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Production of conjunctions and T-units by the elderly

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Abstract

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Recent research indicates a change in healthy elderly adult language capabilities. More specifically, Shadden (1997) and Ryan (1996) state that language competence is less affected by the processes of aging than production. The topic of this research examined specifically the production of conjunctions from the perspective of Halliday and Hasan (1976) in procedural and narrative discourse by the elderly. The hypothesis stated that the relationship between age and conjunctions produced would be non-significant. In a cross-sectional study, 17 subjects between the ages of 60-86 were interviewed and the transcripts analyzed.

Results supported the hypothesis of a non-significant relationship between age and conjunctions produced. However, the size of the tested sample limited the statistical significance of the results. Finally, factors and study limitations were examined and discussed in order to provide explanations for patterns in the results and to provide solutions for use in future research.

Dedication:

In memory of Dr. Thomas A. Haymond (1925-2001)—He was my doctor, my friend, my father, and my greatest inspiration.

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Introduction

It is common knowledge that the process of aging affects people physically and mentally. Yet much remains unknown about mental effects of aging, specifically on language comprehension and production. These mental effects include hearing and speech problems and involve language modules such as vocabulary, syntax, semantics, as well as discourse production.

As to the question, “How are discourse abilities affected by the processes of aging?”, Ryan (1995) states in the context of prose comprehension and recall that:

> Older adults are more likely to show lower scores than are their younger counterparts in the following circumstances: […] when text materials require organizational effort, when materials are youth-oriented, when working memory demands are high, when inferences or logical reasoning are required, when delayed testing is involved, or when free recall is assessed. (p. 87)

And Shadden (1997) writes that

> Age related changes in discourse production have been studied in terms of semantic skills, syntactic complexity, verbal fragmentation, information load, cohesion, macrostructural elements, and conversation skills. In spite of the heterogeneity in older adults’ discourse behaviors, they have a tendency to use shorter, less complex sentences, and more indefinite, ambiguous references. (p. 143)

This thesis will analyze one particular type of discourse organization in older adults, namely the use of conjunctions. A conjunction is a cohesive device which connects elements in the discourse (Halliday and Hasan, 1976). Conjunctions also present information in conversation in a natural and orderly manner, thus organizing discourse (Kaplan, 1995).

1.1 Statement of the Problem

Evidence from the literature on discourse production in aging suggests age-related impairments at the organizational level (Duong and Ska, 2001). There have been many studies examining discourse performance in older adults (Duong and Ska, 2001; Kemper *et al*., 1990; North *et al*., 1986; Pratt *et al*., 1989; and Ulatowska et al., 1986). However, few studies have examined the production of conjunctions by the elderly (Pratt *et al*., 1989; Kemper *et al*., 1990; Duong and Ska, 2001). Since results from these studies are mixed, the answer to the question, "How are conjunctions affected by the processes of aging?", remains inconclusive.

It is hoped that the results from this thesis will provide more conclusive data on the effects of aging on conjunction production. This thesis is a cross-sectional study that compares two groups of adults over the age of 60 to see if there are differences in the use of conjunctions in the production of narrative and procedural discourse. Subjects were examined individually in an interview, which consisted of a picture activity in which they told a story based on the pictures and

an interview in which directions were elicited on a number of tasks ranging from changing the batteries of a flashlight to making coffee.

1.2 Purpose and Significance of the Study

The purpose of this thesis is to analyze the production of narrative and procedural discourse of two groups of an elderly English speaking population for significant changes in the number of conjunctions used by both groups.

The significance of this thesis is that it provides data on verbal behaviors in healthy aging adults, specifically in relation to the use of the cohesive device: conjunction. Most studies that have examined cohesion in the elderly focus on reference, or something other than conjunction.

The present section has provided a general introduction to the topic of this thesis. In chapter one, the review of literature will be presented, which will include a general introduction to principles of language in aging, a review of empirical studies on narrative and aging, and a review of the notion of 'cohesion' from the work of Halliday and Hasan (1976). The second chapter will discuss the methodology for the study. The third chapter will present the results and outline the statistical measures used to analyze the obtained data. The fourth chapter will discuss issues relevant to the results and to the methodology. It will also discuss strengths and weaknesses of the study, and will provide suggestions for further research.

Chapter 1

Review of Literature

In this chapter, research pertaining to issues within this thesis will be reviewed. Starting with the works of Ryan (1995) and Shadden (1997), the first section will examine age-associated language differences in discourse comprehension and performance. The second section will review conjunctions and their role in cohesion using the work of Halliday and Hasan (1976). The third section will review studies related to cohesion and aging (Duong and Ska, 2001; Kemper *et al*., 1990; North *et al*., 1986; Pratt *et al*., 1989; and Ulatowska *et al*., 1986).

1.3 Language and Aging

Beginning with the topic of language comprehension, Shadden (1997) reports that there appears to be a slight but general decline in comprehension skills in subjects from the age of 30 to 70. This decline is associated with stresses upon the individual's cognitive/linguistic system. In this case, stress is defined as the presence of any kind of noise[1] (acoustic or cognitive), reduction in redundancy[2], organization, plausibility[3], and/or increasing cognitive demand, particularly involving working memory (Shadden, 1997).

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[1] A simple definition of noise relevant to this study, is interference in language comprehension.
[2] Redundant information as defined by Yeni-Komshian, (1998) is information that is multiply specified, as in cues to the recognition of speech sounds. So based on this definition, a reduction in redundancy would be, as in the case of speech sounds, fewer cues to assist in the process of recognition.
[3] Shadden does not define these terms. The assumed meaning of 'organization and plausibility as a stress on the individual's cognitive/linguistic system' is the inability to organize and fully understand the material being processed. For further information see Au and Bowles (1991).

Shadden (1997) states further that discourse production in older adults appears to be affected by four variables:

1. Subject characteristics (skills and specific impairments, prior knowledge of context or topic)
2. Task demands (free recall, cueing, immediate versus delayed recall, recognition, summary or thematic identification)
3. Text material design (organization of material, type of discourse text, propositional density, cohesive and propositional ties, modality of presentation, associated imagery, lexical and syntactic complexity, rate and prosodic manipulations of material)
4. Orienting components (instructions to subjects, attentional challenges, recommended cuing or learning strategies).

These four variables affect discourse production because they place increasing demands on working memory (Shadden, 1997). Shadden and Ryan (1995) address the issue of working memory as the primary cause of the language problems discussed. It appears to be the main problem of aging that globally affects language comprehension and production. The general trend is that the more complex the task, the greater the cognitive strain will be for older subjects, which will lead to more instances of error in production and comprehension. In discussing the aspects of vocabulary, syntax, and discourse-

related tasks, one should keep in mind that working memory is a catalyst for age-related change in language comprehension and production.

Vocabulary is one aspect of language that is oddly affected. Ryan (1995) states that vocabulary knowledge does not decline with age, though depending on the task, performance varies. For example, in tasks where specific words are not required (i.e. multiple choice and lexical decision tasks), elicited performances are generally good. But in "…naming tasks, and other tasks requiring productive use of words, [results] tend to show age declines from middle-aged to young-old to old-old" [4] (p. 86). These tasks generally require subjects to name an object presented to them in the form of a picture or model with varying degrees of speed.

As with knowledge of vocabulary, syntactic comprehension does not decline with age. However Ryan remarks about syntactic production that, "…utilization of complex grammatical structures has been shown to be reduced among older adults in various situations" (p. 86). Studies that showed age associations in grammatical production frequently placed high demands on participants' sensory processing and memory. In addition to syntactic complexity, syntactic length appears to be affected by aging as well. In general the pattern is of reduced length with advancing age, depending on the task (Shadden, 1997).

Generally, the elderly have difficulties with discourse related tasks. Ryan (1995) and Shadden (1997) discuss the issues of conversation skills,

[4] Though not specified, it is likely that middle age ranges from 40 to 55 years, young-old from 55 to 70 years, and old-old from 71 years and higher.

informational content, and narrative production and their relation to age-related declines.

As far as conversational skills are concerned, Ryan (1995) states that it was found that among adults over the age of 70, keeping track of a conversation and of who made which statement in large groups is particularly difficult. Another characteristic and potential problem of elderly conversation is verbosity. It was found that verbose individuals were lonely and more demanding in social interactions. In addition, the verbose individuals were older, more extroverted, less physically mobile, and experienced more stress.

Age-related changes also affect the production of narrative and content of information. According to Shadden (1997) there appears to be a slight but general decline in the amount, type, and efficiency of information communicated throughout a lifespan. Ryan (1995) states that "…[an] ambiguity of reference and reduced efficiency in conveying information are the two aspects of story telling and retelling that differentiate the old from the young" (p. 88). As Shadden (1997) points out, the most extensive set of studies of information production in discourse were conducted by Ulatowska and others. Several patterns emerged repeatedly in their work.

> First, when older-old subjects are compared with younger-old subjects, and younger subjects, the older-old produce less overall information in discourse. This is evident in the number of propositions in narrative tasks and information steps in procedural discourse. Second, the types of

> information and the accuracy of that information in narrative discourse particularly distinguish older-old from younger-old. For example, older-old subjects produce less setting information and tend to be more inaccurate in the propositions and narrative elements they provide. Finally, the relevance of the information provided by the oldest subjects is reduced, particularly under more complex and/or more open-ended discourse conditions. (Shadden, 1997, p.150)

In this quotation, the reader should envision the terms of 'older-old' and 'younger-old' on an age scale. For example, in Ulatowska *et al*. (1986), the age range of the younger-old is between 64 and 76, while the age range of the older-old is between 77 and 92.

This section has discussed some of the general patterns of language as affected by the processes of aging. In the next section, cohesion will be examined through the work of Halliday and Hasan (1976).

1.4 Conjunction in Cohesion

This section will examine the role of conjunctions in the work of Halliday and Hasan (1976). It will be organized into two parts: the first examining cohesion and the second transitioning into the role of conjunctions in cohesion.

Before discussing cohesion, it is necessary to define the following terms: Anaphora, cataphora, and exophora. These three terms are primarily related to the first type of cohesion, reference, but they also relate to the other types:

substitution, ellipsis, and conjunction. An anaphoric element refers back to a presupposed element in the preceding context. A cataphoric element looks forward to an element in the following context. An exophoric element is one in which the information required for interpretation is not to be found in the context. Example (1) taken from Halliday and Hasan (1976, p. 18) demonstrates exophora. In this example, the term *those* does not have a reference in the immediate context. Example (2) from Bob Dylan's song *Hurricane* demonstrates anaphora: in which *she* refers back to *Patty Valentine.* In Example (3), a cataphoric relation is demonstrated with *she* referring forward to *Mary*.

1) Did the gardener water *those* plants?
2) …enter *Patty Valentine* from the upper hall. *She* sees the bartender in a pool of blood…
3) Because *she* was so noisy, *Mary* was told to shut up!

Halliday and Hasan (1976) present conjunctions as a type of cohesive relation in a system that was developed to classify linguistic devices that link one part of text with another. A text is the body in which the cohesive relations are found. "[A text]… may be anything from a single proverb to a whole play, from a momentary cry for help to an all-day discussion on a committee" (p.1). Cohesion is examined through the analysis of cohesive ties. A cohesive tie is "…one occurrence of a pair of cohesively related items" (p. 3). There are four types of primary text cohesion: reference, ellipsis, substitution, and conjunction.

Cohesion is a semantic concept in that it refers to relations of meaning that exist within a text and define it as a text. It "…occurs where the

INTERPRETATION of some element in the discourse is dependent on another" (p. 4).

Furthermore, in order to properly understand cohesion, it is necessary to discuss texture. Halliday and Hasan state that a text derives "…texture from the fact that it functions as a unity with respect to its environment" (p. 2). Texture is a combination of three properties that combine to form a text. First, there is the internal organization of each sentence that relates sentential components to each other. Then there is structure that adheres in the particular genre of mode of discourse. Finally there is cohesion that comes from the semantic relation between sentences. In sentence (4) texture is demonstrated in the referential relation between *six cooking apples* and *them*. In this example, the referential relation is anaphoric.

4) "Wash and core six cooking apples. Put them into a fireproof dish" (p. 2).

Texture is the combination of these three components and it is what distinguishes a text from sentences strung together at random.

As mentioned above, there are four primary types of cohesive tie: reference, ellipsis, substitution, and conjunction. The first cohesive tie, reference, according to Halliday and Hasan is "…the relation between an element of the text and something else by reference to which it is interpreted in the given instance" (Halliday and Hasan, 1976, p. 308). There is a semantic link between the reference item and that which it presupposes; but that does not mean that the two necessarily have the same referent. There are three types of

reference: personal, demonstrative, and comparative. Items that are treated as personal reference items are specific deictics (pronouns and determiners). Two examples of exophoric personal reference can be found in example (5)[5] "Demonstrative reference is essentially a form of verbal pointing" (p. 57). With demonstrative reference, the speaker identifies the referent by locating it on a scale of proximity as in a participant or circumstance (Halliday and Hasan, 1976). Example (6) also contains an exophoric reference, excerpted from the song *This Wheel's on Fire* (Bob Dylan and Rick Danko, 1975), which illustrates demonstrative behavior. Comparative reference, is based on an idea of comparison such as likeness or unlikeness. Comparative reference is exemplified by (7) from the song *Masters of War* (Bob Dylan, 1963).

5) It ain't *me you*'re looking for babe…

6) *This* wheel's on fire, rolling down the road, just notify my next of kin…

7) But there's one thing I know, though I'm *younger than* you

Substitution is the replacement of one item by another. A substitute is a word used in place of the repetition of a particular item. As Halliday and Hasan state, "…the distinction between substitution and reference is a relation in the wording rather than in the meaning" (p. 88). In the following example from the lyrics of the song *Cocaine Blues* by Bob Dylan (1999) (8), *two* is the substitute for the proper nouns, *Sally and Sue*.

8) You take *Sally*, an' I take *Sue*, ain't no difference between the *two*--

Ellipsis shows a different pattern from substitution. Ellipsis is considered 'substitution by zero' or the notion of something being left unsaid (p. 142). But

[5] From the song *It Ain't Me Babe* by Bob Dylan (1964).

that does not mean that an omitted item is not understood. Halliday and Hasan write further that they are "...referring specifically to sentences, clauses, etc., whose structure is such as to presuppose some preceding item, which then serves as the source of the missing information" (p. 143). The following example (9) demonstrates ellipsis. The noun phrase *another four* presupposes the lexeme *pearls*.

9) Four *pearls* were dropped, and then *another four* and Mary smiled all the more.

Conjunctions, or conjunctive elements, alternately,

> …are cohesive not in themselves but indirectly, by virtue of their specific meanings; they are not primarily devices for reaching out into the preceding (or following) text, but they express certain meanings which presuppose the presence of other components in the discourse (Halliday and Hasan, 1976, p. 226).

Conjunctions are not directly cohesive which can be observed from two logical sentences connected with an additive conjunction. In example (10) the conjunction 'and' connects two sentences, and there are no other cohesive relations to indicate a cohesive relation.

10)John drank too much coffee *and* Peter ate popcorn.

Additionally, Conjunctions are a different kind of tie because it is no longer necessary to search for an element in the preceding/following context, but

instead to search for a specification in the way in which what follows is connected with what precedes.

A specific clausal order is not always required for conjunctions to be cohesive. Halliday and Hasan write, "…if two sentences cohere into a text by virtue of some form of conjunction, this does not mean that the relation between them could subsist only if they occur in that particular order" (p. 227).

Halliday and Hasan classify conjunctions according to the types of relations they express. There are five relations expressed by conjunctions: additive, adversative, causal, temporal, and continuative.

Additive conjunctions are similar to coordinating conjunctions[6]. They signal that there is something more to be said. The additive relation is expressed through the conjunctions 'and', 'or' and 'nor'. For example,

11) On the seventh day God rested. *And* on the eighth the Donald fired Chris.

The adversative relation expresses a sense of 'contrary to expectation' (Halliday and Hasan, 1976). There are four types of adversative conjunctions: adversative[7], contrastive, corrective, and dismissive (p. 255). An adversative relation can be demonstrated in the phrase 'in spite of'. For example:

12) OJ committed egregious crimes. *In spite of* the plethora of evidence, he was acquitted.

[6] For more information on coordinating conjunctions, see (Kaplan, 1995)
[7] Halliday and Hasan (1976) in their classification of conjunctions list a category of adversative relations while including within this particular category an adversative conjunction as well as three other conjunctions classified as 'adversative'.

The contrastive conjunction expresses a relation demonstrated by the term: ‘as against’. For example:

13) Georgie is an all American guy, *but* when he speaks, the educated people sigh.

The corrective conjunction can be exemplified as the phrase ‘not X but Y’ (p. 255). For example:

14) John did not have a WMD. *Instead* he had bad gas.

Finally the dismissive conjunction is a generalized adversative conjunction. It is “…generalized to cover an entirely open-ended set of possibilities…” (p. 255). Dismissive expressions include phrases such “*in any/either case/event, any/either way, whichever, anyhow, at any rate, in any case, however that may be”* (p. 256). An example of the dismissive conjunction can be found in the following text:

15) They claim that creationism is the one true teaching*. In any case*, one should always be the skeptic.

Causal conjunctions express a reason, result, or purpose. The causal conjunction is expressed by *so, thus, hence, therefore, consequently*, *accordingly*, and by a number of expressions such as *as a result (of that), in consequence (of that)*, and *because of tha*t (p. 256). For example:

16) John was shy and nervous when it came to meeting people*. As a result,* Peter and Paul introduced him to Mary.

Temporal conjunctions express temporal, conclusive, and sequential relations. *Then, next, before,* and *at the same time* are commonly used temporal conjunctions. For example:

17), Georgie kissed Sarah. *After that,* he sent flowers to Mary.

Last, the continuative relation is a number of individual items which do not express a unified relation as with the previous categories of conjunctive relations. Even though continuative relations are not expressed as a unified relation, Halliday and Hasan nevertheless relate, they are used with a cohesive force in the text. The continuative relation is confined to six items: *now, of course, well, anyway, surely,* and *after all*. For example:

18)*Of course* Georgie loves Sarah, why else would he woo her?

Halliday and Hasan's work provides a useful classification of conjunctions in this study, and helps in the understanding of the notion of 'cohesion'.

1.5 Studies of Aging and Cohesion in Discourse

This section will examine the empirical studies of (Duong and Ska, 2001; Kemper et al., 1990; North et al., 1986; Pratt et al., 1989; and Ulatowska et al., 1986) in order to understand the effects of aging on discourse cohesion.

As noted, cohesion is the study of semantic relations between elements in a text that are independent of the structure. Of the four discussed above (reference, ellipsis, substitution, and conjunction), "…only reference has been studied with any detail in the discourse of older adults" (Shadden, 1997, p. 151).

North *et al*. (1986) studied the performance of thirty-three elderly women and eighteen middle-aged women in a number of linguistic discourse tasks. The purpose of this study was to examine and describe discourse performance in elderly adults contrasted with middle aged adults from a well educated population. The tasks of the study were narrative tasks consisting of two story retellings and a personal narrative, a procedural discourse task, consisting of a description of how to (1) mail a letter, (2) polish shoes, and (3) shop in a store. Finally, subjects underwent an interview and took a number of cognitive tests.

Results of the study suggest that "…cognitive performance tends to decline with age even in a well-educated population" (p. 278). Regarding the procedural discourse tasks, each task was scored for the presence versus the absence of essential steps[8]. In addition, scoring took into consideration whether produced order was correct or not. Results demonstrated that the older group produced fewer essential steps on all tasks compared to the middle-aged group. In the narrative tasks, scores were based primarily on the number of propositions produced. The results demonstrated that the older group produced fewer propositions. The overall outcome is that "…cognitive performance tends to decline with age even in a well-educated population" (p. 278).

Ulatowska *et al*. (1986) studied the effects of age in the use of reference in an elderly population. The study emphasizes "…vulnerability of reference to disruption as a result of neuropsychological impairments found in schizophrenia,

[8] The definition of an essential step is not clearly defined within the literature, nor is the methodology of how essential steps are determined. The examiner modeled a description of a procedure, after which subjects described how to mail a letter,…(see description of the study). The assumption is that there were a set number of steps in each task that were used as a device to measure.

aphasia, and dementia, and its potential for diagnostic significance" (p. 26). The subjects were fifty-one women ranging in age from 27 to 92 from a religious order. They were divided into three age groups: 77-92, 64-75, and 27-55 and underwent two types of testing: narrative and procedural. The narrative testing consisted of two story retellings and a self-generated account of a memorable experience. The procedural task consisted of a self-generated description of two procedures: how to mail a letter and how to shop at a large department store.

Results of the study suggest a life-span continuum of referential decline[9]. The impairment of reference was more pronounced in the elderly who were older (76 and above). In addition, there were two points regarding the results. The first is that the impairment was evident with increased complexity of the task. The second is that the impairment was observed across a variety of discourse tasks, suggesting a general decline rather than a variance of style.

Duong and Ska (2001) analyzed discourse samples induced by picture stimuli of fifty-three healthy older adults (65+ years in age) for the percentage of expected main ideas and number of transitional markers.[10] The purpose of the study was "…to describe discourse production induced by either a single picture or a picture sequence in older subjects with higher versus lower levels of formal education" (p. 121).

The fifty-three older adults had no history of neurological, psychiatric, or medical abnormality. They were divided into four groups according to age and education. "Each subject was asked to produce two stories, one induced by the

[9] Referential decline denotes ambiguity of reference in relation to age. In addition, there were related impairments of comprehension and cognition observed (Ulatowska et al., 1986).
[10] Transitional markers are interpreted in this thesis to be conjunctions.

presentation of a single picture, depicting a bank robbery, and the other, by the presentation of seven pictures depicting a car accident" (p. 122). The directions of the task were to "Look at this (these) picture(s) and tell me the story that you see (Ibid). " Production time was unlimited and sessions were terminated when no new information was produced.

Results of the Duong and Ska (2001) study indicate both conceptual and organizational impairments[11] among older subjects. Those results relevant to the present study were that younger subjects produced more transitional markers than older subjects. Younger subjects also produced a higher percentage of expected main ideas than older subjects. A final result of note is that education did not play a statistically significant role in discourse tasks because there were no observed interactions between education and age.

As will be seen in the next chapter, the procedure used by Duong and Ska most closely resembles the procedure used in the present study. It is important to note that they based their conclusions on the percentage of expected main ideas and the frequency of transitional markers produced by the subjects in their study, from which they were able to determine if conceptual and organizational processing were impaired by age. This is important because from their methodology, they were able to make statistically significant observations. To continue this notion, the results from the current study may state some conclusive observations about the production of conjunctions and T-units by older-old and younger-old subjects.

[11] Conceptual information concerns the events and characters that make up a story, whereas organizational information is related to how the conceptual information is organized with narrative structure.

Kemper *et al*. (1990) analyzed narratives to study life-span changes in their structure. Their study was part of a larger project documenting age-related changes in basic psycholinguistic processes in healthy, community-dwelling adults. The study was designed to examine a cross-sectional sample of adults' oral narrative for age-related changes to their structure and content. The analyses examined four aspects of structure of adults' oral narratives:

1. A structural analysis of the complexity of the narratives' plots using the system devised by Botvin and Sutton-Smith (1977, as referenced by Kemper *et al*., 1990) and modified by Kemper (1990, as referenced by Kemper *et al*., 1990).
2. A syntactic analysis focusing on the length, clause structure, and fluency of the narratives using the procedures of Kemper et al. (1989, as referenced by Kemper *et al*., 1990).
3. A propositional analysis based on the work of Kintsch and Keenan (1973, as referenced by Kemper *et al*., 1990)
4. An analysis of the cohesiveness of the narratives derived from Halliday and Hasan (1976; Fine, 1978, as referenced by Kemper *et al*., 1990).

Sixty-two elderly adults participated in the study. All subjects were native speakers of English and healthy, active community-dwelling adults, but no physical impairments were noted. The subjects were divided into three age groups: 60-69 years, 70-79 years, and 80-90 years. Narratives were elicited

during an hour long interview, in which subjects were interviewed in groups of 2-4 people. Subjects were instructed to tell a story.

Of concern to the current study are the results in the analysis of cohesiveness (or the fourth aspect: see above). The analyses determined the presence of "…seven types of cohesion: anaphora, cataphora, exophora, ellipsis, lexical repetition, substitution, and conjunction" (p.219). They reorganize the traditional classifications of cohesion set by Halliday and Hasan. They justify these classifications in the following statement.

> Potentially, ellipsis, lexical repetition, substitution, and conjunction can be used anaphorically, cataphorically, or exophorically to point forward, backward, or outside the text. As in Halliday and Hasan (1976) and Fine (1978), few cataphoric or exophoric uses of ellipsis, lexical repetition, substitution, and conjunction occurred in adults' narratives. Hence, all three types of reference…were summed together for these types of cohesive ties. The resulting system included seven types of cohesion: anaphoric reference, cataphoric reference, exophoric reference, all forms of ellipsis, all forms of lexical repetition, all forms of substitution, and all forms of conjunction. (Kemper *et al*., 1990, p 213)

There were no significant differences for the use of cataphora, exophora, lexical repetition, and substitution. In contrast, there were effects of age on the use of anaphora, ellipsis, and conjunction. The results showed that usage of

these three types of cohesion declined with the age of the story teller and with the complexity of the narratives. It was concluded that the pattern of gain and loss appears to reflect the demands placed on working memory by the construction and production of complex narrative and syntactic structures.

Pratt *et al*. (1989) investigated age differences in the cohesion of narrative retellings in both the reference and conjunction, and explored the role of information-processing factors in accounting for differences between them. The study was designed to provide descriptive evidence of adult age differences on the management of the two types of cohesion.

There were a total of 60 healthy subjects divided equally between three age groups: 18 to 26, 26 to 55, and 60 to 87. Subjects completed a total of five tasks, of which four were used: a story retelling task, a cued memory recall test of story knowledge, a vocabulary test, and a sentence memory span measure.

With the story-retelling task, Pratt and colleagues used two different stories. Half of the subjects were presented with one of the two stories for three minutes, following which the materials were removed and subjects were asked to retell the story that they heard. For the cued story-recall test, a 10-item questionnaire was administered after the story retelling task. In the sentence span task, subjects read a series of 13- to-16-word sentences aloud at their own pace. They were then tested on the recall of their final word in the sentence.

Results indicate that older adults had shorter working memory spans for sentence information. According to Pratt and colleagues, story information recall on the first test was also lower for the older sample. Yet, with conjunctions, “The

percentage of all conjunctions that were scored as complex[12] was only weakly correlated with memory span in the older groups…" (p. 634). They suggest a further need for investigation of factors that predict conjunction usage.

The research of (Duong and Ska, 2001; Kemper *et al*., 1990; North *et al*., 1986; Pratt *et al*., 1989; and Ulatowska *et al*., 1986) have shown a general decline the production of conjunctions/referential and transitional markers in older subjects. Memory is for some (Kemper *et al*., 1990 and Pratt *et al*., 1989) the catalyst explaining the decline, yet Pratt and colleagues suggest only a weak correlation between memory and production of conjunctions.

As to the relation of the previously mentioned studies to the research question of how conjunctions are affected by the processes of aging, the research suggests the likelihood of a decline. While considering the conclusions drawn by Pratt *et al.* (1989), and Kemper *et al.* (1990), the hypothesis nevertheless is that there is a non-significant relationship between age and the production of conjunctions. The results will provide insight into the production of conjunctions.

[12] Temporal, causal, and adversative conjunctions are complex conjunctions. Additive conjunctions are considered to be simple conjunctions.

Chapter 2

Methodology

The primary objective of the study was to elicit natural language of a narrative and procedural content from elderly subjects. This chapter is divided into four sections; the first discusses characteristics of the subjects while the second examines characteristics of the setting. The third analyzes the tasks used and the fourth discusses the processes of developing and analyzing the data.

2.1 Subjects

A total of 17 subjects between the ages of 60 and 86 (mean= 70) participated in the study. The gender distribution between the subjects was 10 females (mean age= 73) and seven males (mean age= 68). The subjects were divided into two groups based on age: 60-69 (mean age= 63, n= 8), and 70-86 (mean age= 77, n= 9). All subjects spoke English as their native language and their ethnic background was Caucasian.

Subjects were recruited from three locations: Seniors Monongalia of the Mountaineer Mall, the Morgantown Life Long Learner's Association, and the Village at Heritage Point, a retirement home in Morgantown, West Virginia. Thus, the geographic distribution of the subjects was centered in Morgantown, West Virginia and the surrounding areas.

2.2 Setting

Data collection occurred at Health South MountainView Hospital, a regional rehabilitation hospital in Morgantown, West Virginia, henceforth known as Health South. It was chosen as a site to collect data because of its location and because the directors of the facility were willing to allow its use for research. The research was conducted in Health South's Department of Speech Pathology.

Within the Health South facility, interviews were conducted in therapy rooms. Subjects sat face-to-face with the interviewer and completed two different tasks. There was no time limitation for the tasks, although often they did not exceed 45 minutes.

2.3 Tasks

Two tasks were used to provide the data elicited from the subjects. The first task was a story telling task consisting of six picture-panel sequences. The second task was an interview in which subjects described how to perform a number of different activities ranging from changing the batteries in a flashlight to making coffee with a coffee grinder, coffee beans, water, and a coffeepot. The tasks were designed to elicit natural language production.

In the first task (the story telling task) subjects were instructed to "Look at the pictures and tell a story based on what you see." The sequences consisted of one four-picture-panel sequence, two five-picture-panel sequences, and three six-picture-panel sequences. The reason for using picture-panel sequences for a story telling task was to provide the subjects with cues on which to base a story.

In addition, this task was a structured task, which was intended to accustom the subjects to the oral production tasks. The story consisted primarily of a monologue from the subject. On occasion, it was necessary to clarify directions for the subjects and assure them that they were completing the task correctly.

In the second task (interview), each subject was asked the same twelve questions. The questions were designed to elicit procedural discourse from the subjects. Of the twelve questions asked, the answers to nine were reported because a majority of subjects did not know how to answer three of the questions. The same questions were omitted for all subjects. For example, a discarded question asked 'How do you change the oil in your car?'

One major goal in the design of the study was to allow for free production of natural language. It permitted the subjects to speak from their own interpretation of what they believed they were supposed to do. The result of this design characteristic was that few answers in any given situation were identical.

2.4 Data Collection and Analysis

The sessions, which ranged from 40 to 55 minutes in length, were recorded using a tape recorder. The recordings were transcribed verbatim by a medical transcriptionist.

Transcripts were analyzed by dividing the subjects' responses into T-Units. A T-unit as described by Cherney, Shadden, and Coehlo (1998, pgs. 22-23) is a "minimal terminal unit." It consists of one main clause plus any subordinate clauses or nonclausal structures attached to or embedded in the

main clause. The purpose of the T-Unit is to measure segment passages of continuous language into the shortest unit that is grammatically allowed as a sentence. Cherney *et al*. (1998) state further that minor sentence types can be considered T-Units as long as they fit into one of three categories:

1) Complex sentences, which are answers to questions, comments on previous statements, or situational comments such as introductions. For example: (Who composed *Joe's Garage*?) *Frank Zappa*.
2) Exclamatory sentences, which are primary or secondary objections. For example: (Do you like Bob Dylan?) *Hell yes!*
3) or Aphoristic sentences, which are expressions that operate as full sentences. For example: *A dime a dozen*.

The T Units were then counted, as were the conjunctions. In counting conjunctions, all types, as discussed in Halliday and Hasan (1976) (additive, adversative, causal, temporal, and continuative) were counted.

As shown in the following chapter, the analysis of data consisted of variance testing and ratio analysis. An ANOVA was performed on T-Units to examine how much of the perceived relations between age and age group[13] as relevant to the T-units produced were due to chance. An additional ANOVA was performed on the number of conjunctions produced to examine how relevant age, age group, and T-units were in affecting the number produced. Lastly, a

[13] There is a difference between age and age group. Age group is the data unadjusted. With age, the groups are statistically adjusted and reflect a mathematical balancing of the differences.

descriptive measure was utilized to demonstrate the ratio of conjunctions and T-units per age group.

Chapter 3

Results

The question this thesis attempted to answer is whether younger-old subjects produce more conjunctions than older-old subjects. Considering the conclusions drawn by Kemper *et al*. (1990) and Pratt *et al*. (1989), the hypothesis is that there is a non-significant relationship between age and the production of conjunctions. This chapter will discuss the results of variance tests on T-units and conjunctions and their relations to age.

The analysis of the data was performed using two analyses of variance that tested the number of T-Units and conjunctions produced for relationships between age, age groups, and T-units/conjunctions.[14] In addition, a descriptive analysis of ratio between T-units and conjunctions compared to age group was performed on the data. The statistical analyses were performed using the data in Table 1.

[14] An additional note of importance is that the results reported have been adjusted proportionally because of the low number of subjects.

Table 1: Subject Data

Subjects	Age	Sex	T-units	Conjunctions	Group
MSF	60	F	8.47	4.79	1
KTF	61	F	7.27	3.33	1
PJF	62	F	4.33	1.73	1
HSF	63	F	5.27	2.73	1
JSM	64	M	12.53	4.27	1
JSMA	65	M	4.87	2.75	1
CIM	65	M	11.53	8.73	1
LPM	65	M	6	1.87	1
TSM	70	M	9.87	3	2
VSM	71	M	7.13	2.47	2
SMF	72	F	9	6.13	2
FRM	74	M	7	1.93	2
FPF	76	F	6	2.13	2
LCF	82	F	9.13	2.87	2
IFSF	83	F	13.73	5.93	2
MANF	83	F	5	2	2
DWF	86	F	6.25	2.33	2

In Table 1, the data is divided into six categories. The first column: “subjects” is a coded identifier established to protect the identity of the study participants. The second column: “age” is the chronological age of the participant. The third column: “sex” is the participants’ gender. The fourth column: “T-units” shows the average number of T-units produced by each participant. The fifth column: “conjunctions” shows the average number of conjunctions produced by each participant. The final column: “group” shows the division of the participants into two groups. Group 1 ranges from 60-69 years and Group 2 ranges from 70-86 years.

3.1. Analysis of T-Units

In Table 2, the values involved with the analysis of T-units are shown. It is divided into three categories: source, F Ratio, and P value. The source lists the variables being analyzed. The F Ratio determines whether the variables are statistically significant or not. If the numerical value of the F Ratio is above 1.0 then the variable is potentially significant. The p-value determines the possibility of random error affecting the numbers. Because the value of the F Ratio is below 1.0, the data is not significant. With the p value above .05, random error is likely to influence the results.

Table 2: Analysis of Variance for T-Units

Source	F Ratio	P value
Group	0.28	0.61
Age	0.17	0.69

An ANOVA test[15] was used to test the number of T-units produced by the subjects in relation to the variables of age group, and age.

Age: The relation of age[16] to T-Units was not statistically significant (*F*=0.17, *p*=.69), and neither was age group significantly related to T-Units (*F*=0.28, *p*=.61). Based on the data, there were no significant variables that affected the production of T-units.

[15] The purpose of *analysis of variance* (*ANOVA*) is to test for significant differences between means by comparing (i.e., analyzing) variances. More specifically, by partitioning the total variation into different sources (associated with the different effects in the design), we are able to compare the variance due to the between-groups (or treatments) variability with that due to the within-group (treatment) variability. (http://www.statsoft.com/textbook/glosfra.html)

[16] See footnote four in the previous chapter for an explanation of the difference between age and age group.

3.2. Analysis of Conjunctions.

Table 3, shows the results of the analyzed data in the analysis of conjunctions.

Table 3: Analysis of Variance for Conjunctions

Source	F Ratio	P value
Age	1.46	0.2545
Group	0.26	0.6202
T-Units	15.32	0.0029

An ANOVA test was used to examine the number of conjunctions produced by the subjects and their relation to the variables of age group, age, and T-units.

Age: Age was not a significant variable in relation to conjunctions produced (F=1.46, p= .26). The F Ratio looks significant because the value is above 1.0, but the p value for age is above .05 so random error is a likely influence on whether age affects the number of conjunctions produced.

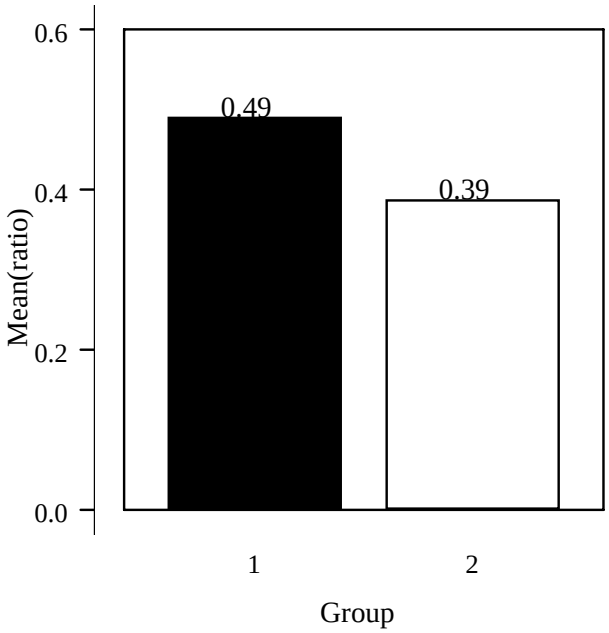
Group: Age Group was not a significant factor in relation to the production of conjunctions (*F*=0.26, *p*=.62).

T-Units: T-units though, did appear to be a statistically significant, relevant variable in the production of conjunctions (*F*=15.32, *p*=.0029). The inference to be made from these numbers is that the amount of T-units produced affects the number of conjunctions produced.

3.3 Ratio between T-Units and conjunctions

A statistical comparison illustrating the difference between group one and group two with respect to the ratio of conjunctions to T-units (conjunctions per T-unit) was performed. The results suggest that the difference is not statistically significant. However, a change in ratio from younger-old subjects and older-old subjects is noted.

Figure 1: Ratio of Conjunctions/T-units by age group



This figure is a bar graph that depicts the ratio of conjunctions to T-units by age groups. In the figure, Group 1(black) produces approximately five conjunctions for every ten T-units produced. Group 2 (white) produces about four conjunctions for every ten T-units produced.

3.4 Conclusions

The results of this study do not allow the null hypothesis to be rejected. There are no significant relations between the production of T-units and the production of conjunctions in younger-old subjects vs. older-old subjects, but suggest that a change is present. It is demonstrated that age is not a significant variable in the production of either T-units or conjunctions. The data analysis suggests that there are no variables in this study that affect the production of T-units. However, T-units appear to affect the production of conjunctions. Age also seems to have an effect on production of conjunctions, but as a variable given the small number of subjects, no definite conclusions can be made. Although, it looks like there is a tendency that with age, the number of conjunctions produced tends to decrease. Regarding T-units and their effect on conjunctions, the data shows a ‘strong’ relation with a potential random error of only three per every one thousand produced. Issues that relate to the production of T-units as well as conjunctions will be discussed in the following chapter.

Chapter 4

Discussion and Conclusion

The results have shown that there are no significant relations between the production of T-units and the production of conjunctions in younger-old subjects vs. older-old subjects in procedural and narrative discourse. There are a number of potential explanations for these findings. In discussing these explanations, this chapter will explore the iconicity assumption from Zwaan (1996) and Dowty (1986), and relate phenomena of child discourse and child narrative production from Tomasello (2003). In addition, methodological issues will be examined related to this thesis. Those issues are: issues of education, health issues, cross-sectional versus longitudinal studies, issues in measuring age, and issues with the tasks using the perspectives of Duong and Ska (2001), Holland (1990), Shadden (1997) and Ringel and Chodzko-Zajko (1990). Also discussed are the limitations of this study and finally, suggestions for future research.

4.1. The Iconicity Assumption

In examining the subjects' narrative and procedural discourse for conjunctions and T-units, a pattern emerged on some of the tasks performed by some of the subjects. This pattern was that the subjects would describe a narrative or procedural task as well as the event without using conjunctions but develop the discourse in an organized manner.

This pattern viewed in Table 1 shows exactly that: subjects producing orderly procedural and narrative discourse without using conjunctions. Table 1

has two examples where subjects did not produce conjunctions in procedural discourse and two examples of subjects not using conjunctions in narrative discourse. It also has two examples of younger-old and two examples of older-old subjects who did not use any conjunctions within the discourse tasks. The inferences to be made from this table are that occurrences of subjects not using conjunctions in the discourse may be present regardless of age, gender, or task. The description of these patterns can be classified by using the Iconicity Assumption.

Table 4: Examples of Iconic Ordering without Linguistic Cues

Subject: LCF	Gender: Female	Age: 82
Question: How do you change the batteries in a flashlight?		
L: …Unscrew the bottom. Drop out the ones that are bad. Get some new L: flashlight, new batteries that is. Be sure that you put them in correctly, positive L: and negative. Screw the bottom back on…		
Subject: PJF	Gender: Female	Age: 62
Picture Task 6:1 (See appendix)		
P: Okay, a lady plants a seed. Corn grows. She harvests it. Cooks it. They all get P: to eat the rewards of what she planted.		
Subject: LPM	Gender: Male	Age: 65
Question: How do you change the batteries in a flashlight?		
L: You either screw it off at the top or bottom. Take the batteries out. Assuming it L: is D batteries, it is usually 2-3. What else do you need to know? You screw it L: back together again.		
Subject: VSM	Gender: Male	Age: 71
Picture Task 6:4 (See appendix)		
V: We are at the Zoo, the Middleton Zoo. They are seeing the bears, lions, V: elephants, monkeys. They are going home happy.		

The Iconicity Assumption takes into consideration the role of event-ordering in the interpretation of discourse. In the instances from the results where subjects used few to no conjunctions, the Iconicity Assumption provides a

framework for the interpretation of their verbal behavior. Although the Iconicity Assumption describes how some forms of discourse are interpreted, it does not explain why subjects do not use certain linguistic cues such as temporal adverbs, conjunctions, etc. In the case of this thesis, it deals with conjunctions indirectly by focusing on the interpretation of successively produced T-units

With the Iconicity Assumption (Fleischman, 1990; Dowty, 1986)[17], listeners/readers assume that the order by which the events are reported match the chronological order. In the context of this thesis, the Iconicity Assumption is relevant to both the procedural and narrative tasks performed by the subjects.

Psycholinguistic research supports the thesis of the Iconicity Assumption. According to Zwaan (1996), young children[18] interpret the sentence in the example (1) by following an order of mention strategy, ignoring the semantic meaning of the temporal conjunction *before*.

1) Before he patted the dog, he jumped the gate

In addition, Zwaan (1996) discusses the Temporal Discourse Interpretation Principle in discussing Dowty (1986). He states

> The TDIP [Temporal Discourse Interpretation Principle] is a strong version of the iconicity principle[[19]] because it postulates that the default assumption in the interpretation of narrative time is not only that successive sentences describe successive events, but also that contiguous sentences describe contiguous events (Zwaan, 1996, p. 1197).

[17] The Iconicity Assumption is normally applied in a literary context of writer/reader. Here it is being applied in the context of the speaker/hearer.
[18] Young children are children under the age of five.
[19] The iconicity principle is the Iconicity Assumption.

And the TDIP states:

Given a sequence of sentences S_1, S_2,…,S_n to be interpreted as a narrative discourse, the reference time of each sentence S_i (for i such that $1< i \leq n$) is interpreted to be:

(a) a time consistent with the definite time adverbials in S_i if there are any;

(b) otherwise, a time which immediately follows the reference time of the previous sentence $S_{i-1.}$ (Dowty, 1986, p. 45)

In conclusion, the Iconicity Assumption describes how successive sentences are interpreted in instances in which linguistic cues are absent. Regarding the data from this thesis, in those tasks in which subjects narrated the picture sequences without using conjunctions, the descriptive framework provided by the Iconicity Assumption can allow for inferences to be made about the processes of organization used by the subjects.

4.2. Children and the Elderly

This section will seek to provide an answer to the question of why a more pronounced difference between the production of conjunctions by older-old and younger-old subjects was not present in the data by exploring similarities between child language and elderly language. In addition, it will expand on the idea of the Iconicity Assumption by using the work of Tomasello (2003) to examine children's narrative development.

During the interviews, in some of the discourse segments produced by subjects, a pattern emerged of the subjects employing only the additive and temporal-sequential conjunctions for both types of tasks. Though not surprising, this pattern became interesting when the work of Tomasello (2003) was considered.

In Table 5 are examples from the data of the subjects telling how to make tea. These examples are from the tasks that elicited procedural discourse.

Table 5: Examples of the use of Additive and Temporal Conjunctions in Procedural Discourse

Subject: MSF	Gender: Female	Age: 60
M: I pour cold water into the tea kettle **and** bring it to a boil. Place a tea bag in a M: cup or mug **and** fill that vessel with boiling water **and** let it steep. I go by the M: color.		
Subject: IFSF	Gender: Female	Age: 83
F: I am very lucky to have an electric pot that boils my water. I get my box of tea F: out of the cupboard. I prefer chamomile tea. It is already measured out in F: bags. I put that in the cup. Wait until the water boils in the electric tea kettle. F: **Then** I pour the water over that. **Then** I have a small plate, I put over the cup F: **and** steep it as long as, different teas I steep longer than others.		
Subject: LPM	Gender: Male	Age: 65
L: Take the kettle, you need some water too. Pour water in the kettle. Heat the L: water to high temperature. Put the teabag in the cup **and** pour the water in. L: Let it set a little bit **then** you have your tea.		

In the following examples in Table 6, subjects are using only additive and temporal-sequential conjunctions in a narrative context. They are producing the narrative from Picture Panel 5:8 (See Appendix).

Table 6: Examples of the use of Additive and Temporal Conjunctions in Narrative Discourse

Subject: LCF	Gender: Female	Age: 82
L: I have seen beavers do this **and** I think it's fantastic that no other animals do it. L: I've asked about it. He is gnawing away at the tree **and** finally fells the tree. He L: carries it with his mouth. This is fascinating. He swims down the stream with in L: mouth **and** he brings it to where all other whatever little twigs, barks, trees, L: whatever he's collected.		
Subject: MANF	Gender: Female	Age: 83
M: Oh, this is Mr. Beaver. We have beavers at a camp we have on the XX river. I M: hate to tell you. This beaver is very busy in a stand of trees. He is making M: pencil points out of them. He is taking them off **and** making his home **and** M: standing on top of it to guard it.		
Subject: CIM	Gender: Male	Age: 65
C: We have a beaver who is knawing a tree **and then** he gets it cut down **and** he C: picks it in his teeth. **And** he carries it over to the water, **and then** he swims C: through the water **and** he carries it over to his hutch **and then** he puts it on C: the hutch. **And** you can see...actually he puts it on the beaver dam, I think. He C: puts it on the beaver dam **and** goes back to his hutch.		

A key consideration for this pattern is that subjects had interpretive freedom regarding how to perform the task. They were only asked to tell a story based on pictures before them or to give directions to a specific task such as changing a battery in a flashlight. So the exclusive use of additive and temporal-sequential conjunctions could be a natural response to the requirements of the tasks. An additional consideration deals with the counting of the conjunctions. If the continuative relation had been ignored, since the majority of instances were the lexeme 'well' and occurred at the beginning of the discourse segment, there would have been many more instances of the exclusive use of additive and temporal-sequential conjunctions within the discourse.

Tomasello (2003) briefly discusses temporality in discourse narratives of children in his book; *Constructing a language*: *A usage based theory of language acquisition*. An important point discussed by Tomasello that relates to the pattern of exclusivity using additive and temporal conjunctions is that children use the temporal language in scripted patterns without really understanding its meaning. It has been found that constructions using *and*, as well as *then*[20] exist at a young age. The usage of more sophisticated words such as *before*, a*fter*, *first*, *while*, *during*, *since,* and *so on*-- is notoriously poor until well into the school years (Tomasello, 2003). .

An additional point of Tomasello's work with children is that there is very little temporal structure organized using linguistic cues in their narratives but that they follow the sequence of events as they actually happened (Tomasello, 2003). He states further that the use of linguistic cues to modulate iconic structuring is minimal and often redundant with iconic ordering. Returning to example #1, the idea that children use few linguistic devices to describe iconic ordering is concurrent with Zwaan's point that children follow an order of mention strategy for interpretation of sentences and therefore can be expected to use fewer temporal, causal, and adversative conjunctions as well as other temporal/spatial cues such as time adverbs, etc.

These findings are important. Using the conclusions drawn by Tomasello, the additive conjunction appears to be commonly used by children, and the other types of conjunctions are made more prominent through education. Its relation to

[20] These conjunctions would be classified as additive and temporal-sequential by Halliday and Hasan (1976).

the current study is that in many of the tasks, subjects appeared to use additive and temporal-sequential conjunctions more than the other types. Moreover, the fact that children interpret sentences using an order of mention strategy, the additive and temporal-sequential conjunctions would then be the expected medium when using conjunctions because they do not alter the structural order of events.

There are two ideas meant to be inferred from this section. The first is the use of iconic ordering or the iconicity assumption by children, which lends further credence to the idea of the iconicity assumption and suggests why subjects did not use a large number of conjunctions. The second is that young children use conjunctions without really knowing their meaning. They use some basic terms but, according to Tomasello, other cognitive developments are necessary for the use of sophisticated conjunctions[21]. These inferences are related to this study because they may provide an explanation as to why adults do not use a large number of conjunctions.

4.3 Methodological Issues

This section will discuss methodological issues affecting this study. The topics discussed in this section are education, subject health and recruitment, cross-sectional versus longitudinal studies, issues in measuring age, and issues with the tasks. These issues are relevant to the analysis of elderly discourse and to this study.

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[21] Sophisticated conjunctions are assumed to be the other classifications of conjunctions of Halliday and Hasan. This idea of sophisticated conjunctions also relates to the complex conjunction discussed in Pratt *et al.* (1989) in the first chapter.

The subjects' educational background should have been noted. As noted in Chapter 1, Duong and Ska's (2001) research focused on the effects of formal education on the discourse production of elderly adults. They found that subjects with a higher amount of formal education produced a higher percentage of expected main ideas (Duong and Ska, 2001). Such a distinction could have been made for a clearer understanding of patterns in the results of the present study. For example, a stronger correlation could be drawn regarding the number of T-units produced[22]. All the subjects who were educated beyond secondary school have produced a larger number of T-units than those whose highest level of education was secondary school.

By examining the raw data, suggestions can be made that education affected the results. In Table 7, six of seven subjects (JSM, CIM, TSM, LCF, IFSF, and SMF) had a T unit average of ≥ 9, and had education beyond the secondary level. However, with these data, the relationship between average T-units and education is circumstantial because other educated subjects did not have a T-unit average of ≥ 9, (i.e. LPM). Even though a pattern emerges of educated subjects speaking more, hence a T-unit average of ≥ 9, there are others who are educated beyond secondary school who have a T-unit average of < 9.

[22] Even though this thesis is concerned with the production of conjunctions, the Analysis of Variance found a statistically significant relation between the production of conjunctions and T-units. So it is therefore necessary to consider issues that relate to T-units.

Table 7: Subject Average of T-units

Subjects	Age	T-Units
MSF	60	8.47
KTF	61	7.27
PJF	62	4.33
HSF	63	5.27
JSM	64	12.53
JSMA	65	4.87
CIM	65	11.53
LPM	65	6
TSM	70	9.87
VSM	71	7.13
SMF	72	9
FRM	74	7
FPF	76	6
LCF	82	9.13
IFSF	83	13.73
MANF	83	5
DWF	86	6.25

Another issue that affects research of the elderly and affected this study is health. The topic of the subjects' health embodies many issues. Their health can affect where they are interviewed as well as if they are interviewed. In addition, these issues affect the type of population that participate in the study and limit the possibilities of generalizing the results of the study.

When designing research, a risk to the validity of the data is posed by only using subjects with good vision and hearing because it limits the "generalizibility" of the results (Holland, 1990). Shadden (1997) writes that a "…natural selection bias exists in selecting only subjects who volunteer to serve (p. 145)." This consideration in the research of elderly language of the "…use of healthy, highly educated, normal hearing, visually intact, economically comfortable subjects… as geriatric supermen", is an issue that researchers must contend with when recruiting subjects.

The setting of this study was at moments limiting but in the overall context worked out well. The limiting aspect of the setting was due to the larger problem of recruiting a large pool of subjects. For many potential subjects, the problem of

transportation was a problem. The interviews were confined to the Health South facilities of Fairmont and Morgantown. Those potential subjects who suffered from physical ailments that limited their mobility participated in the interviews if arrangements could be made to transport them to the interview site.

The benefit of conducting research at Health South was that it reduced the bureaucratic wrangling such as competing for time with others who have similar priorities that would have occurred if the setting would have been open to other arenas such as interview facilities at the Department of Speech Pathology and Audiology, and any other public space at West Virginia University. Overall, there were few problems that hindered the study.

Related to the issues of subject recruitment was the quantity of subjects. The small number of subjects limited the strength of the statistics. The p values for many of the factors mentioned were greater than 0.05. P values, however, depend on the sample size. Important relationships among factors may go undetected if the sample is too small. Had there been a larger sample size, it might have been possible to discuss significant relationships between factors in the data.

A solution to the recruitment problem would have been to design the study to meet the subjects in different locations. Specifically, the subjects could have been interviewed at their homes, senior centers, or at a series of public locations. In addition, if there had been more locations from where to interview subjects, then perhaps, subjects could have been recruited from different locales in the counties surrounding Monongalia County, West Virginia.

A separate issue affecting research design is the measurement of age. Shadden (1997) writes of the uncertain criteria for defining age in research to be a dilemma for methodology, a chronological age versus a biological index of age processes. On the topic of biological age, Ringel and Chodzko-Zajko (1990) write:

> The most common approach has been to estimate the "biological" or "functional" age of an individual. In this procedure, the combination of physiological variables which maximizes the prediction of chronological age is used to estimate biological age. From a conceptual viewpoint, those individuals whose biological age exceeds their chronological age are considered "old" for their age, whereas those whose biological age is less than their actual age are considered physiologically young. (p. 68)

The use of biological age is not without shortcomings. According to Ringel and Chodzko-Zajko, "The most critical objection centers about the requirement that chronological age be selected as the criterion against which the biological variables are regressed (Ringel and Chodzko-Zajko, 1990, p. 68)." Another potential weakness of biological age is the heterogeneity of elderly subjects. The premise that certain physical and mental features are to provide a value of age is idealistic because every person will age based on genetics, environment, and personal history.

Within the context of this research, a dilemma between biological and chronological age did not exist. The use of criteria to estimate an age-index would not have been necessary in the data analysis because of the lack of difference between conjunction production by younger-old subjects and older-old subjects. Moreover biology is not a likely influence on the production of conjunctions.

Another major consideration in designing a study involves deciding whether to use a longitudinal method or a cross-sectional method. "Cross-sectional research compares individuals of varying ages at some particular point in time or study other independent variables in age-matched subjects" (Holland, 1990, p. 36). A potential use for cross-sectional research would be the study of healthy adults matched with language disordered individuals such as those suffering from aphasia. In the context of research of the elderly, problems with cross-sectional research are caused by issues such as elderly differences and environmental constraints. An additional problem is that it is difficult to obtain representative samples.

Longitudinal research is the study of selected individuals over a long period of time. The benefits of longitudinal research are that individual effects of aging can be studied and "…the comparison group affects minimized" (Holland, 1990, p 36). The disadvantages of using longitudinal research are threefold. The first disadvantage is the amount of time required to obtain the observations. The second is the expense involved and the third is the inflexibility of longitudinal research designs.

A longitudinal study may have allowed for statistically significant observations and a more in-depth quantitative study. Subjects could have been interviewed annually or biannually within a 10 year span and the results compared each year. Naturally this would have required a larger number of participants but nonetheless would have yielded some interesting results. Regarding cross-sectional research and with the consideration that this research was cross-sectional, an improvement would be to address the considerations of iconicity, heterogeneity, environmental, and health issues mentioned in the previous sections.

There were also issues with the tasks. They were developed with the intent of researching subjects suffering from head trauma and were simplified in order to make it possible for the intended subjects to accomplish the tasks. Therefore, the actual subjects examined were asked to describe tasks that were not challenging to their intellectual capacities. This was evident in some of the comments that were made. Usually, after the interview was over many subjects would ask questions about the purpose of the study. Table 8 illustrates one of the remarks that were made by subjects regarding the tasks.

Table 8: Example of Subject Comments

Subject: FRM	Age: 74
Question: How do you write a check?	
F: Well, you write a check by (funny questions) you get your checkbook with a …	

Another issue with the tasks was that there were portions of a test not discussed in this thesis, (the Revised Token Test) that could be given to the subjects only in a clinical setting. The Revised Token Test was designed for

brain-damaged patients and was given by a speech-language-pathology-graduate student who scored it and wrote a report about subjects' performance.

Finally, there was not a large enough quantity of tasks. Various factors contributed to subjects not answering procedural tasks in particular. One subject replied when asked how to plant a flower that she was from New York City and people do not plant flowers in New York City. Because of the different reasons for subjects being unable to complete the task, it limited the amount of discourse available. For the record, however, a large body of discourse was still available for analysis, though perhaps with more information, the results may have differed.

The solution to improving the tasks is multifaceted. First, using the tasks of a previously tested methodology from other researchers would have helped because it would have allowed for comparison of other studies with the current study, therefore giving the results more validity. Second, having more procedural and picture tasks would have provided more data to analyze from which to draw conclusions. Third, with the picture tasks, having larger sequences of pictures, (i.e. 7 to 9 panel pictures) would have provided more data as would have more complicated procedural discourse tasks.

A certain solution would have been the inclusion of a control group composed of subjects under the age of 50. Perhaps such a study would allow for a generalization about age and conjunction production.

The lesson to be drawn from this issue is that the development of a study is a long process. With clear goals and solid planning, events and circumstances

such as the ones previously mentioned can be avoided and/or embraced. Many of the limitations of this study stem from a low number of subjects and a methodology designed for a special population.

4.4 Suggestions for Further Research

This section will suggest ideas for further research, based on the work of this study. The suggestions range from examining aphasic patients to expanding the current research by improving the methodology and expanding the subject number.

Because the methodology was designed for examination of patients suffering from head trauma, the first suggestion of future research would be to examine the effects of aphasia on the production of conjunctions. Based on this idea, another possibility would be to examine the relationship between the Revised Token Test[23] and spatial language used in describing pictures because the Revised Token Test examines the ability of subjects to follow commands on spatial tests. It would therefore be interesting to see if there is a correlation between performances on a spatial test against the use of spatial language within descriptive picture tasks. This suggestion might require omitting the procedural tasks and adding more pictures to for description. In addition,

[23] McNeil, M, & Prescott, T. 1978. *Revised Token Test*. Austin Texas: Pro-Ed. The Revised Token Test (RTT) is a standardized test for adults between the ages of 20 to 80 with left and right side brain damage. The results demonstrate how a patient can process language and understand the meaning of certain types of words such as prepositions and adjectives. The results will also provide information on how patients understand linguistic structures such as statements and conditionals (Touch X if you have not touched Y.)

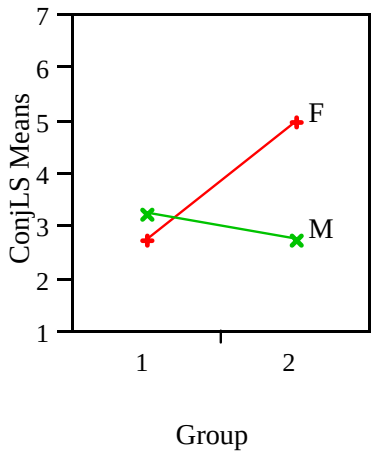
changing the directions to describe the pictures rather than telling a story would be necessary.

The current study would work as a control for another study, as long as the present methodology is not altered too much. A second suggestion would be to expand the current research in order to draw more significant conclusions. The following, Table 9 and Figure 2 illustrate the situation. A power analysis was performed in order to determine how many subjects would be required to lower the p value to $p<.05$ and it was found that at least 38 subjects would be necessary for a standard p value. The results of this study could be combined with future results, from which a significant conclusion could be drawn. For example, an important relationship between sex and age may exist.

Figure 2 illustrates the number of conjunctions split between younger-old males, younger-old females, older-old males, and older-old females. It shows that older-old females tend to use more conjunctions than younger-old females, whereas older-old males tend to produce fewer conjunctions than younger-old males. Table 9 provides the same information but numerically.

Table 9: Adjusted Means Table: Conjunctions			
Level	**Adjusted Mean**		**Std Error**
F,1	2.6978348		1.2804157
F,2	4.9534318		1.3610875
M,1	3.2233581		0.9407407
M,2	2.7360231		0.8253806

Figure 2: Group/Conjunction plot



In the current study, the statistical significance of the results was limited by the sample size, although patterns in the data suggest a potential relationship between age and conjunctions produced. In addition, the results appear to suggest a decline in the number of conjunctions produced between the age groups. However, there are issues in the methodology: education, health, cross-sectional versus longitudinal research, measurement of age, and methodology

that could have affected the production of conjunctions and T-units by the sampled elderly population. With additional research, these methodological issues could be addressed allowing for more statistically significant results to be obtained.

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Appendix A

Interview Questions:

Questions in **bold** will be elicited from every patient.

1. How long have you been seeing a speech-language pathologist?

2. How long have you been receiving therapy?

3. On a scale of 1 to 5 how would you rate your communication skills after your stroke?

4. On a scale of 1 to 5 how do you rate your communication skills now?

5. How do you change the batteries in a flashlight?

6. Describe how you write a check.

7. How do you plant a flower using a pot, a bag of soil, a small shovel, and water?

8. How do you microwave popcorn?

9. How do you make an ice cream sundae when you have a gallon of ice cream, chocolate, ground nuts, whipped cream, and a cherry.

10. How do you make a peanut butter and jelly sandwich?

11. Have you ever physically changed the tire on a car? If so describe how you change a tire on a car.

12. Have you ever checked the oil in your car? If so how do you check the oil in your car?

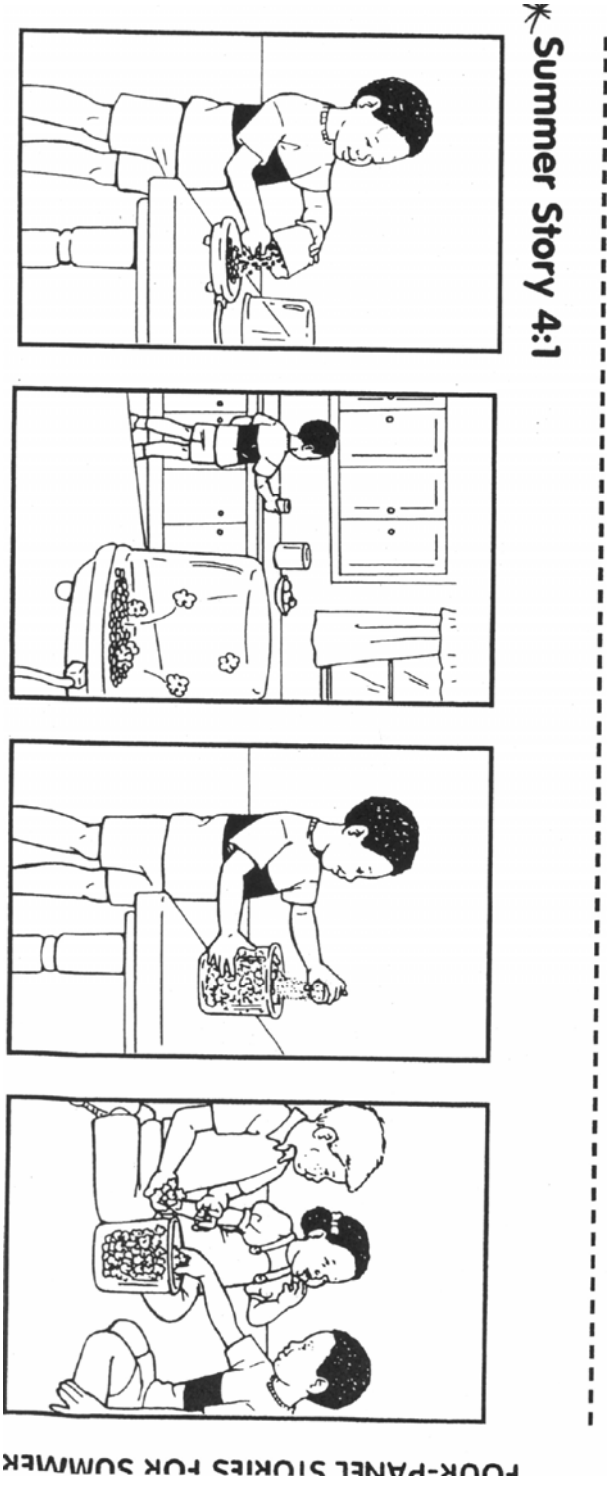
13. How do you get money from an ATM?

14. Do you drink tea? If so how do you make tea using a kettle, a cup, and a teabag?

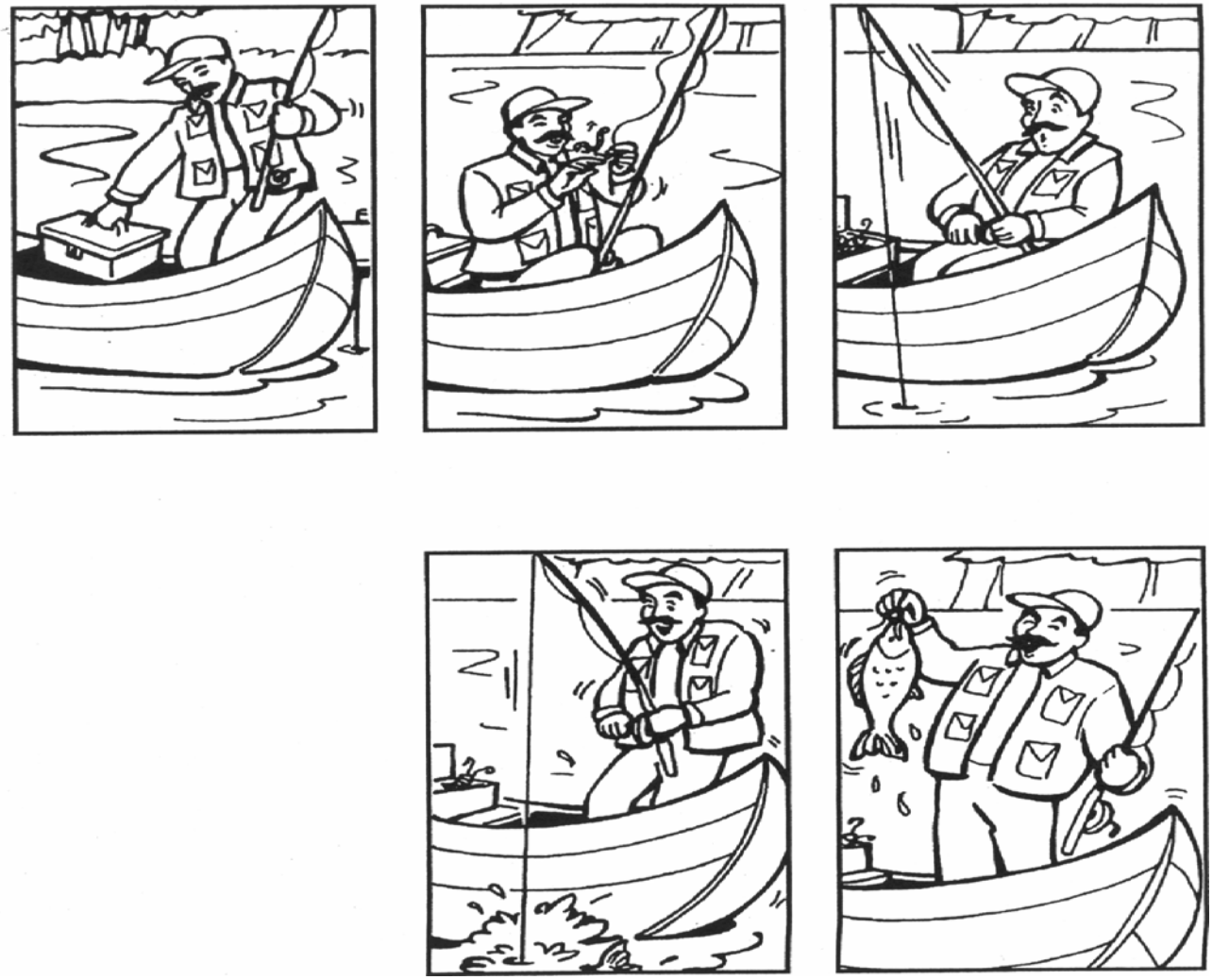
15. Do you drink Coffee? If so how do you make coffee using coffee beans, a coffee grinder, water, and a coffee pot?

16. Describe how you brush your teeth using toothpaste and a toothbrush.

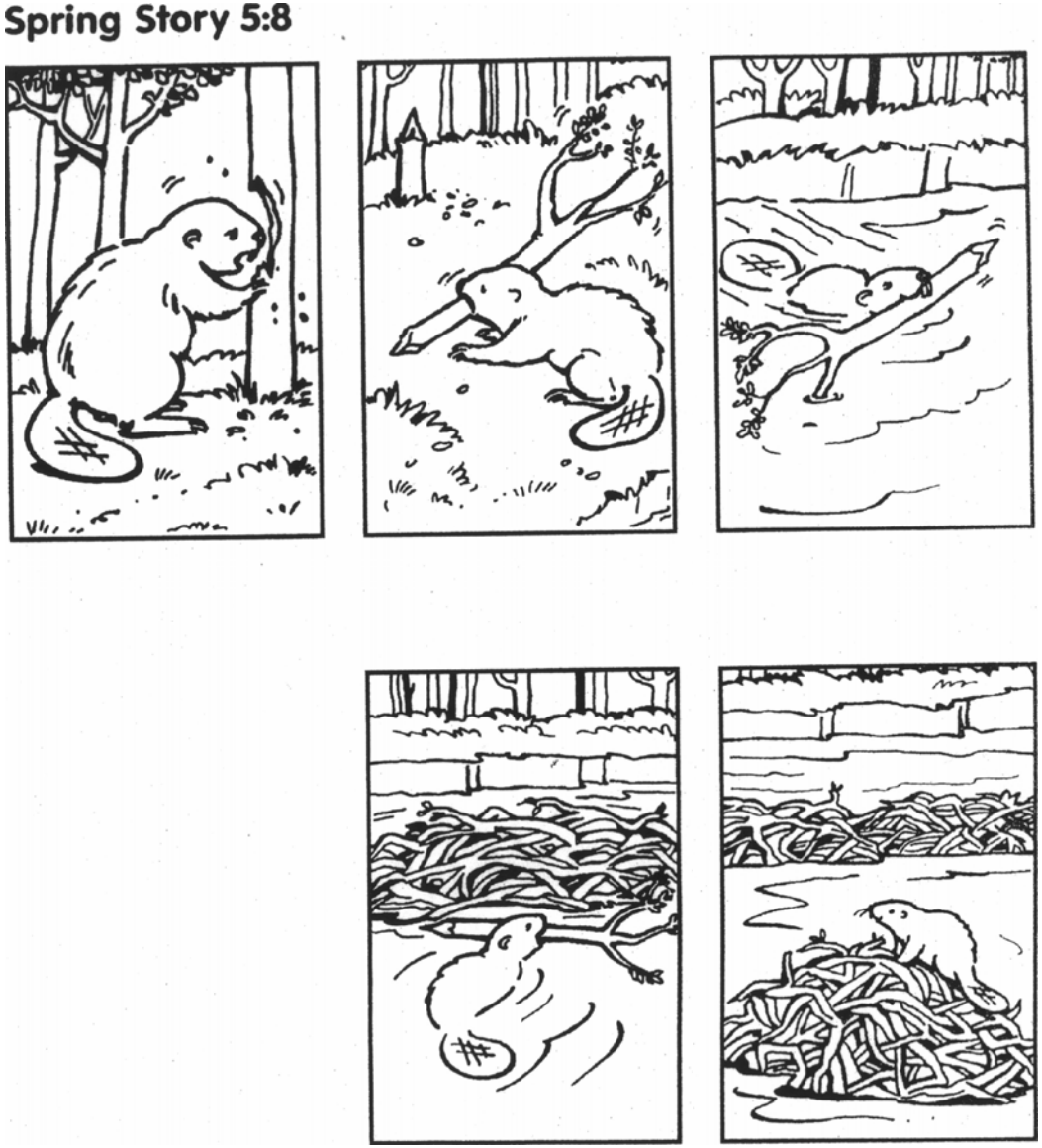
Appendix B
Picture Exercises



Summer Story 5:4

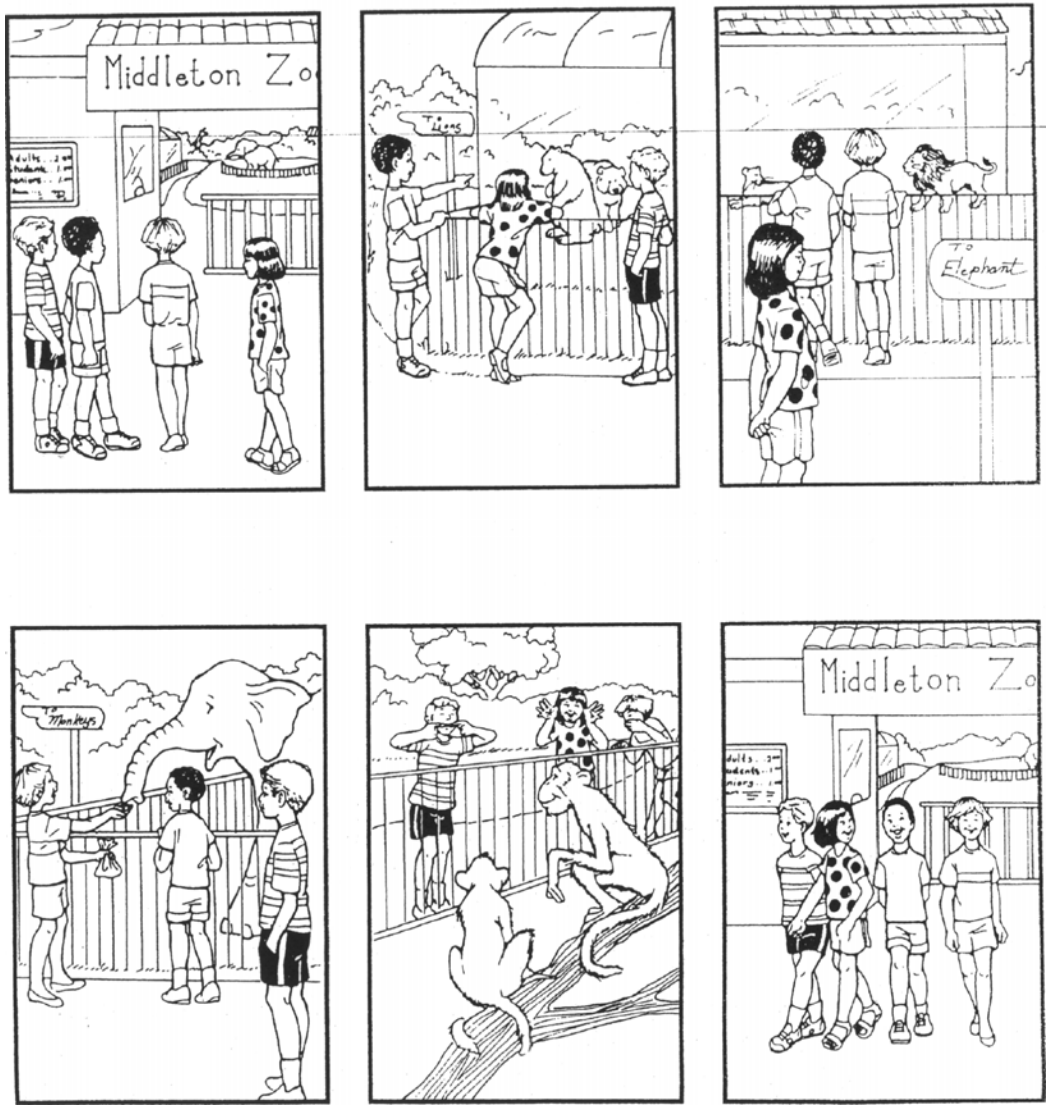


Spring Story 5:8

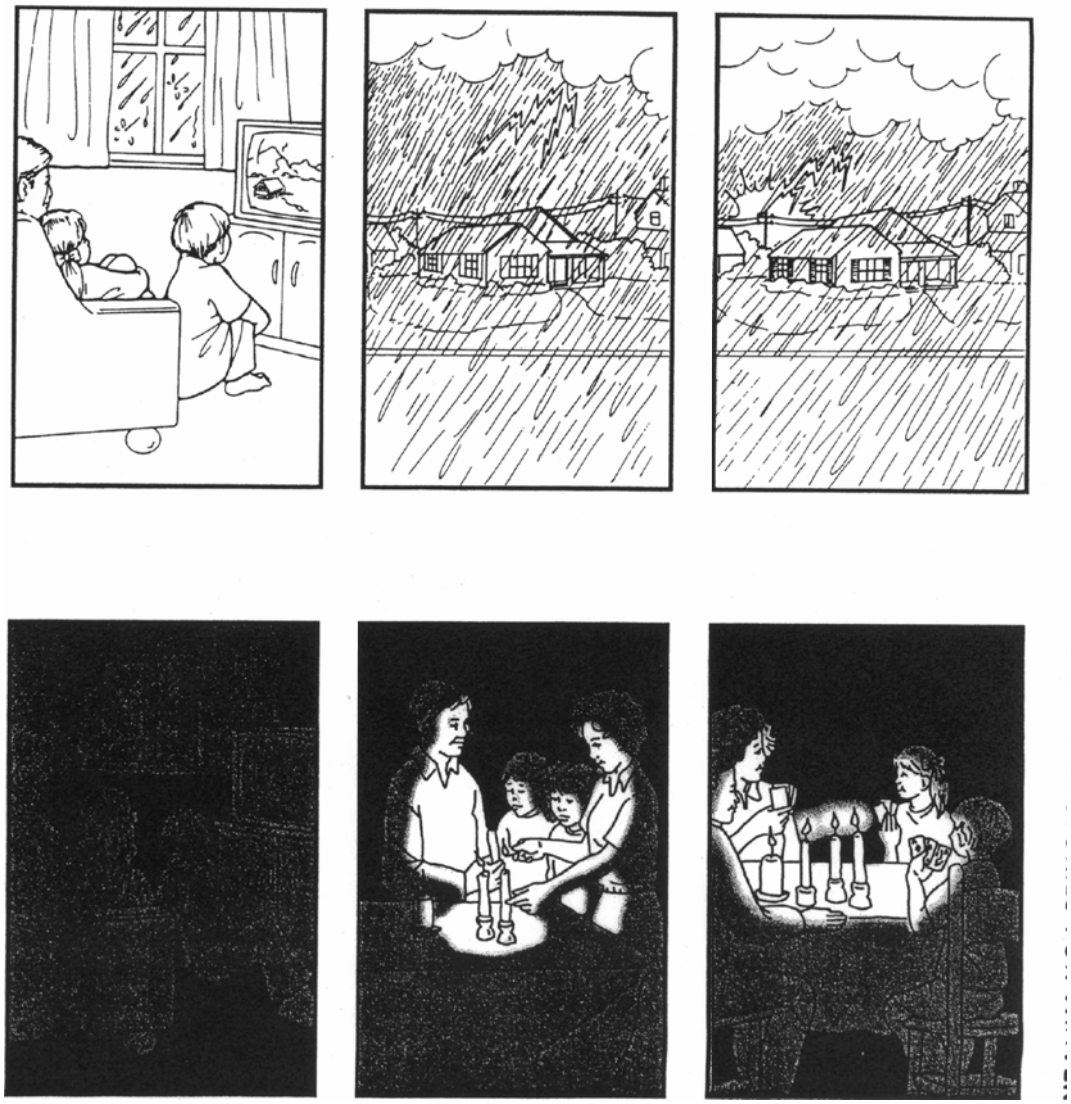


Spring Story 6:1

Summer Story 6:4



Winter Story 6:5



Resume

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Education

West Virginia University, Morgantown, WV
Candidate for M.A. in Foreign Languages, December 2005

Marietta College, Marietta, OH
B.A. History, August 2001
Certificate: Teach English as a Foreign Language (TEFL)

Middlebury College, Middlebury, VT
Seven week intensive German Program (10 credits earned)

Career Related Experience

Research
•Experienced in writing research publications (Master's Thesis)
•Drafted proposals to a scientific research board (IRB)
•Conducted interviews and surveys
•Analyzed scientific literature and statistical data
•Succeeded in defense of research before an academic committee

International/Intercultural
•Traveled abroad extensively
•Taught international students English
•Participated as a conversation partner for students learning English
•Volunteered as a international exchange host

Public Relations
•Prepared press releases and event bulletins
•Marketed and organized events for international students
•Solicited gifts and donations from businesses and the public

Work Experience

The Book Exchange, Morgantown, WV (1/05, 8/05)
Security Contractor (Seasonal)

WVU Intensive English Program, Morgantown, WV (8/02-12/04)
ESL Instructor
Activities Coordinator

Marietta Paint and Janitorial Supply, Marietta, OH (3/01-11/01)
Assistant Manager

Computer Skills

Experienced with Software: Excel, Word, PowerPoint, Word Perfect, Adobe Acrobat, Adobe Photoshop, Internet Explorer, Netscape Navigator, and Quicken
Experienced with Hardware Installation: CD ROM, Hardrives, RAM

Languages

English (Native), German (Proficient)

Activities	Tom Haymond Foundation (Fundraiser; 2005) (Board of Directors; 2005) West Virginia TESOL (Treasurer; 2003-2005) West Virginia University Department of Foreign Languages (S/F Rep; 2003-2004) WVU International Student Orientation (Orientation Leader; 8/02, 1/03, 8/03) Marietta College Great Outdoors Club (Founder, Vice President, President; 1999-2001) Marietta College Crew (JV8 3 Seat; 1998)