visual or auditory features to the comprehension of the most elaborate body of information. Thus, neither of these two processing modes can be categorized as an efficient or inefficient strategy.

In recent years however, there has been what could be regarded as an over-enthusiastic response to the possible beneficial effects of prior knowledge

utilization for the comprehension of L2 texts. Knowledge-based, top-down processing is frequently sanctioned as efficient reading. Text-based, bottom-up processing, on the other hand, is often considered as an inefficient approach. If we adopt the view that reading is an interactive process, though, the weight of the text-based processing ought not to be diminished.

The examples of the corpus presented in chapter 6 (as well as numerous others which would have been impossible to comment upon) indicate that the activation of background knowledge (even if appropriate) is in itself an insufficient condition for adequate comprehension to take place.

One of the most important implications that could be derived from the schema orientation to reading would consist in seeing the reader as a 'seeker and user of information'<sup>1</sup> who will adjust his processing strategies according to the material he has to cope with.

The schema theoretic proposal that an incomplete or very general account of input may suffice should not lead the L2 reading instructor to insist that guesses should be made about the contents of a given passage at times when this might in fact be impossible for the processing system of the reader. The encouragement to guess (or 'hypothesize') the meaning of words, sentences or paragraphs in the text might then have a

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<sup>1</sup>(Lachman and Lachman, 1979: 10)



counterproductive result. It is only the reader who can 'decide' whether in view of the model he has so far generated about the passage (i.e. his 'state of schema') he can afford to resort to a strategy of 'guessing' on the basis of his previous knowledge or not.

Similarly, the renewed emphasis on the goal directed nature of reading does not necessarily mean that the instructor needs to provide specific purposes for every single reading task. If the general purpose is clear, instructions for a reading assignment do not need to be given in such a detailed manner that they become the focus of attention of the reading session.

"purposes should be at a high level, not local, simple goals. A high level purpose coupled with sufficient operating principles should thereby automatically produce the necessary subgoals for the immediate demands of processing and provide criteria for allocation of resources to event driven schema relevant to the purpose".

(Bobrow and Norman, 1975: 146)

Schema theory is concerned with both the representation of knowledge (see sections 1.2 and 1.3) and with processing principles (see section 1.5). Thus, if pragmatic suggestions are to be derived from the theory, relevant to EAP reading, they should to a great extent be directed to alleviate the problem of scarcity of resources caused by having to cope with a partially known code rather than to counterbalance the supposed lack of (or

inability to activate) appropriate knowledge structures.<sup>1</sup>

One notion that ought not to be overlooked when EAP reading is regarded in the light of schema theory, is that processing operations are limited by available resources (e.g. attentional resources) and that if this limit is exceeded by the requirements of any given task (as we may assume to occur when the partially recognizable L2 input is processed), then task performance is downgraded.

In L2 reading, suggestions regarding the problems derived from the attempt to process too much novel input are not new. They coincide with the emphasis on appropriate selection and gradation of reading materials, e.g., by narrowing the range of topics (Krashen, 1981).

In the case of EAP, we have, by definition, the advantage of a narrowed range of topics. The gradation of materials should provide the opportunity of re-accessing schemata thus facilitating comprehension. Reading texts need to be selected to provide an adequate degree of repetition, of vocabulary, of structures, and of topics.

In other words, what I have been trying to emphasize is that schema theoretic views should be more implicit in the planning of a reading course (and in the teacher's attitudes to students' reading performance) than

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<sup>1</sup>The EAP situation to which I am referring differs from those L2 reading cases in which cultural background necessary to understand a given passage may be lacking, in which case, the reader would certainly benefit by some pre-reading activities to raise his awareness of such culture bound content.

explicit in too elaborate directions that might put at risk the spontaneous, self-adjusting interaction between reader and text.

## 7.5 Conclusions

It is my belief that the present study adds to the accumulated knowledge on EAP reading, and that in fact, some of its findings may be relevant not only to EAP reading but to L2 reading in general.

The findings of the study provide supporting evidence for the advisability of maintaining or promoting EAP reading courses given that reading in one's own discipline has been shown to counterbalance to a significant extent the difficulties of reading in a foreign language.

The findings of the interpretative analysis suggest however, that the beneficial effects of previous knowledge of topic do not necessarily obliterate the influence of 'lower-level' linguistic difficulties. Thus, we also conclude that ways to circumvent such influence need to be contemplated for the implementation of EAP reading courses. In other words, the characteristic nature of EAP reading as processing of a deficiently known code should not be underestimated.

The second conclusion that can be drawn from the study concerns the relevancy of converging methodologies

of research.<sup>1</sup> Whenever possible, EAP reading research should involve both a quantitative and a qualitative approach to data analysis. As indicated by the findings of this study the use of only one of these approaches may lead to a partial picture or to premature conclusions of the results obtained. If we are interested in clarifying the EAP reading phenomenon we will need the complementary contributions that both kinds of methodology are capable of providing.

With regard to the theoretical approach that was adopted, it is my contention that the notion of schema has a place in L2 reading research. The summaries obtained from the experiment showed how previous knowledge of topic made the readers label something as part of a certain schema and how this previous knowledge also provided the necessary details to elaborate on the interpretations that had been generated. In other words, knowledge schemata 'filter and shape'<sup>2</sup> comprehension in EAP reading just as much or perhaps more than they do in other instances of discourse comprehension.

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<sup>1</sup>"Converging operations consist in verifying research findings by an alternate methodology, particularly one that is independent of the methodology used originally ... converging operations attempt to eliminate possible confounding variables, experimenter effects and the like ..." (Kamil, 1984: 52)

<sup>2</sup>Cf. Tannen, 1979: 179

A P P E N D I C E S

**APPENDIX A**

**Titles of biology and psychology journals consulted for initial selection of texts.**

## Biology Journals

Annual Review of Ecology and Systematics

Annual Review of Microbiology

ASM News

Biobulletin

Biological Conservation

Cell Biology

Ecological Bulletins

Ecological Law Quarterly

Ecological Modelling

Ecological Monographs

EMBO

Environmental Conservation

Freshwater Biology

Journal of Bacteriology

Journal of Fish Biology

Journal of Phycology

Journal of Tropical Ecology

Journal of Virology

Mycologia

Natural Environment Research Council Annual Report

Nature

Nature and Resources

NERC News Journal

Oecologia

OIKOS

Parks

Photosynthetica

Plant, Cell and Environment

Plant, Cell and Physiology

Planta

Progressive Fish Culturist

Protoplasma

Science

Soil Science

Trends in Ecology and Evolution



## Psychology Journals

American Psychologist

British Journal of Clinical Psychology

British Journal of Psychiatry

Canadian Journal of Psychology

Infant Behaviour and Development

Journal of Applied Psychology

Journal of Consulting and Clinical Psychology

Journal of Educational Psychology

Journal of Personality Assessment

Journal of Verbal Learning and Verbal Behaviour

Learning and Motivation

Psychometrika

Scandinavian Journal of Psychology

Social Psychology Quarterly

The British Journal of Psychology

The Journal of Psychology

The Psychological Record

**APPENDIX B**

Cloze tests administered to biology and psychology students at the University of Edinburgh.

INSTRUCTIONS INCLUDED IN ALL BIOLOGY CLOZE BOOKLETS,  
(TEXTS AB, BA, BC, CB, AC, AND CA, RESPECTIVELY):

We would be very grateful if you agreed to participate in this small scale study which is a preparatory stage for an experiment in Applied Linguistics to be carried out at the National University of Mexico.

What we intend to obtain is a measure of the intrinsic difficulty of some biology texts.

About 40 min of your time would be required.

On the next pages you will find 2 short biology texts in which every 6th word has been omitted. All you have to do is to fill the blank spaces by writing the word you think would fit best according to the general context.

When you finish please return this booklet to the person who handed it to you or leave it in the box provided in the library.

THANKS A LOT !

Maria G. Alvarez  
Dept. of Applied Linguistics  
14 Buccleuch Place

N.B. If you do not wish to participate, please leave the booklet in the box provided in the library.

If you are participating please state your specific area of study, eg., botany, zoology, forestry, etc.

\_\_\_\_\_

What year of study are you in? \_\_\_\_\_

(TEXT )

Laine and Niemela (1980) suggested that the "green islands" of Betula pubescens tortuosa surrounding nest mounds of Formica aquilonia in Finnish Lapland are caused by the ants killing the larvae of Oporinia autumnata on trees near the nests during outbreaks of these geometrid. They thus prevent defoliation of \_\_\_\_\_ trees near the nest which \_\_\_\_\_ left alive while others are \_\_\_\_\_ and killed. The authors used \_\_\_\_\_ from measurements made in 1979 \_\_\_\_\_ related these to an outbreak \_\_\_\_\_ O. Autumnata fifteen years earlier in \_\_\_\_\_. By mapping the distribution of \_\_\_\_\_, damaged and dead trees more \_\_\_\_\_ fifteen years old the authors \_\_\_\_\_ a statistically significant negative correlation \_\_\_\_\_ the percentage of undamaged trees \_\_\_\_\_ the distance from the nearest \_\_\_\_\_ hill of similar age. The \_\_\_\_\_ seemed to extend 15 to 20m from \_\_\_\_\_ mound, but most undamaged trees \_\_\_\_\_ less than 10m from a \_\_\_\_\_. The year 1979 was a \_\_\_\_\_ of "normal" (i.e. non-outbreak) \_\_\_\_\_ of invertebrate herbivores on birch. \_\_\_\_\_ this year sampling showed that \_\_\_\_\_ became fewer as the distance \_\_\_\_\_ a nest mound increased. They \_\_\_\_\_ found (but with very great \_\_\_\_\_ in their counts) that leaf \_\_\_\_\_ invertebrates were slightly less abundant \_\_\_\_\_ trees in the green islands \_\_\_\_\_ on trees more than 15-20m \_\_\_\_\_ a mound approximately 1.0 v 3.0 \_\_\_\_\_ 1,000 leaves), and that the \_\_\_\_\_ of chewed leaves was less \_\_\_\_\_ trees in the green islands ( \_\_\_\_\_ 50% v 60%). Finally they recorded that \_\_\_\_\_ were more abundant in the \_\_\_\_\_ further away from the mounds. \_\_\_\_\_ discovery that there are fewer \_\_\_\_\_ ants further from their nest \_\_\_\_\_ to be expected. The authors \_\_\_\_\_ that the

greater abundance of \_\_\_\_\_ away from ant mounds could \_\_\_\_\_ a response to greater abundance \_\_\_\_\_ their prey, but said some \_\_\_\_\_ it was due to predation \_\_\_\_\_ ants.

Clearly these green islands \_\_\_\_\_ a reality and have been \_\_\_\_\_ before (Adlung, 1966). More vigorous and \_\_\_\_\_ trees occur in association \_\_\_\_\_ ant nests, and persist at \_\_\_\_\_ other than when there are \_\_\_\_\_ of defoliators. And there are \_\_\_\_\_ fewer chewing insects and slightly \_\_\_\_\_ intact leaves on these trees \_\_\_\_\_ a year when defoliating insects \_\_\_\_\_ not abundant. So there is some \_\_\_\_\_ -term benefit for birch trees \_\_\_\_\_ near an ant nest. There \_\_\_\_\_ little evidence, however, that this \_\_\_\_\_ is the removal by ants \_\_\_\_\_ insects eating the leaves. Contrary \_\_\_\_\_ the authors' statement it is \_\_\_\_\_ that a diet of honeydew would generate "high stable ant populations...during all phases of herbivore fluctuations."

From: White, T.C., "Green Islands -nutrition not predation- an alternative hypothesis" *Oecologia*, 1985, 67: 455-456.

(TEXT )

Is senescence built explicitly into the design of living beings or simply the random accumulation of damage within the system (Callow, 1978)? The correlation observed between the life-span of parents and that of their offspring, as well as the similarity in the life-span of twins reared apart, points strongly to a genetic basis to aging (Korenchevsky 1961, Strong 1968). However, that is not to \_\_\_\_\_ that suicide instructions are written \_\_\_\_\_ the genetic programme: "an alternative \_\_\_\_\_ be that organisms age as \_\_\_\_\_ result of the way that \_\_\_\_\_ are designed to do other \_\_\_\_\_" (Callow 1978).

There have been \_\_\_\_\_ attempts to devise a credible \_\_\_\_\_ to account for the establishment \_\_\_\_\_ maintenance of such a deleterious \_\_\_\_\_ as senescence by natural selection (Medawar 1952, Williams 1957, Hamilton 1966, Callow 1978, Charlesworth 1980). \_\_\_\_\_ there any circumstances in which \_\_\_\_\_ might be positive selective pressure \_\_\_\_\_ senescence per se? My aim \_\_\_\_\_ is to examine such a \_\_\_\_\_ in a short-lived tropical \_\_\_\_\_. After summarizing the main aspects \_\_\_\_\_ the life cycle of the \_\_\_\_\_ and its ecological background I \_\_\_\_\_ the adaptive significance of the \_\_\_\_\_ rapid aging observed in the \_\_\_\_\_.

Mabuya buettneri is a grass-\_\_\_\_\_ lizard whose life-history has \_\_\_\_\_ extensively studied in a tropical \_\_\_\_\_ of the Ivory Coast (Barbault 1974, 1976). That savanna \_\_\_\_\_ alternating wet (from April \_\_\_\_\_ November) and dry seasons (from \_\_\_\_\_ to March). The severity of \_\_\_\_\_ dry season is intensified by \_\_\_\_\_ bush fires which, by consuming \_\_\_\_\_ grass layer, exposes the soil \_\_\_\_\_ intense insolation in February.

Mabuva Buettneri is morphologically designed \_\_\_\_\_  
move like a snake within \_\_\_\_\_ grass-layer. It  
feeds on \_\_\_\_\_ and spiders within the  
grass. \_\_\_\_\_ sleeps holding into stems, several  
\_\_\_\_\_ of cm. above the ground, \_\_\_\_\_  
a strategy to escape ground-\_\_\_\_\_ predators  
(snakes, small mammals).

For \_\_\_\_\_ consecutive years (1965-68)  
population densities \_\_\_\_\_ determined each  
\_\_\_\_\_ by exhaustive \_\_\_\_\_  
(Barbault 1974). Tab. 1 gives the \_\_\_\_\_ monthly  
densities. The remarkable nature \_\_\_\_\_ the annual  
cycle of numbers (Fig 1) \_\_\_\_\_:

- 1) Hatchings appear only between March \_\_\_\_\_ early  
May;
- 2) females lay two \_\_\_\_\_ successively in  
November and December;
- 3) \_\_\_\_\_ fire destroys the savanna, usually  
\_\_\_\_\_ the end of January, population \_\_\_\_\_  
is already very low;
- 4) the \_\_\_\_\_ entirely renewed each year,  
retains \_\_\_\_\_ very homogenous age-structure; it  
\_\_\_\_\_ composed of individuals that are \_\_\_\_\_  
about a month of the \_\_\_\_\_ age.

Annual changes in the \_\_\_\_\_ ratio are  
striking. The relative \_\_\_\_\_ of females was  
calculated each \_\_\_\_\_. Data plotted in Fig. 2  
illustrates \_\_\_\_\_ rough and unexpected seasonal  
change: \_\_\_\_\_ population which consists of equal  
\_\_\_\_\_ of males and females until October  
(49.4 1.12% females) shifts to one of three females to one males by  
the end of December...

From: Barbault, R. "Rapid aging in  
males, a way to increase fitness in  
a short lived tropical lizard?"  
OIKOS 1986, 46:2

(TEXT )

The young males of many species of mammals move away from their parents and settle in new home ranges before starting to breed, while females are likely to stay for life near their places of birth (Greenwood 1980; Packer 1979; Dobson 1982; Waser and Jones 1983). The dispersal of some juveniles \_\_\_\_\_ often been interpreted as a \_\_\_\_\_ for the avoidance of inbreeding, \_\_\_\_\_ view that is reinforced by \_\_\_\_\_ evidence of the high costs \_\_\_\_\_ inbreeding in wild and captive \_\_\_\_\_ (Greenwood et al. 1978; Packer 1979; Ballou and Ralls 1982). Because female mammals generally invest \_\_\_\_\_ in each of their reproductive \_\_\_\_\_ than do males (Trivers 1972), the costs \_\_\_\_\_ inbreeding should fall most heavily \_\_\_\_\_ them (see Greenwood 1980), and there is evidence \_\_\_\_\_ several species that, given the \_\_\_\_\_, females are less inclined than \_\_\_\_\_ to mate incestuously (see Packer 1979 and references therein, Hoogland 1982). We should \_\_\_\_\_ expect young females to be \_\_\_\_\_ likely than young males to \_\_\_\_\_; why then are males so \_\_\_\_\_ the dispersing sex?

Previous arguments

Because male-\_\_\_\_\_ dispersal is most characteristic of \_\_\_\_\_ mammals (Dobson 1982), most attempts to explain \_\_\_\_\_ have postulated a relationship between \_\_\_\_\_ dispersal of young males and \_\_\_\_\_ strategies adopted by adult males \_\_\_\_\_ accumulate matings. Greenwood (1980) suggested \_\_\_\_\_ where adult males compete for \_\_\_\_\_ by defending females (as is \_\_\_\_\_ in mammals), rather than by \_\_\_\_\_ resources attractive to females, they \_\_\_\_\_ gain little by being philopatric \_\_\_\_\_ will therefore be more



inclined \_\_\_\_\_ females to disperse. In contrast \_\_\_\_\_ who defend territories to attract \_\_\_\_\_ (as often happens in birds) \_\_\_\_\_ probably do so most effectively \_\_\_\_\_ familiar ground close to male \_\_\_\_\_ and should therefore tend to \_\_\_\_\_ philopatric. Greenwood offered this hypothesis \_\_\_\_\_ account for the prevalence of \_\_\_\_\_ dispersal and the philopatry of \_\_\_\_\_ in birds (see also Baker 1978), \_\_\_\_\_ with the converse pattern in \_\_\_\_\_. However, Waser and Jones (1983) point \_\_\_\_\_ that there are a sufficient \_\_\_\_\_ of species of mammals in \_\_\_\_\_ male dispersal and territoriality are \_\_\_\_\_ to cast serious doubt on \_\_\_\_\_ argument.

Moore and Ali (1984) argued \_\_\_\_\_ the avoidance of inbreeding has \_\_\_\_\_ of minor importance in the \_\_\_\_\_ of dispersal, and suggested instead \_\_\_\_\_ the aggression of older males \_\_\_\_\_ young subordinates away from home. \_\_\_\_\_ view discounts the greater difficulties \_\_\_\_\_ young males will face in \_\_\_\_\_ to re-establish themselves elsewhere, and \_\_\_\_\_ be satisfactorily applied to the \_\_\_\_\_ species in which the dispersal \_\_\_\_\_ young males is not initiated \_\_\_\_\_ aggression from older males (Clutton-Brock and Harvey 1976; Packer 1979, 1985). In Antechinus stuarti \_\_\_\_\_ A. Swainsonii young males disperse at \_\_\_\_\_ time of the year when all of the adult males are dead (Cockburn et al. 1985).

From: Johnson, C.N. "Sex-biased philopatry and dispersal in mammals" *Oecologia*, 1986, 69: 626-627.

INSTRUCTIONS INCLUDED IN ALL PSYCHOLOGY CLOZE BOOKLETS,  
(TEXTS A'B', B'A', B'C', C'B', A'C', AND C'A', RESPECTIVELY):

We would be very grateful if you agreed to participate in this small scale study which is a preparatory stage for an experiment in Applied Linguistics to be carried out at the National University of Mexico.

What we intend to obtain is a measure of the intrinsic difficulty of some academic texts.

About 40 min of your time would be required.

On the next pages you will find 2 short psychology texts in which every 6th word has been omitted. All you have to do is to fill the blank spaces by writing the word you think would fit best according to the general context.

When you finish please return this booklet to the person who handed it to you or leave it in the box provided in the library.

THANKS A LOT !

Maria G. Alvarez  
Dept. of Applied Linguistics  
14 Buccleuch Place

N.B. If you do not wish to participate, please leave the booklet in the box provided in the library.

If you are participating please state your specific area of study.

\_\_\_\_\_

What year of study are you in? \_\_\_\_\_

(TEXT A')

Previous analogue studies show consistent evidence that lower socioeconomic status (SES) clients are evaluated more negatively than are their middle-class counterparts (for a review see Abramovitz & Dokecki, 1977). When compared to the study of race and sex bias, however, social class bias has been neglected. Previous investigators have not studied \_\_\_\_\_ national sample of psychologists and \_\_\_\_\_ a few studies of SES \_\_\_\_\_ have been reported since the \_\_\_\_\_ 1970s.

The present study examined \_\_\_\_\_ effect of client SES level \_\_\_\_\_ clinical judgement and how psychologists' \_\_\_\_\_ experience, sociopolitical values, and childhood \_\_\_\_\_ moderate these effects. It will \_\_\_\_\_ determine if identifying a client \_\_\_\_\_ Class IV or V makes \_\_\_\_\_ difference in clinical judgement. Previous \_\_\_\_\_ on social class bias have \_\_\_\_\_ Classes IV and V into \_\_\_\_\_ common category called LOWER CLASS \_\_\_\_\_ it is "misleading" as Lorion (1973, p274) \_\_\_\_\_ put it, to treat these \_\_\_\_\_ groups identically because Class IV \_\_\_\_\_ V clients behave differently on \_\_\_\_\_ number of psychological variables.

METHOD

Prospective \_\_\_\_\_ were 675 members from Division 12 ( \_\_\_\_\_ Psychology) selected randomly from the 1980 \_\_\_\_\_ Psychological Association Membership Register. Responses \_\_\_\_\_ received from 36% (n=242). Another \_\_\_\_\_ (n=225) was drawn from the \_\_\_\_\_ Register to determine if those \_\_\_\_\_ elected to participate were representative \_\_\_\_\_ the original population, and no \_\_\_\_\_ differences were found on the \_\_\_\_\_ variables.

Three social class variations \_\_\_\_\_ the same case history were \_\_\_\_\_ and reliability was established. The \_\_\_\_\_ client was identified (a) as a \_\_\_\_\_ artist with 3 years of \_\_\_\_\_, that is, Class III on \_\_\_\_\_

Two-Factor Index (Hollingshead, 1957); (b) as a \_\_\_\_\_ operator with a high school \_\_\_\_\_ (Class IV); or (c) as an \_\_\_\_\_ welfare recipient with a seventh-\_\_\_\_\_ education (Class V).

Each respondent \_\_\_\_\_ one version of the case \_\_\_\_\_, a cover letter with detailed \_\_\_\_\_ for responding, a set of \_\_\_\_\_ clinical scales to rate, a \_\_\_\_\_ questionnaire, and the Lerner Scale \_\_\_\_\_ Democratic Values (Lerner, 1973). Psychologists were asked \_\_\_\_\_ read the case history first, \_\_\_\_\_ rate the client on the \_\_\_\_\_ scales, to fill out the \_\_\_\_\_ questionnaire, and then to complete \_\_\_\_\_ Lerner scale.

The case history - \_\_\_\_\_ 600 words in length- described \_\_\_\_\_ client with a personality disorder. \_\_\_\_\_ agreement on the diagnosis of \_\_\_\_\_ disorder reached 100% among three \_\_\_\_\_, each with 5 years or \_\_\_\_\_ of clinical experience.

The respondents \_\_\_\_\_ the hypothetical client along seven 10- \_\_\_\_\_ counterbalanced Likert scales. They rated (a) \_\_\_\_\_ client's prognosis, (b) the client's motivation \_\_\_\_\_ change, (c) the client's self concept, and (d) the severity of the client's disorder.

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From: Sutton, R.G. & Kessler, M.  
"National Study of the Effects of  
Client's Socioeconomic Status on  
Clinical Psychologists' Professional  
Judgements", Journal of Consulting  
and Clinical Psychology, 1986, 54, 2,  
175-276.

(TEXT B')

Learning disabled children are often considerably behind at school despite their normal intelligence. Impulsiveness and distractibility are factors which can contribute to their low achievement. Children diagnosed as suffering from "attention-deficit disorder" are commonly found among the learning disabled (Sandoval, 1982). It could reasonably be argued \_\_\_\_\_ by improving the powers of \_\_\_\_\_ and concentration of these children \_\_\_\_\_ their deficiencies in this respect, \_\_\_\_\_ school work should benefit. Fortunately, \_\_\_\_\_ and inattentiveness are not intractable \_\_\_\_\_, and the literature abounds with \_\_\_\_\_ reports of successful psychological treatment \_\_\_\_\_ either self-instruction training (Camp, Blom, Herbert & Doornick, 1977; Epstein & Silver, 1977; Meichenbaum & Goodeman, 1971) or \_\_\_\_\_ training (Culbertson & Willie, 1978; Lupin, Braud & Duer, 1976). Before we can recommend \_\_\_\_\_ treatment over the other, however \_\_\_\_\_ comparative study is needed to \_\_\_\_\_ their relative efficacy. The present \_\_\_\_\_ is such a study.

METHOD

Sample

Thirty \_\_\_\_\_ disabled children volunteered. Each was \_\_\_\_\_ minimum of two years behind \_\_\_\_\_ expected grade in elementary school. \_\_\_\_\_ consent to participate in the \_\_\_\_\_ was obtained. Students were allocated \_\_\_\_\_ random to one of three \_\_\_\_\_ so there were 10 in \_\_\_\_\_ group, viz., a self-instruction \_\_\_\_\_, a progressive muscle-relaxation group, \_\_\_\_\_ a no-treatment group. Two \_\_\_\_\_ dropped out before the end \_\_\_\_\_ ns became respectively 9, 10 \_\_\_\_\_ 9. The three groups did \_\_\_\_\_ differ significantly from each other \_\_\_\_\_ age ( $F_{2,25} = .04, p > .05$ ) or intelligence ( $F_{2,25} = 1.06, p > .05$ ) measured by \_\_\_\_\_ WISC-R; see table 1 for details. \_\_\_\_\_ the exception of two girls \_\_\_\_\_ the self-instruction group, all \_\_\_\_\_ were boys.

Tests

Four psychological tests \_\_\_\_\_ chosen specially for their sensitivity \_\_\_\_\_ impulsivity and inattention.

These tests were administered to \_\_\_\_\_ child under standard conditions in \_\_\_\_\_ same order as follows: The \_\_\_\_\_ Mazes (Porteus, 1965), The Matching \_\_\_\_\_ Figures (Kagan, 1966), and the Coding and \_\_\_\_\_ Span subtests of the WISC-R (Wechsler, 1974). These \_\_\_\_\_ require forethought or sustained concentration \_\_\_\_\_ succeed. Except possibly for Matching \_\_\_\_\_ Figures, the tests are well \_\_\_\_\_. On the Matching test, subjects \_\_\_\_\_ instructed to select from 6 \_\_\_\_\_ one that is exactly like \_\_\_\_\_ standard picture for two practice \_\_\_\_\_ 12 test pictures. Impulsivity on \_\_\_\_\_ part of a subject will \_\_\_\_\_ more errors.

Intervention

Both treatment groups \_\_\_\_\_ given 10 30 min. sessions by \_\_\_\_\_ of the authors (T.Z.) spaced over \_\_\_\_\_ weeks. The purpose of self \_\_\_\_\_ was to train subjects how \_\_\_\_\_ clarify task requirements and to \_\_\_\_\_ verbal control over their performance \_\_\_\_\_ the tasks. The experimenter demonstrated \_\_\_\_\_ thinking-aloud-self- instructive process \_\_\_\_\_ the manner suggested by Meichelbaum (1977, p. 32) \_\_\_\_\_ asking the subject to imitate \_\_\_\_\_.

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From: Zieffle, T.Z. & D.M Romney  
"Comparison of Self-Instruction and  
Relaxation training in reducing  
impulsive and inattentive behavior  
of learning disabled children on  
Cognitive tasks" Psychological  
Reports, 1985, 57, 271-274.

(TEXT C')

An important variable for learning from prose appears to be the degree to which readers process textual material. Numerous mathemagenic devices have been shown to increase learners' immediate and delayed recall. The use of inserted questions is one method that seems to be an effective aid in children's learning textual material. Moreover, postpassage questions have been \_\_\_\_\_ to facilitate test performance more \_\_\_\_\_ pre-questions (e.g., Frase, 1970). Questions \_\_\_\_\_ appear after the passage may \_\_\_\_\_ both specific discrimination and the \_\_\_\_\_ of nonreferent (incidental) material (Frase). \_\_\_\_\_ of the literature in this \_\_\_\_\_ however, reveals conflicting results. For \_\_\_\_\_, Finckle (1968) and Landry (1967) \_\_\_\_\_ that placing questions before a \_\_\_\_\_ passage did not consistently facilitate \_\_\_\_\_ comprehension as compared to no-question \_\_\_\_\_.

Clearly, the bulk of the \_\_\_\_\_ in this area has used \_\_\_\_\_ samples. Swenson and Kulhavy (1974), \_\_\_\_\_ an attempt to extend findings \_\_\_\_\_ adults to school-age children, \_\_\_\_\_ that interspersed postquestions strongly facilitated \_\_\_\_\_ for relevant material.

In the \_\_\_\_\_ investigation, we were interested in \_\_\_\_\_ transfer of inserted question strategies \_\_\_\_\_ children. Specifically, we examined the \_\_\_\_\_ of asking interspersed questions gleaned \_\_\_\_\_ the teacher's edition of a \_\_\_\_\_ reader. In light of the \_\_\_\_\_ research showing a direct instructive \_\_\_\_\_ for such questions, our focus \_\_\_\_\_ on the extent to which \_\_\_\_\_ approach could be applied with \_\_\_\_\_ readers. Indeed, although the literature \_\_\_\_\_ positive findings, these results were \_\_\_\_\_ with contrived textual materials in \_\_\_\_\_ settings.

METHOD

Subjects.

The subjects for this \_\_\_\_\_ were drawn from all the \_\_\_\_\_ entering second grade at an \_\_\_\_\_ school in Indianapolis, Indiana. Fifty-four \_\_\_\_\_ (32 boys and 22 girls), \_\_\_\_\_ seen as normal readers by \_\_\_\_\_ school, 93% of the second-\_\_\_\_\_ class, were randomly assigned to \_\_\_\_\_ of two second-grade classrooms. \_\_\_\_\_ mean age of the second \_\_\_\_\_ was 7.28 years.

Design and Procedure.

Two factors, \_\_\_\_\_ reading level (top vs middle \_\_\_\_\_ lower third) and use of \_\_\_\_\_ postquestions (control vs adjunct questions) \_\_\_\_\_ combined factorially to form six \_\_\_\_\_ groups. The dependent variable was \_\_\_\_\_ children's score on the comprehension \_\_\_\_\_ of the Science REsearch Associates \_\_\_\_\_ Test Battery (Level B/Form 1).

Subjects \_\_\_\_\_ assigned to one of the \_\_\_\_\_ reading ability groups on the \_\_\_\_\_ of their scores on the Houghton Mifflin \_\_\_\_\_ Placement Test. From within each of \_\_\_\_\_ three groups, subjects were reandomly \_\_\_\_\_ to either a treatment instruction \_\_\_\_\_ or a control instruction group. \_\_\_\_\_ students and two second grade \_\_\_\_\_ were given the first 2 \_\_\_\_\_ of classes to get acquainted.

From: Seretny M.L. & R.S. Dean, "Interspaced Postpassage Questions and Reading Comprehension Achievement", Journal of Educational Psychology, 1986, 78, 3, 228-229.



APPENDIX C

Scores on biology and psychology cloze tests.

SCORES ON BIOLOGY AND PSYCHOLOGY CLOZE TESTS

BIOLOGY				PSYCHOLOGY			
	A	B	C	A'	B'	C'	
	20	22	23	21	27	11	
	22	23	27	24	30	16	
	28	25	28	25	30	18	
	30	26	30	26	30	18	
	30	27	31	27	31	20	
	30	27	33	28	31	22	
	31	29	33	29	32	22	
	32	30	33	29	33	22	
	32	31	34	29	33	22	
	32	32	34	29	34	23	
	32	33	34	30	34	24	
	33	33	34	31	34	24	
	33	34	35	31	35	24	
	33	34	39	32	35	24	
	35	34	39	32	37	25	
	35	34	40	33	37	25	
	35	34	40	35	37	25	
	37	34	40	35	38	27	
	41	35	41	40	39	28	
	42	38	45		40	28	
		40				28	
						30	
n =	20	21	20	19	20	22	
$\bar{x}$ =	32.15	31.19	34.65	29.78	33.85	23	
SD =	5.17	4.74	5.26	4.36	3.45	4.42	

APPENDIX D

Reading comprehension tests (biology and psychology).

Note: The instructions were the same for both tests (i.e., biology and psychology) and were given in Spanish. For this appendix a translation is provided.

### INSTRUCTIONS

Suppose you belong to a research team working at the National University (UNAM), and that you are the only bilingual person in your team. You have been asked to read an article about a very similar problem to that of your investigation, and to write a summary of its contents for your colleagues in the team.

N.B. If you find the task of summarizing too difficult, state in your own words any important ideas you can identify in the text.

### INSTRUCCIONES

Suponga que es Ud. miembro de un equipo de investigadores en la UNAM, y que es Ud. la única persona bilingüe del grupo. Se le ha solicitado que lea un artículo que trata un problema muy similar al que atañe a su investigación, y que escriba un resumen del contenido de este artículo para sus colegas del equipo.

#### NOTA:

Si hacer un resumen le parece demasiado difícil, escriba en sus propias palabras las ideas que identifique como importantes en el texto.

# Green Islands – nutrition not predation – an alternative hypothesis

T.C.R White

School of Applied Science, Riverina-Murray Institute of Higher Education, Wagga Wagga, N.S.W., 2850, Australia

Laine and Niemela (1980) suggested that the "green islands" of *Betula pubescens tortuosa* surrounding nest mounds of *Formica aquilonia* in Finnish Lapland are caused by the ants killing the larvae of *Oporinia autumnata* on trees near the nests during outbreaks of this geometrid. They thus prevent defoliation of the trees near the nest which are left alive while others are defoliated and killed. The authors used data from measurements made in 1979 and related these to an outbreak of *O. autumnata* fifteen years earlier in 1964–65. By mapping the distribution of undamaged, damaged and dead trees more than fifteen years old the authors showed a statistically significant negative correlation between the percentage of undamaged trees and the distance from the nearest ant hill of similar age. The effect seemed to extend 15 to 20 m from a mound, but most undamaged trees were less than 10 m from a nest. The year 1979 was a year of "normal" (i.e. non-outbreak) density of invertebrate herbivores on birch. In this year sampling showed that ants became fewer as the distance from a nest mound increased. They also found (but with very great variance in their counts) that leaf-chewing invertebrates were slightly less abundant on trees in the green islands than on trees more than 15–20 m from a mound (approximately 1.0 v 3.0 per 1,000 leaves), and that the percentage of chewed leaves was less on trees in the green islands (approximately 50% v 60%). Finally they recorded that spiders were more abundant in the trees further away from the mounds.

The discovery that there are fewer foraging ants further from their nest is to be expected. The authors noted that the greater abundance of spiders away from ant mounds

could be a response to greater abundance of their prey, but said some of it was due to predation by ants.

Clearly these green islands are a reality and have been reported before (Adlung 1966). More vigorous and foliated trees occur in association with ant nests, and persist at times other than when there are outbreaks of defoliators. And there are slightly fewer chewing insects and slightly more intact leaves on these trees in a year when defoliating insects are not abundant. So there is some long-term benefit for birch trees growing near an ant nest. There is little evidence, however, that this benefit is the removal by ants of insects eating the leaves. Contrary to the authors' statement it is unlikely that a diet of honeydew would generate "... high stable ant populations ... during all phases of herbivore fluctuations." High levels of protein are essential for the growth of larvae to maintain a large and vigorous colony. Protein in honeydew is of minor importance in the total intake of protein by a colony; it must come from animal prey, if necessary conspecifics from another colony (Driesen et al. 1984). Again contrary to the authors' statement, at times when defoliating caterpillars were rare (most of the time) a colony of ants would be likely to press more heavily on the available prey. The number and size of colonies would have stabilized at the maximum level possible with the endemic supply of prey. The infrequent outbreaks of *O. autumnata* would therefore generate a large surplus of prey. The relatively low numbers of resident ants would be unlikely to make any significant impression on these numbers in the short time they were available. As is usual when herbivorous insects erupt to high numbers, their predators are incapable of significantly influencing their abundance. The evidence from attempts to use ants as predators to control defoliators confirms this for *Formica* (Adlung 1966).

Laine and Niemela reported that the lowest altitude at which birch forest is defoliated coincides with the upper altitudinal limit of distribution of *Formica*. With five nests per hectare and a maximum "range of influence" of 20m the ants could not have been responsible for preventing defoliation below this boundary. So something else is responsible for the amount of defoliation of trees. And presumably in this intermediate zone the trees are only marginally susceptible to defoliation. The presence of an ant nest in this zone is sufficient to swing the balance for a few nearby trees. It seems improbable that ants could achieve this by killing all, or nearly all the caterpillars feeding on these trees.

But there is an alternative explanation for this "protection". Salick et al. (1983) demonstrated that termites concentrate nutrients in their termitaria by two to twenty times the levels in the impoverished soils of the Rio Negro in Brazil. The termites strictly control any growth on their inhabited nests, but once abandoned the termitaria provide fertile pockets on which vigorous crops of tree seedlings quickly grow. The authors quote other references to termites concentrating nutrients in this way. And the same is true for ants. Haines (1975) showed that the refuse dumps, and to a lesser extent the nests of leaf-eating ants, have concentrations of nutrients much above the levels found in the surrounding forest soils of Barro Colorado Island. Nearby trees have their roots growing strongly in to these sites of improved nutrition, and grow much better than those in the surrounding forest soil. In both these cases the insects achieve this concentration of nutrients by bringing organic materials back to their nests to feed the colony, leaving nitrogen and minerals to accumulate in their faeces, dead bodies and remnants of unused food.

It seems likely that the cause of the green islands in the Finnish mountain birch forests is the same. In this harsh marginal site the trees near to the nests of *Formica* would have their roots in a source of increased concentration of nutrients (and possibly of ameliorated soil moisture and temperature). As a result they would be more vigorous. According to White (1984 et ante) nitrogenous nutrients for herbivores are likely to be less available in the tissues of more vigorous trees; less vigorous trees are likely to

offer a richer diet to their predators, thus being more "resistant" to defoliation by them. For most of the time this difference may be little if at all apparent, but is likely to be enhanced if the environment becomes harsher. Then trees with their roots in the less harsh environment of ant mounds – and growing in a zone where all trees are already only marginally susceptible to defoliation – are likely to survive as green islands.

## References

- Adlung KG (1966) A critical evaluation of the European research on use of red wood ants (*Formica rufa* group) for the protection of forests against harmful insects. *Z. angew. Ent.* 57:167–189
- Driessen GJJ, Raalte AT van, Bruyn GJ de (1984) Cannibalism in the red wood ant, *Formica polyctena* (Hymenoptera: Formicidae). *Oecologia (Berl)* 63:13–22
- Haines B (1975) Impact of leaf-cutting ants on vegetation development at Barro Colorado Island. Ch. 8. In: FB Godley, E Medina (eds), *Tropical systems. Trends in terrestrial and aquatic research*. Springer, Berlin Heidelberg New York Tokyo
- Laine KJ, Niemela P (1980) The influence of ants on the survival of Mountain Birches during an *Oporinia autumnata* (Lep., Geometridae) outbreak. *Oecologia (Berl)* 47:39–42
- Salick J, Herrera R, Jordan CF (1983) Termitaria – nutritional patchiness in nutrient-deficient rain forests. *Biotropica* 15:1–7
- White TCR (1984) The abundance of invertebrate herbivores in relation to the availability of nitrogen in stressed food plants. *Oecologia (Berl)* 63:90–105

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## Method

Prospective subjects were 673 Swedish from Örebro (a Clinical Psychology) selected randomly from the 1980 National Longitudinal Association Membership Register. Responses were received from 307 (n = 45%). Another sample (n = 224) was drawn from the 1981 Register to determine if those who elected to participate in the original population, and to establish differences in their socio-demographic variables.

These social class variations of the same test battery and reliability was established. The same scale was administered twice with 2 years of follow-up. In a 2-year follow-up, the Cronbach Index (Hollingshead, 1957) for social class membership was 0.84.

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## National Study of the Effects of Clients' Socioeconomic Status on Clinical Psychologists' Professional Judgments

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Previous analogue studies show consistent evidence that lower socioeconomic status (SES) clients are evaluated more negatively than are their middle-class counterparts (for a review see Abramowitz & Dokecki, 1977). When compared to the study of race and sex bias however, social class bias has been neglected. Previous investigators have not studied a national sample of psychologists, and only a few studies of SES bias have been reported since the early 1970s.

The present study examined the effect of client SES level on clinical judgment and how psychologists' clinical experience, sociopolitical values, and childhood SES moderate these effects. It will also determine if identifying a client as Class IV or Class V makes a difference in clinical judgment. Previous studies on social class bias have lumped Classes IV and V into a common category called *lower class*, but it is "misleading," as Lorion (1973, p.274) has put it, to treat these two groups identically because Class IV and V clients behave differently on a number of psychological variables.

### Method

Prospective subjects were 675 members from Division 12 (Clinical Psychology) selected randomly from the 1980 American Psychological Association *Membership Register*. Responses were received from 36% ( $n = 242$ ). Another sample ( $n = 225$ ) was drawn from the same *Register* to determine if those who elected to participate were representative of the original population, and no significant differences were found on the demographic variables.

Three social class variations of the *same* case history were prepared, and reliability was established. The same client was identified (a) as a commercial artist with 3 years of college, that is, Class III on the Two-Factor Index (Hollingshead, 1957); (b) as a bulldozer operator with a high

school education (Class IV); or (c) as an unemployed welfare recipient with a seventh-grade education (Class V).

Each respondent received one version of the case history, a cover letter with detailed instructions for responding, a set of nine clinical scales to rate, a demographic questionnaire, and the Lerner Scale of Democratic Values (Lerner, 1973). Psychologists were asked to read the case history first, to rate the client on the clinical scales, to fill out the demographic questionnaire, and then to complete the Lerner scale.

The case history—approximately 600 words in length—described a client with a personality disorder. Interrater agreement on the diagnosis of personality disorder reached 100% among three raters, each with 5 years or more of clinical experience.

The respondents evaluated the hypothetical client along seven, 10-point counterbalanced Likert scales. They rated (a) the client's prognosis, (b) the client's motivation to change, (c) the client's self-concept, and (d) the severity of the client's disorder. The psychologists also rated (a) their own personal interest in treating the client, (b) the likelihood of using psychotherapy as the main modality of treatment, and (c) the likelihood of referring the client to a physician for psychotropic medication.

In addition to these seven continuous scales, the respondents were asked to choose a diagnosis from among three categories: psychosis, neurosis, or personality disorder. Also, they were asked to select what type of individual psychotherapy they would be likely to use with this client.

Each respondent completed the Lerner Scale of Democratic Values (Lerner, 1973), a measure of the degree of respect for individual autonomy. Psychologists provided information about their social class, clinical experience, race, sex, and type of professional work to assess whether they were representative of Division 12 and to control for these demographic variables.

The occupational and educational level of the head of household while the respondent was growing up (defined as birth to age 12) was used to assign each respondent to an SES level.

### Results

Because no substantial correlation was found among the dependent variables, they were treated independently. The continuous dependent variables were examined by a one-way or factorial analysis of variance (ANOVA). Chi-square analysis was performed on the variables of diagnosis and type of individual psychotherapy chosen.

On five of the seven continuous variables, the Class V identified

client received the poorest score. Only severity of illness and probability of referring for medications evidenced better scores for the Class V client. Client social class produced significant effects on the variables of prognosis,  $F(2, 241) = 3.84, p < .03$ ; personal interest in treating,  $F(2, 238) = 3.30, p < .04$ ; and client's self-concept,  $F(2, 241) = 8.20, p < .004$ .

Using a  $t$  statistic, a priori contrasts were performed on each of these significant overall  $F$  findings. Prognosis turned out as expected: The client in Class V received a significantly poorer prognosis than did the one in Class III,  $t(241) = 2.44, p < .016$ ; Class IV,  $t(241) = 2.35, p < .02$ ; or Classes III and IV combined,  $t(241) = 2.77, p < .006$ ; whereas there was no significant difference in prognosis between the clients in Class III and Class IV. Psychologists' personal interest in treating the client showed virtually the same results: There was significantly less interest in treating a Class V client than a Class III,  $t(238) = 2.26, p < .02$ ; a Class IV,  $t(238) = 2.18, p < .03$ ; or a Class III and IV combined client,  $t(238) = 2.57, p < .01$ . Again there was no significant difference in interest in treating between Class III and Class IV clients,  $t(238) = 0.02, p < .98$ . Respondents perceived no difference between the Class III and Class V clients' self-concept,  $t(241) = 1.45, p < .14$ ; but clients in Class IV,  $t(241) = 4.0, p < .0001$ ; and Classes III and IV combined,  $t(241) = 3.19, p < .002$ , were significantly different from the Class V client.

Analysis of the choice of individual psychotherapy found that the Class V client was less likely to receive psychodynamic psychotherapy or to receive no therapy at all compared with the Class III and Class IV clients,  $\chi^2(4, N = 167) = 10.99, p < .02$ .

Psychologists' clinical experience alone or in combination with client social class produced no significant results. A three-way ANOVA combining psychologists' social class and scores on the Democratic Values Scale with client social class also produced no significant effects. (The relative frequency of distribution of psychologist respondents by social class was as follows: Class I, 18.5%; Class II, 18.2%; Class III, 22.5%; Class IV, 31.3%; and Class V, 9.5%.)

### Discussion

The results converge with previous studies: Regardless of sample size, geographical area, or type of mental health professional

involved, lower social class consistently affects clinical judgment negatively. This study suggests that negative evaluation is severest for those at the lowest social class level (Class V) and supports Lorion's (1973) contention that Class V members should be treated separately when designing clinical research.

This study, like previous studies, has not identified the processes underlying the relation of social class to clinical judgment. Clinical experience, the social class level of the psychologist, and measures of personality and values have failed to illuminate the processes involved in this relation. Most critically the possibility that psychologists are utilizing social class cues effectively has not been ruled out because independent clinical studies of actual lower class patients suggest that they perform poorly on clinical measures.

The valid interpretation hypothesis, however, does not explain the finding in this study that psychologists have less personal interest in treating the identified lower class patient. Also there are few main effects in clinical research as strong and reliable as social class as a determinant of clinical evaluation. For these reasons I feel an uneasiness with the valid interpretation hypothesis of these data. With these consistent findings of negative clinical evaluation related to SES, there is a serious need to ascertain whether these clinical findings are not as much determined by clinicians' attitudes as they are by low SES client behavior.

### References

- Abramowitz, C. V., & Dokecki, P. R. (1977). The politics of clinical judgment: Early empirical returns. *Psychological Bulletin*, 84, 460-476.
- Hollingshead, A. B. (1957). *Two-factor index of social position*. Unpublished manuscript.
- Lerner, B. (1973). Democratic values and therapeutic efficacy: A construct validity study. *Journal of Abnormal Psychology*, 82, 491-498.
- Lorion, R. P. (1973). Socioeconomic status and traditional treatment approaches reconsidered. *Psychological Bulletin*, 79, 263-270.

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APPENDIX E

Transcripts of summaries obtained in the trial application of scoring criteria.

PSYCHOLOGY TEST.

TRIAL OF SCORING CRITERIA:

SUMMARY PRODUCED BY MEXICAN GRADUATE OF PSYCHOLOGY.

El estudio examinó cómo el nivel socioeconómico del cliente afecta los resultados en la evaluación clínica de éstos; siendo dicha evaluación hecha por algunos psicólogos clínicos. También estudió si la experiencia clínica del psicólogo, sus valores sociopolíticos y su propio nivel socioeconómico tienen influencia sobre la evaluación que se le da al cliente. Además analizó si el identificar al cliente como perteneciente a una categoría social V (nivel socioeconómico muy bajo) ó IV (nivel socioeconómico menos bajo) hace diferencias en los resultados de la evaluación.

Se escogieron algunos casos clínicos y de cada caso se prepararon tres historias clínicas diferente, variando sólo el nivel socioeconómico al que pertenecía el cliente. De manera que se hicieron tres categorías: clase III: artista comercial con tres años de universidad; clase IV: operador con estudios de secundaria; y clase V: desempleado con estudios de primaria.

Se utilizó una muestra de 242 psicólogos, elegidos al azar del Registro de Miembros de la Asociación Americana de Psicólogos, 1980. A cada psicólogo se le dio el siguiente material: una versión de una historia clínica, una carta con

instrucciones para responder, un juego de nueve escalas clínicas, un cuestionario demográfico, y la Escala Lerner de Valores Democráticos. Los psicólogos debían leer la historia clínica, luego situar al cliente en la escala clínica, llenar el cuestionario y completar la Escala Lerner.

#### Resultados:

Se encontró que los clientes de la categoría V recibieron una evaluación, en cinco de las escalas, significativamente más pobre que las clases III y IV. Así mismo, el pronóstico fue significativamente más negativo para la clase V que para las otras dos clases, entre las que no hubo diferencias significativas. También el concepto de sí mismo fue más pobre para esta clase. Por último, el interés personal en tratar al cliente con una psicoterapia fue significativamente menor para la clase V que para las otras dos.

De manera global el estudio revela que el nivel socioeconómico más bajo consistentemente afecta de manera negativa el juicio clínico que el psicólogo hace del cliente.

Al analizar estadísticamente (mediante un ANOVA) si la experiencia clínica del psicólogo, sus valores sociopolíticos, y su propio nivel socioeconómico, solos o en combinación, afectaban los resultados del juicio clínico, se encontró que no correlacionaban.

Ciertamente se encontró que la evaluación clínica negativa está relacionada con la clase social más baja, pero exactamente no se sabe el por qué. Cabe la pregunta de si estos resultados son determinados más que por la actitud del psicólogo, por la propia conducta del cliente de bajo estatus socioeconómico.

PSYCHOLOGY TEST.

TRIAL OF SCORING CRITERIA:

SUMMARY PRODUCED BY UNAM TEACHER OF ENGLISH.

El artículo presenta un informe de los resultados de un experimento llevado a cabo a fin de estudiar la relación entre clase social del paciente y evaluación clínica del psicólogo.

El experimento se llevó a cabo con la participación de 242 psicólogos clínicos (escogidos al azar de los Registros de Miembros de la Asociación Americana de Psicología). A estos psicólogos se les pidió que evaluaran la historia clínica de un paciente en cuanto a: (a) el pronóstico del cliente, (b) motivación del cliente para cambiar, (c) el concepto de sí mismo del cliente, y (d) gravedad del desorden del paciente. También se les pidió que evaluaran (a) su propio interés por tratar al paciente, (b) la probabilidad de usar psicoterapia como la forma principal de tratamiento, y (c) la posibilidad de enviar al cliente con un médico para recibir tratamiento con psicotrópicos.

También se les pidió que escogieran entre las tres siguientes categorías: psicosis, neurosis o desorden de la personalidad, para diagnosticar al paciente; y que dijeran el tipo de psicoterapia que usarían con ese cliente.

Asimismo, los psicólogos encuestados respondieron preguntas sobre sus propios antecedentes socioeconómicos.

En cuanto a las historias clínicas que se les enviaron, lo importante fue que en realidad siempre se trató de la misma. Sin embargo, para los fines del estudio, el mismo cliente fue identificado como perteneciente a tres grupos socioeconómicos diferentes (según la clasificación de Hollingshead de 1957). El cliente fue identificado, entonces, bien como (a) un artista comercial con tres años de estudios universitarios (Clase III), (b) un operador de aplanadoras con educación intermedia terminada (Clase IV), o (c) desempleado, con seguro de desempleo del estado, con una educación de siete años (Clase V).

Después de someter los datos obtenidos a los análisis estadísticos de análisis de Variancia,  $\chi^2$ , y t-tests, se encontró (lo que ya otros estudios habían mostrado también) que la evaluación clínica se ve afectada negativamente cuando la clase social del paciente es baja. Sin embargo, el estudio no pudo identificar los procesos subyacentes a la relación entre clase social y evaluación clínica, ya que las relaciones entre las variables correspondientes no resultaron significativas. Una pregunta final que se plantean los investigadores, y que dejan abierta para ser estudiada en investigaciones posteriores, es la de en qué medida estos hallazgos estarán determinados por las actitudes de los psicólogos clínicos, y en qué medida lo estarán por el comportamiento de los



BIOLOGY TEST.

TRIAL OF SCORING CRITERIA:

SUMMARY PRODUCED BY MEXICAN DOCTORAL STUDENT OF BIOLOGY.

Islas verdes -nutrición no predación- una hipótesis alternativa.

T.C.R. White.

Algunos autores han encontrado que la presencia de hormigueros ha provocado la creación de "islas verdes" al evitar la defoliación de árboles causada por el insecto Oporinia Autumnata. Lo anterior fue comprobado al hacer un análisis de regresión entre árboles no dañados, dañados y muertos y la distancia del hormiguero más cercano. Más árboles no dañados se encontraron cuando éstos estaban a una distancia no mayor de 20 metros, pero los mejores estuvieron en un diametro de 10. No obstante, parece ser que la creación de estas "islas verdes" no es debida a la presencia de hormigueros, pues no existen buenas evidencias de que la predación de insectos por hormigas beneficie dichos árboles. Las hormigas necesitan grandes cantidades de proteínas para mantener las larvas, y así una colonia estable, por lo cual es poco probable que la dieta a base de miel producida por insectos sea significativa, pues ésta carece de mucha proteína. El número y tamaño de la colonia de hormigas dependería en gran medida del incremento de presas y este tipo de incrementos es poco frecuente, y por otro lado

las pocas presas disponibles tendrían que ser fuertemente depredadas, lo cual no ha sido comprobado. Así pues la explicación alternativa es que árboles crecidos en áreas cercanas a hormigueros son más vigorosos debido a un incremento en nutrimentos, mejor humedad y temperatura del suelo, y como resultado los árboles serían más resistentes a la defoliación causada por insectos. La misma evidencia ha sido encontrada cuando se ha detectado la presencia de termiteros en Río Negro, Brasil; al comprobarse que la materia orgánica producida por nidos de termitas incrementó la presencia de árboles más vigorosos. Por otro lado en la Isla de Barro Colorado se encontró la misma evidencia pero con hormigas.

BIOLOGY TEST.

TRIAL OF SCORING CRITERIA:

SUMMARY PRODUCED BY UNAM TEACHER OF ENGLISH.

Previos autores han propuesto que las "islas verdes" de Betula P.T que rodean a nidos de cierto tipo de hormiga existen porque dichas hormigas depredan a la larva de la Oporinia A. que es un defoliador de esos árboles.

La anterior propuesta se ha hecho en base a mapeos de la zona (Lapland, Finlandia) en los que se hizo un recuento de los árboles dañados y no dañados, y se encontró que a mayor cercanía de los árboles con los hormigueros, mejores y más sanos ejemplares de árboles se encontraban. Estas "islas" habían sido ya reportadas con anterioridad, por ejemplo, Adlung, quien en 1966 también reporta su asociación con los hormigueros.

El autor del presente artículo pone en tela de juicio la explicación previa de que las hormigas sean capaces de acabar con los insectos que se alimentan de hojas. Puesto que las hormigas tienen colonias estables que se sostienen durante las largas temporadas en que no hay Oporinia A., es muy discutible la posibilidad de que estas mismas colonias de hormigas fueran capaces de hacer mella en las orugas defoliadoras durante la corta temporada en que estas aparecen. De hecho, hay evidencia (Adlung, 1966) de que no se pueden usar las hormigas para controlar plagas de defoliadores.

La hipótesis que ofrece el autor -alternativa a explicaciones previas del fenómeno de las islas verdes- es la siguiente:

Las hormigas, (al igual que las termitas) almacenan nutrientes en sus hormigueros. Esta concentración de nutrientes eleva la calidad del suelo que rodea al hormiguero. Los árboles cercanos se ven favorecidos en tanto que sus raíces penetran en un suelo con mayor cantidad de minerales y nitrógeno, y en consecuencia, a la larga, crecen más vigorosos, y aparentemente menos susceptibles a la defoliación de las orugas Oporinia A.

**APPENDIX F**

Raw scores of biology and psychology tests awarded by researcher and independent judge, and corresponding correlations.

BIOLOGY TEST SCORES (JUDGES A AND B).

SUBJECT	JUDGE		SUBJECT	JUDGE	
	A	B		A	B
1	3	4	31	11	5
2	3	5	32	0	1
3	3	3	33	2	0
4	4	2	34	8	4
5	2	0	35	4	2
6	1	0	36	0	0
7	4	2	37	1	0
8	4	1	38	6	4
9	0	1	39	5	6
10	3	0	40	3	5
11	0	1	41	2	3
12	1	0	42	1	4
13	2	2	43	0	0
14	8	4	44	1	0
15	1	4	45	1	3
16	1	2	46	2	0
17	4	2	47	0	1
18	0	1	48	1	0
19	1	0	49	0	3
20	1	0	50	1	1
21	0	1	51	1	5
22	3	5	52	1	0
23	1	4	53	0	1
24	0	2	54	7	10
25	5	2	55	0	1
26	0	2	56	0	1
27	1	0	57	9	5
28	3	0	58	0	1
29	4	1	59	3	2
30	12	6	60	12	5

	<u>JUDGE A</u>	<u>JUDGE B</u>
$\bar{x}$ =	2.6167	2.1667
SD =	3.0426	2.1246
$r$ =	.61	

PSYCHOLOGY TEST SCORES (JUDGES A AND B)

SUBJECT	JUDGE		SUBJECT	JUDGE	
	A	B		A	B
1	2	3	31	10	7
2	2	0	32	2	0
3	1	3	33	0	1
4	4	1	34	0	2
5	7	9	35	7	4
6	0	1	36	0	2
7	1	2	37	13	10
8	0	1	38	14	7
9	2	0	39	14	6
10	1	0	40	7	9
11	5	8	41	0	2
12	4	1	42	3	1
13	1	3	43	3	5
14	1	0	44	0	0
15	10	5	45	2	0
16	11	6	46	12	6
17	2	4	47	2	0
18	1	2	48	0	1
19	10	4	49	0	2
20	10	5	50	0	2
21	2	4	51	2	4
22	1	0	52	0	2
23	1	3	53	0	1
24	0	0	54	13	7
25	10	6	55	0	1
26	9	4	56	1	1
27	0	0	57	11	7
28	0	1	58	0	0
29	2	4	59	0	2
30	3	5	60	1	0

	<u>JUDGE A</u>	<u>JUDGE B</u>
$\bar{x}$ =	3.6667	2.95
SD =	4.45	2.72
$\underline{r}$ =	.7839	

**APPENDIX G**

Steps followed in the computation of the expected frequencies used in the chi-square test.



COMPUTATION OF THE EXPECTED FREQUENCIES USED IN THE CHI-SQUARE TEST, SHOWN IN TABLE 5.5.

(According to the procedure suggested by Cohen and Manion, 1986: 353-360).

Notational Classification:

- i = Field:                    1 = Biology students.  
                                   2 = Psychology students.
- j = Performance:            1 = Good  
                                   2 = Bad
- k = Text                        1 = "Green Islands ..."  
                                   2 = "National Study ..."

Expected frequency in cell 111 (i.e.,  $i_1 j_1 k_1$ : biology students, good performance, "Green Islands ...")

$$\begin{aligned}
 & N(P_{i_1}) (P_{j_1}) (P_{k_1}) \\
 = & 120 \quad \frac{60}{120} \quad \frac{43}{120} \quad \frac{60}{120} \\
 = & 120 \quad (.50) \quad (.36) \quad (.50) \\
 = & \underline{10.8}
 \end{aligned}$$

Where: p = probability.

N = Total number of subjects.

Expected frequency in cell 121 (i.e.,  $i_1 j_2 k_1$ : biology students, bad performance, "Green Islands ...")

$$\begin{aligned} & N (P_{i_1}) (P_{j_2}) (P_{k_1}) \\ &= 120 \quad \frac{60}{120} \quad \frac{77}{120} \quad \frac{60}{120} \\ &= 120 \quad (.50) (.64) (.50) \\ &= \underline{19.2} \end{aligned}$$

Cell 122 (biology students, good performance, "National Study ...") =

$$\begin{aligned} &= 120 \quad \frac{60}{120} \quad \frac{43}{120} \quad \frac{60}{120} \\ &= 120 \quad (.50) (.36) (.50) \\ &= \underline{10.8} \end{aligned}$$

Cell 122 (biology students, bad performance, "National Study ...") =

$$\begin{aligned} &= 120 \quad \frac{60}{120} \quad \frac{77}{120} \quad \frac{60}{120} \\ &= 120 \quad (.50) (.64) (.50) \\ &= \underline{19.2} \end{aligned}$$

Cell 211 (psychology students, good performance, "Green Islands ...") =

$$\begin{aligned} &= 120 \quad \frac{60}{120} \quad \frac{43}{120} \quad \frac{60}{120} \\ &= 120 \quad (.50) (.36) (.50) \\ &= \underline{10.8} \end{aligned}$$

Cell 221 (psychology students, bad performance, "Green Islands ...") =

$$= 120 \quad \frac{60}{120} \quad \frac{77}{120} \quad \frac{60}{120}$$

$$= 120 \quad (.50) \quad (.64) \quad (.50)$$

$$= \underline{19.2}$$

Cell 212 (psychology students, good performance, "National Study ...") =

$$= 120 \quad \frac{60}{120} \quad \frac{43}{120} \quad \frac{60}{120}$$

$$= 120 \quad (.50) \quad (.36) \quad (.50)$$

$$= \underline{10.8}$$

Cell 222 (psychology students, bad performance, "National Study ...") =

$$= 120 \quad \frac{60}{120} \quad \frac{77}{120} \quad \frac{60}{120}$$

$$= 120 \quad (.50) \quad (.64) \quad (.50)$$

$$= \underline{19.2}$$

## APPENDIX H

Computation of sums of squares used in the ANOVA test, and F-ratios of each between-group variance.

COMPUTATION OF SUMS OF SQUARES USED IN THE ANOVA TEST AND F-RATIOS OF EACH BETWEEN-GROUP VARIANCE.

(According to the procedure suggested by Hatch and Farhady, 1982: 153-157).

1 Sum of Square Total (SST)

$$SST = X^2 - \frac{(\sum X)^2}{N} = 118.79$$

2 Sum of Squares Between (SSB)

$$SSB = \frac{(\sum X_1)^2}{n_1} + \frac{(\sum X_2)^2}{n_2} + \frac{(\sum X_3)^2}{n-3} + \frac{(\sum X_4)^2}{n-4} - \frac{(\sum X)^2}{N}$$

$$= 19.7897$$

3 Sum of Squares Within (SSW)

$$SSW = SST - SSB$$

$$= 99.01$$

4 Sum of Squares for Factor A ( $SS_a$ )

$$SS_a = \frac{(\text{scores level 1})^2}{n \text{ level 1}} + \frac{(\text{scores level 2})^2}{n \text{ level 2}} - \frac{(\sum X)^2}{N}$$

$$= 4.3021$$

5 Sum of Squares for Factor B ( $SS_b$ )

$$SS_b = \frac{(\text{scores level 1})^2}{n \text{ level 1}} + \frac{(\text{scores level 2})^2}{n \text{ level 2}} - \frac{(\sum X)^2}{N}$$

$$= -.002$$

6 Sum of Squares for Interaction ( $SS_{ab}$ )

$$SS_{ab} = SSB - (SS_a + SS_b)$$

$$= 15.489$$

$$\underline{F}\text{-ratio for Factor A (FIELD)} = \frac{MS_a}{MSW} = 5.05$$

$$\underline{F}\text{-ratio for Factor B (TEXT)} = \frac{MS_b}{MSW} = -.0023$$

$$\underline{F}\text{-ratio for Interaction} = \frac{MS_{ab}}{MSW} = 18.21$$

APPENDIX I

Transcripts of summaries used for the interpretative analysis.

(S1) BIOLOGY STUDENT PERFORMING POORLY IN THE  
PSYCHOLOGY TEST.

COMPLETE SUMMARY.

Este estudio se llevó a cabo con pacientes de estratos socioeconómicos bajos comparándolos con pacientes de clase media. Los pacientes se identificaron como clase IV o clase V marcando una cierta diferencia en el número de variables psicológicas.

Método:

Las variaciones de clases sociales fueron preparadas y rehabilitadas para tener más estabilidad, los pacientes se identificaron

- a) Como un artista comercial con 3 años de colegio que es clase III en el factor 2
- b) Como un operador de buldozer con educación mínima Clase IV
- c) y con un empleado con un 7o grado de educación Clase V

Se les dieron ciertas instrucciones para que respondieran; se les dieron escalas clínicas y un cuestionario demográfico y una escala de valuación democrática y una lectura de histórica...

La suma de todo daba la evaluación de cada uno para el caso de historia...- 600 palabras describían un paciente con personalidad desordenada. La evaluación de respuestas de los pacientes son 10 puntos que contribuyen a la escala

Likert. La adición de las escalas continuas aportan la diagnosis de las categorías de psicosis, neurosis o personalidad desordenada. En base a los resultados se trata de buscar un tipo de psicoterapia para cada individuo.

Resultados: Las variables dependientes fueron examinadas mediante un análisis factorial o de varianza (ANOVA) lo cual permitía establecer las variables de diagnosis y el tipo individual de psicoterapia.



(S46) PSYCHOLOGY STUDENT PERFORMING WELL IN THE  
PSYCHOLOGY TEST.

COMPLETE SUMMARY.

Estudio nacional de los efectos del nivel socio-económico de los clientes en el juicio profesional de psicólogos clínicos.

En estudios previos se ha visto que los clientes de nivel socioeconómico más bajo tienden a ser evaluados en forma más negativa que los de mejor nivel por los especialistas. En este estudio el propósito es observar si efectivamente ocurre lo anterior, para lo cual se seleccionó una muestra al azar de la División 12 de la lista de miembros de la Asociación Psicológica Americana de 675 psicólogos clínicos. A todos se les envió el mismo caso clínico, pero con variaciones en la clase social del supuesto paciente. La variación fue: a) un artista comercial con tres años de Universidad. b) operador de maquinaria pesada con bachillerato terminado y c) desempleado con 7o grado de escolaridad. Los psicólogos debían llenar un juego de nueve escalas clínicas, un cuestionario demográfico y la escala de Lerner de valores democráticos.

El caso fue preparado por psicólogos con 5 años o más de experiencia clínica con un acuerdo de 100% en el diagnóstico.

Los respondientes evaluaron al cliente en una escala

tipo Likert según su opinión del caso así como el interés por atenderlo y el tipo de tratamiento sugerido, además de que debían diagnosticarlo en una de tres categorías: psicosis, neurosis o desórdenes de personalidad.

Los resultados fueron los siguientes: No hubo correlaciones significativas entre las variables por lo que se trataron de manera independiente. Se realizaron análisis factoriales de varianza, chi cuadrada y análisis T y F.

Pero en 5 de las 7 variables la clase V (la más baja) recibió los puntajes más pobres en comparación con las otras clases.

Estos resultados confirman lo encontrado en estudios anteriores: el juicio clínico de los profesionales de la salud se ve afectado por la clase social de los pacientes, siendo más negativo para la clase social más baja, aunque no afecta el interés por atenderlos. El autor finaliza cuestionando la necesidad de determinar si esto se debe a las actitudes de los clínicos hacia la conducta de los clientes de bajo nivel socioeconómico.

(S19) PSYCHOLOGY STUDENT PERFORMING POORLY IN THE  
BIOLOGY TEST.

COMPLETE SUMMARY.

Los autores dan una hipótesis alternativa para explicar el fenómeno de la deforestación de islas verdes. Sugieren que cerca de los árboles afectados se cría una larva proveniente de una especie de hormiga. Este tipo de hormiga sobrevive gracias a los nutrientes que roba a los árboles, estos nutrientes proveen gran cantidad de proteínas que fortalecen a la colonia de hormigas, pero que debilitan a los árboles. Comúnmente se refugian en las raíces de los árboles, por encontrar proteínas en mayor grado.

Los autores hacen una semejanza con las termitas, al explicar como las hormigas distribuyen los minerales y el nitrógeno en sus cuerpos, específicamente en la cara, lo que hace más fuertes y resistentes a estos depredadores.

Por último señalan que las hormigas escogen a los árboles mas vigorosos, que son los más ricos en proteínas, minerales y nitrógeno, convirtiéndolos en árboles débiles y por lo tanto presas fáciles de cualquier enfermedad.

(S60) BIOLOGY STUDENT PERFORMING WELL IN THE  
BIOLOGY TEST.

COMPLETE SUMMARY.

En 1980 los investigadores Laine y Niemela sugirieron que las "~~islas verdes~~"<sup>1</sup> green Islands de Betula Pubescens Tortuosa que rodean los nidos de ~~la hormiga~~ Formica aquilonia en Finnish Lapland fueron causadas por la muerte de la ~~hormiga~~ larva de la hormiga Oporinia Autumnata en los nidos de los árboles durante la dispersión de este geométrido.

Se emplearon datos realizados en 1979. Con mapas de distribución de árboles dañados, no dañados y muertos. Además de datos estadísticos del porcentaje de árboles dañados y la distancia del nido a que se encontraban.

Se notó que la gran abundancia de arañas lejos de los hormigueros podría ser una respuesta a la gran abundancia de sus presas, pero se dijo que esto fue debido a la predación por hormigas.

Existen árboles más vigorosos en asociación con nidos de hormigas y persisten más que otros cuando hay dispersión de defoliadores. Esto quiere decir que hay un beneficio para los árboles que crecen cerca del nido de las hormigas. Sin embargo hay poca evidencia de esto.

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<sup>1</sup>The original crossing out of words in this summary has been maintained as they might represent hesitations meaningful for the interpretative analysis.

Laine y Niemela reportaron que a menor altitud a la cual es defoliado un bosque coincide con el límite altitudinal superior de distribución de Formica. Con cinco hormigueros por hectárea y un "rango de influencia" máximo de 20 m. las hormigas no podían ser responsables para prevenir la defoliación. Probablemente en las zonas intermedias los árboles son sólo marginalmente susceptibles a la defoliación.

Salick et al. (1983) demostraron que las termitas concentran nutrientes en sus termitarios por de dos a veinte veces los niveles en los suelos de el Río Negro en Brasil. Las termitas controlan estrictamente cualquier crecimiento en sus nidos habitados, pero una vez abandonados los termitarios constituyen un fértil lugar para las semillas de los árboles. Lo anterior, según los autores, se puede aplicar para las hormigas. Se han encontrado árboles mucho más vigorosos creciendo en esos lugares que en los que crecen en suelo forestal únicamente.

En ambos casos los insectos proveen de nutrientes introduciendo materia orgánica en sus nidos.

Parece que el caso de las "Green Islands" es el mismo. Los árboles cerca de los nidos de Formica podrían tener sus raíces en una fuente de alta concentración de nutrientes. Como resultado podrían ser más vigorosos. De acuerdo a White (1984) los nutrientes de nitrógeno para herbívoros es menos disponible en los tejidos de árboles más vigorosos y por lo tanto son más resistentes a la defoliación.

B I B L I O G R A P H Y

## BIBLIOGRAPHY

- Adams, M.J. and Collins, A. (1979) "A schema-theoretic view of reading" in R. Freedle (ed.) New Directions in Discourse Processing. Norwood, N.J.: Ablex.
- Alderson, J.C. (1984) "Reading in a foreign language: a reading problem or a language problem?" in J.C. Alderson and A.H. Urquhart (eds.) Reading in a Foreign Language. New York: Longman.
- Alderson, J.C. and Urquhart, A.H. (eds.) (1984) Reading in a Foreign Language. New York: Longman.
- Anderson, J.R. (1976). Language, Memory and Thought, Hillsdale, N.J.: Erlbaum.
- Anderson, R.C. (1977). "Schema directed processes in language comprehension" Technical Report No 50. Center for the Study of Reading, University of Illinois at Urbana Campaign.
- Anderson, R.C. and Pearson, P.D. (1984). "A schema theoretic view of basic processes in reading" in P.D. Pearson (ed.) Handbook of Reading Research. London: Longman.
- Bartlett, F.C. (1932). Remembering: A Study in Experimental and Social Psychology. Cambridge: C.U.P. (Reprinted, 1950)
- Biggs, J.B. and Collis, K.F. (1982). Evaluating the Quality of Learning. The SOLO Taxonomy (Structure of the Observed Learning Outcome). New York: Academic Press.
- Bisanz, G.L. and Voss, J.F. (1981). "Sources of knowledge in reading comprehension: cognitive development and expertise in a content domain" in A.M. Lesgold and C.A. Perfetti; (eds.) Interactive Processes in Reading. Hillsdale, N.J.: Erlbaum. (pp. 215-239)
- Bobrow, D.G. and Norman, D.A. (1975) "Some principles of memory schemata" in D.G. Bobrow and A. Collins (eds.) Representation and Understanding. London: Academic Press.
- Bransford, J.D. and Johnson, M.K. (1972). "Contextual prerequisites for understanding: some investigations of comprehension and recall". Journal of Verbal Learning and Verbal Behaviour, 11: 717-726.

- Bransford, J.D., Barclay, J.R. and Franks, J.J. (1972) "Sentence memory: a constructive versus interpretive approach". Cognitive Psychology, 3: 193-209.
- Bruner, J.S. and Postman, L. (1949) "On the perception of incongruity: a paradigm". Journal of Personality, 18: 206-223.
- Carrell, P.L., (1984) "Evidence of a formal schema in second language comprehension". Language Learning, 34: 87-112.
- Carrell, P.L. (1987) "Content and formal schemata in ESL reading". TESOL Quarterly, 21(3): 461-481.
- Carrell, P.L. and Eisterhold, J.C. (1983) "Schema theory and ESL reading pedagogy". TESOL Quarterly, 17(3).
- Carroll, J.B. (1971) "Current issues in psycholinguistics and second language teaching". TESOL Quarterly, 5: 101-104.
- Chafe, W.L. (1977) "Creativity in verbalization and its implications for the nature of stored knowledge" in R.O. Freedle (ed.) Discourse Production and Comprehension. Norwood, N.J.: Ablex.
- Clark, H.H. (1969) "Linguistic processes in deductive reasoning". Psychological Review, 76: 387-404.
- Cohen, A. and Hosenfeld, C. (1981) "Uses of introspection/retrospection in learner-centered research". Language Learning, 31: 285-313.
- Cohen, L. and Manion, L. (1985) Research Methods in Education. London: Croom Helm.
- Collins, A., Brown, J.S. and Larkin, K.M. (1980) "Inference in text understanding" in R.J. Spiro, B.C. Bruce and W.F. Brewer (eds.) Theoretical issues in Reading Comprehension. Hillsdale, N.J.: Erlbaum.
- Cooper, C.R. and Petrosky, A.R. (1976) "A psycholinguistic view of the fluent reading process". Journal of Reading, 20(3).
- Corder, S.P. (1981) "Strategies of Communication". Error Analysis and Interlanguage. Oxford: Oxford University Press.
- Davies, A. (1978) Survey article. Language Teaching and Linguistics: Abstracts Part II-4 (Language Testing). London: Cambridge University Press.



- Dooling, D.J. and Lachman, R. (1972) "Effects of comprehension on retention of prose". Journal of Experimental Psychology, 88: 216-222.
- Eysenck, M. (1984) A Handbook of Cognitive Psychology. Hillsdale, N.J.: Erlbaum.
- Fawcett, R. (1979) "Reading laboratories" in E. Lunzer and K. Gardner (eds.) The Effective Use of Reading. London: Heinemann.
- Fillmore, C.J. (1975) "An alternative to checklist theories of meaning" in Proceedings of the First Annual Meeting of the Berkeley Linguistics Society. Institute of Human Learning, University of California, Berkeley, (pp. 123-131).
- Galicia-Ortega, F. (1988) Proficiency and Quality in Foreign Language Reading: A Study of the Relationship between Proficiency Level and Reading Outcome. Ph.D Thesis, University of Edinburgh.
- Gibson, E.J. and Levin, H. (1975) The Psychology of Reading. Cambridge, Mass., MIT Press.
- Goetz, E.T. and Armbruster, B.B. (1980) "Psychological correlate of text structure" in R.J. Spiro, C.B. Bertram and W.F. Brewer (eds.) Theoretical Issues in Reading Comprehension. Hillsdale, N.J.: Erlbaum.
- Goodman, K.S. (1967) "Reading: a psycholinguistic guessing game". Journal of the Reading Specialist, 6(1): 126-135.
- Goodman, K.S. (1973) "Psycholinguistic universals in the reading process" in F. Smith (ed.) Psycholinguistics and Reading. New York: Holt, Reinhart and Winston.
- Goodman, K.S. (1979) "The know-more and the know-nothing movements in reading. A personal response". Paper presented at the Annual Meeting of the National Conference on Language Arts in the Elementary School. Hartford, Connecticut. (ERIC document 170716).
- Grotjahn, R. (1987) "On the methodological basis of introspective methods" in C. Faerch and G. Kasper (eds.) Introspection in Second Language Research (in the series: Multilingual Matters). Clevedon: Derrick Sharp.
- Hatch, E. and Farhady, H. (1982) Research Design and Statistics for Applied Linguistics. Rowley, Mass.: Newbury House.
- Head, H. (1920) Studies in Neurology. Oxford: Oxford University Press.

- Henzell-Thomas, J. (1985) Learning from Informative Text: Prediction Protocols as a Means of Accessing the Interaction between Top-down and Bottom-up Processes. PhD Thesis: University of Lancaster.
- Hidi, S. and Baird, W. (1986) "Interestingness - A neglected variable in discourse processing". Cognitive Science, 10: 179-194.
- Hintzman, D. L. (1978) "Comments on the papers by Hunt and by Rumelhart and Norman" in J.W. Cotton and R.L. Klatzky (eds.) Semantic Factors in Cognition. Hillsdale, N.J.: Erlbaum.
- Hochberg, J. (1970) "Components of literacy: speculations and exploratory research" in H. Levin and J.P. Williams (eds.) Basic Studies on Reading. New York: Basic Books. (pp. 74-89).
- Holliday, A. and Cooke, T. (1982) "An ecological approach to ESP" in A. Waters (ed.) Issues in ESP. Lancaster Papers in English Language Education, Vol 5.
- Hudelson, S. (1981) "An investigation of the oral reading behaviors of native Spanish speakers reading in Spanish" in S. Hudelson (ed.) Learning to read in different languages (Linguistics and Literacy series: 1). Washington, D.C.: Center for Applied Linguistics.
- Ingram, E. (1975) English Language Battery Test. Edinburgh: Edinburgh University.
- Kamil, M.L. (1984) "Current traditions of reading research" in P.D. Pearson (ed.) Handbook of Reading Research New York: Longman.
- Kant, E. (1781) Critique of Pure Reason (1787, 2nd ed., translated by N. Kemp Smith). London: Macmillan (1963).
- Kintch, W. and Keenan, J.M. (1973) "Reading rate as a function of the number of propositions in the base structure of sentences". Cognitive Psychology, 5: 257-274.
- Kolers, P.A. (1970) "Three stages in reading" in H. Levin and J.T. Williams (eds.), Basic Studies in Reading, New York: Basic Books.
- Krashen, S. (1981) "The case for narrow reading" TESOL Newsletter, 15(6): 23.

- Kuipers, B.J. (1975) "A frame for frames: representing knowledge for recognition" in D.G. Bobrow and A. Collins (eds.) Representation and Understanding, London: Academic Press.
- Lachman, R. and Lachman, J.L. (1979) Cognitive Psychology and Information Processing: An Introduction. Hillsdale, N.J.: Erlbaum.
- Lautamatti, L. (1978) "Developing materials for teaching reading comprehension in a foreign language" in The Teaching of Comprehension. ETIC Occasional Paper. London: The British Council.
- Mackworth, A.K. (1987) "What is the schema for a schema?" Behavioral and Brain Sciences, 1987, 10(3): 443-444
- McGinitie, W.H. (1981) "The role of non-accommodative cognitive strategies". Paper presented in the International Symposium Nuevas Perspectivas en los Procesos de Lectura y Escritura, Mexico City, July 1981.
- Meyer, B.J.F. (1977) "The structure of prose: effects on learning and memory and implications for educational practice" in R.C. Anderson, R.J. Spiro and W.E. Montague (eds.) Conference on Schooling and the Acquisition of Knowledge. Hillsdale, N.J.: Erlbaum.
- Meyer, B.J.F. and McConkie, G.W. (1973) "What is recalled after hearing a passage?" Journal of Educational Psychology, 65: 109-117.
- Miller, G.A. (1962) "Some psychological studies of grammar". American Psychologist, 17: 748-762.
- Neisser, U. (1967) Cognitive Psychology. New York: Appleton-Century-Crofts.
- Nix, D. and Shwarz, M. (1979) "Toward a phenomenology of reading comprehension" in R.O. Freedle (ed.) New Directions in Discourse Processing. Norwood, N.J.: Ablex.
- Norman, D.A. and Bobrow, D.G. (1975) "On data-limited and resource-limited processes". Cognitive Psychology, 7: 44-64.
- Norman, D.A. and Rumelhart, D.A. (1975) Explorations in Cognition. San Francisco: Freeman.
- Nuttall, C. (1982) Teaching Reading Skills in a Foreign Language. London: Heinemann.
- Oller, J.W. (1979) Language Tests at School. London: Longman.

- Olson, D.R. (1977) "Open discussion on Meyer's and Carter's contributions" in R.C. Anderson, R.J. Spiro and N.E. Montague (eds.) Conference on Schooling and the Acquisition of Knowledge. Hillsdale, N.J.: Erlbaum.
- Piaget, J. (1950) The Psychology of Intelligence. London: Routledge and Kegan Paul.
- Piaget, J. (1970) "Piaget's Theory" in P.H. Mussen (ed.) Carmichael's Manual of Child Psychology, Vol. I. New York: Wiley.
- Robson, C. (1973) Experiment Design and Statistics in Psychology. Harmondsworth: Penguin. (Reprinted in 1977)
- Ross, R.N. (1975) "Ellipsis and the Structure of Expectation". San Jose State: Occasional Papers in Linguistics, 1: 183-191.
- Rothkopf, E.Z. (1972) "Structural text features and the control of processes in learning from written materials" in J.B. Carroll and R.O. Freedle (eds.) Language Comprehension and the Acquisition of Knowledge. London: J. Wiley (pp 315-334).
- Rowntree, D. (1981) Statistics Without Tears. Harmondsworth: Penguin. (Reprinted in 1985)
- Rumelhart, D.E. (1976) Toward an Interactive Model of Reading. Technical Report No 56, Center for Human Information Processing, University of California, San Diego.
- Rumelhart, D.E. (1980) "Schemata: the building blocks of cognition" in R.J. Spiro, B.C. Bruce and W.F. Brewer (eds.) Theoretical issues in Reading Comprehension. Hillsdale, N.J.: Erlbaum.
- Rumelhart, D.E. (1984) "Understanding understanding" in J. Flood (ed.) Understanding Reading Comprehension: Cognition, Language and the Structure of Prose. Newark, Del.: I.R.A.
- Rumelhart, D.E. and McClelland, J.L. (1981) "Interactive processing through spreading activation" in A.M. Lesgold and C.A. Perfetti (eds.) Interactive Processes in Reading. Hillsdale, N.J.: Erlbaum.
- Rumelhart, D.E., McClelland, J.L. and the PDP Research Group (1987). Parallel Distributed Processing. Explorations in the Micro-structure of Cognition. Vol 1: Foundations. A Bradford Book, MIT Press.
- Rumelhart, D.E. and Norman, D.A. (1978). "Accretion, tuning and restructuring: three modes of learning" in

- J.W. Cotton and R.L. Klatzky (eds.) Semantic Factors in Cognition. Hillsdale, N.J.: Erlbaum.
- Rumelhart, D.E. and Ortony, A. (1977) "The representation of knowledge in memory" in R.C. Anderson, R.J. Spiro and W.E. Montague (eds.) Conference on Schooling and the Acquisition of Knowledge. Hillsdale, N.J.: Erlbaum.
- Schank, R.C. (1975) "The structure of episodes in memory" in D.G. Bobrow and A. Collins (eds.) Representation and Understanding. Studies in Cognitive Science. New York: Academic Press.
- Smith, F. (1971) Understanding Reading. A Psycholinguistic Analysis of Reading and Learning to Read. New York: Holt, Reinhart and Winston.
- Smith, S. L., Harste, J. and Carey, R. (1979) "Schemata, Context and Comprehension" Paper presented at the Annual Meeting of the National Reading Conference. San Antonio, Texas: Dec, 1979.
- Spiro, R.J. (1977) "Remembering information from text: the 'state of schema' approach" in R.C. Anderson, R.J. Spiro and W.E. Montague (eds.) Conference on Schooling and the Acquisition of Knowledge. Hillsdale, N.J.: Erlbaum.
- Spiro, R.J. (1980) "Constructive processes in prose comprehension and recall" in R.J. Spiro, B.C. Bruce and W.F. Brewer (eds.) Theoretical Issues in Reading Comprehension. Hillsdale, N.J.: Erlbaum.
- Spiro, R.J., Bruce, B.C. and Brewer, W.F. (eds.) (1980) Theoretical Issues in Reading Comprehension. Hillsdale, N.J.: Erlbaum.
- Spiro, R.J. and Myers, A. (1984) "Individual differences and underlying cognitive processes in reading" in P.D. Pearson (ed.) Handbook of Reading Research. New York: Longman.
- Sutton, R.G. and Kessler, M. (1986) "National study of the effects of clients' socioeconomic status on clinical psychologists' professional judgements" Journal of Consulting and Clinical Psychology, 54: 2, 275-276.
- Swales, J. (1985) Episodes in ESP. Oxford: Pergamon Press.

- Tannen, D. (1979) "What's in a frame? Surface evidence for underlying expectations" in R.O. Freedle (ed.) New Directions in Discourse Processing. Vol. II in the Series Advances in Discourse Processes. Norwood, N.J.: Ablex.
- Taylor, K.K. (1983) "Can college students summarize?" Journal of Reading, March 1983.
- Taylor, W.L. (1953) "'Cloze Procedure': A new tool for measuring readability." Journalism Quarterly. 30: 415-433.
- Thomas, L.F. and Harri-Augstein, E.S. (1976) "The Self-organized learner and the printed word". Mimeo, Centre for the Study of Human Learning, Brunel University.
- Thomas, L. F. and Harri-Augstein, E.S. (1984) "Conversational investigations of reading: the self-organized learner and the text" in J.C. Alderson and A.H. Urquhart (eds.) Reading in a Foreign Language, New York: Longman.
- Urquhart, A. H. (1987) (Correspondence) ELT Journal, 41: 67-68.
- Warren, W.H., Nicholas, D.W. and Trabasso, T. (1979) "Event chain and inferences in understanding narratives" in R.O. Freedle (ed.) New Directions in Discourse Processing. Norwood, N.J.: Ablex.
- White, T.C.R. (1985) "Green islands - nutrition, not predation - an alternative hypothesis" Oecologia, 67: 455-456.
- Widdowson, H.G. (1975) "EST in theory and practice" in English for Academic Study with special reference to Science and Technology. Problems and Perspectives. An ETIC occasional paper. British Council.
- Winograd, P. (1984) "Strategic difficulties in summarizing texts" Reading Research Quarterly, 19(4).