This study explores the possible uses of Sentence Shaper (Linebarger, McCall, & Berndt, 2004), a software program designed as a language remediation tool for individuals with nonfluent aphasia. In particular, Sentence Shaper allows users to practice message production by facilitating sentence construction. Previous studies indicate that after extended use of this program, individuals with nonfluent aphasia may be able to produce more morphosyntactically complex narratives. As Sentence Shaper allows users to record and save messages, there is the potential that this program could be used to augment communication. The goals of this study were, first, to partially replicate the Linebarger et al. (2004) study and, second, to explore ways in which Sentence Shaper could be used to augment communication in everyday life.

These goals were investigated in a four-month case study with a woman with nonfluent aphasia and her mother. Models of social approaches to aphasia intervention informed the design of the study, which included a treatment component and an ethnographic component. For the treatment component, the participant with aphasia practiced producing messages using Sentence Shaper for 12 weeks. Treatment effects were measured by comparing pre- and post-treatment unaided narratives, as well as post-treatment aided narratives. The ethnographic component involved regular meetings with the participants. Integration of qualitative data from fieldnotes, recorded conversations, brief interviews, and questionnaires revealed the uses of Sentence Shaper and the ways in which the participants’ life situation affected its use.

Treatment results demonstrated an increase in the morphosyntactic complexity of the participant’s narratives, while measures of informativeness and narrative structure
remained relatively unchanged. Given these conflicting findings, a judgment task was also conducted with two groups of listeners (speech-language pathologists and peers). Findings from the ethnographic component revealed that, although the participant with aphasia used Sentence Shaper messages for e-mail and in conversation, neither participant readily accepted the use of the program to augment communication in everyday life. Reasons for this lack of acceptance are explored. Finally, ways in which a social approach contributed to a deeper understanding of the findings, as well as implications for future research and clinical practice, are discussed.
# TABLE OF CONTENTS

ABSTRACT ......................................................................................................................... ii

TABLE OF CONTENTS ........................................................................................................ iv

LIST OF TABLES ................................................................................................................ viii

LIST OF FIGURES ............................................................................................................. ix

LIST OF EXCERPTS .......................................................................................................... x

ACKNOWLEDGEMENTS ..................................................................................................... xi

CHAPTER ONE: REVIEW OF THE LITERATURE .................................................................. 1

  1.1 Introduction ................................................................................................................... 1
  1.2 ICF as an Organizing Framework ............................................................................... 5
      1.2.1 Description ........................................................................................................ 5
      1.2.2 Application of the ICF to Aphasia ................................................................. 7
  1.3 The Nature of Nonfluent Aphasia ............................................................................. 10
      1.3.1 The Impairments of Nonfluent Aphasia ....................................................... 10
      1.3.2 Effects of Nonfluent Aphasia at the Activity/Participation Level ............. 14
      1.3.3 The Social Impact of Aphasia ....................................................................... 18
  1.4 Treatment of Aphasia ............................................................................................... 21
      1.4.1 Treatment within an ICF Framework .......................................................... 21
      1.4.2 Treatment Addressing the Impairment ......................................................... 21
      1.4.3 Treatment Focusing on the Activity Level .................................................. 25
      1.4.4 Targeting Impairment and Activity Limitations through a Processing Prosthesis ................................................................. 27
  1.5 AAC and Aphasia: Focusing on Participation ....................................................... 33
      1.5.1 Conversation and the Impact of AAC ......................................................... 38
      1.5.2 Recent Advances in AAC Technology ......................................................... 40
      1.5.3 Sentence Shaper: Further Possibilities ......................................................... 42
  1.6 Research Objectives ................................................................................................. 43

CHAPTER TWO: METHODOLOGY ....................................................................................... 46

  2.1 Introduction ................................................................................................................ 46
  2.2 The Case Study ........................................................................................................ 46
  2.3 Overview .................................................................................................................. 47
  2.4 Participants .............................................................................................................. 48
      2.4.1 Initial Participant Guidelines ....................................................................... 48
      2.4.2 Ethical Considerations ............................................................................... 50
      2.4.3 Communication Profile ............................................................................. 51
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2.4 Listeners’ Perceptions</td>
<td>85</td>
</tr>
<tr>
<td>4.2.4.1 Perceptions of pre- and post-treatment narratives</td>
<td>86</td>
</tr>
<tr>
<td>4.2.4.1 Perceptions of post-treatment unaided and aided narratives</td>
<td>88</td>
</tr>
<tr>
<td>4.2 Component Two</td>
<td>90</td>
</tr>
<tr>
<td>4.2.1 Participation Opportunities: Uses of Sentence Shaper</td>
<td>91</td>
</tr>
<tr>
<td>in Everyday Life</td>
<td></td>
</tr>
<tr>
<td>4.2.1.1 The training phase</td>
<td>92</td>
</tr>
<tr>
<td>4.2.1.2 Nicole’s strategies for creating Sentence Shaper messages</td>
<td>93</td>
</tr>
<tr>
<td>4.2.1.3 Use of Sentence Shaper with e-mail</td>
<td>94</td>
</tr>
<tr>
<td>4.2.1.4 Use of Sentence Shaper messages in conversation</td>
<td>95</td>
</tr>
<tr>
<td>4.2.1.5 Sentence Shaper as language therapy</td>
<td>96</td>
</tr>
<tr>
<td>4.2.2 Contextual Factors</td>
<td>97</td>
</tr>
<tr>
<td>4.2.2.1 Personal factors: Nicole as a communicator</td>
<td>98</td>
</tr>
<tr>
<td>4.2.2.2 Environmental factors: The social context</td>
<td>102</td>
</tr>
<tr>
<td>4.2.3 Themes and Patterns: Interpretive Support</td>
<td>105</td>
</tr>
<tr>
<td>4.2.3.1 Language remediation as meaningful activity</td>
<td>105</td>
</tr>
<tr>
<td>4.2.3.2 “Sentence Shaper is not real life”</td>
<td>107</td>
</tr>
<tr>
<td>4.2.3.3 Seeking perfection</td>
<td>112</td>
</tr>
<tr>
<td>4.2.3.4 Nicole as a dependent communicator</td>
<td>114</td>
</tr>
<tr>
<td>4.2.3.5 Nicole as an independent user of technology</td>
<td>117</td>
</tr>
<tr>
<td>4.2.4 Outcomes of Sentence Shaper</td>
<td>118</td>
</tr>
<tr>
<td>4.2.4.1 Narrative versus conversational speech</td>
<td>119</td>
</tr>
<tr>
<td>4.2.4.2 Final participant responses to Sentence Shaper</td>
<td>120</td>
</tr>
<tr>
<td>4.2.4.3 The participants’ ideas for future use of Sentence Shaper</td>
<td>121</td>
</tr>
<tr>
<td>4.2.4.4 QCL and CETI outcomes</td>
<td>123</td>
</tr>
</tbody>
</table>

CHAPTER FIVE: DISCUSSION ........................................................................... 127

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 Introduction</td>
<td>127</td>
</tr>
<tr>
<td>5.2 The Researcher’s Perspective</td>
<td>128</td>
</tr>
<tr>
<td>5.2.1 Comparison of Nicole’s Performance to Linebarger et al.’s (2004)</td>
<td>128</td>
</tr>
<tr>
<td>Participants</td>
<td></td>
</tr>
<tr>
<td>5.2.2 Possible Explanations for these Differences</td>
<td>131</td>
</tr>
<tr>
<td>5.2.3 Implications for Processing versus Linguistic Approaches to</td>
<td>134</td>
</tr>
<tr>
<td>Intervention of Nonfluent Aphasia</td>
<td></td>
</tr>
<tr>
<td>5.2.4 Generalization to Conversational Speech</td>
<td>137</td>
</tr>
<tr>
<td>5.2.5 The Integration of Sentence Shaper into Conversation: Lessons from</td>
<td>138</td>
</tr>
<tr>
<td>Nicole</td>
<td></td>
</tr>
<tr>
<td>5.3 The Participants’ Perspectives</td>
<td>139</td>
</tr>
<tr>
<td>5.3.1 Changes in Communication Ability</td>
<td>139</td>
</tr>
<tr>
<td>5.3.2 Acceptance of Sentence Shaper as an AAC Device</td>
<td>141</td>
</tr>
<tr>
<td>5.4 An Integration of Perspectives</td>
<td>143</td>
</tr>
<tr>
<td>5.5 How Do the Principles of a Social Model Apply to this Study?</td>
<td>144</td>
</tr>
</tbody>
</table>
5.6 Implications for Clinical Practice ........................................... 146
5.7 Limitations of the Study ..................................................... 147
5.8 Directions for Future Research ......................................... 147
5.9 Conclusion ........................................................................ 148

REFERENCES ............................................................................ 150

APPENDICES ............................................................................ 159

Appendix A: Consent Forms .................................................... 160
  Consent Form for Person with Aphasia ................................ 160
  Consent Form for the Communication Partner ..................... 163
  Aphasia Friendly Consent Form ......................................... 165
Appendix B: Certificate of Approval for Ethics ....................... 178
Appendix C: Interview Guide ................................................... 179
Appendix D: Key to Transcription .......................................... 181
Appendix E: Schedule of Data Collection ............................... 182
Appendix F: List of Sentence Shaper Messages ....................... 185
Appendix G: Transcribed Narratives ...................................... 187
Appendix H: QCL and CETI Scores ........................................ 192
  The Quality of Communication Life Scale ......................... 192
  The Communicative Effectiveness Index .............................. 193


List of Tables

Table 3.1  Nicole's assessment scores ................................................. 65

Table 3.2  Summary of Transcribed Conversations ................................ 70

Table 4.1  Excerpts from *The Three Little Pigs* pre and post narratives. Underlined portions are those words included in the QPA ............................................ 78

Table 4.2  QPA analysis results for Nicole's unaided narrative samples pre/post use of Sentence Shaper .......................................................... 79

Table 4.3  QPA analysis results for aided narrative samples following use of Sentence Shaper .......................................................... 80

Table 4.4  Sentence Shaper Narratives .................................................. 80

Table 4.5  CIU analysis results for Nicole's unaided narrative samples pre/post use of Sentence Shaper. Results presented Linebarger et al. (2004) are provided for comparison .......................................................... 82

Table 4.6  CIU analysis results for Nicole's aided narrative samples. The time required to create the narratives is also included .......................................................... 83

Table 4.7  The percentage of core propositions found in the setting, complication, and resolution of *The Cowboy Story* unaided and aided narratives ...................... 84

Table 4.8  Listeners' perceptions of *The Three Little Pigs* and *The Cowboy Story* unaided narratives .......................................................... 87

Table 4.9  Listeners' perceptions of *The Three Little Pigs* and *The Cowboy Story* post-treatment unaided narrative versus the aided narrative ...................... 89

Table 4.10  Sample of Sentence Shaper message and corresponding message unaided .......................................................... 109
List of Figures

Figure 1.1 The Sentence Shaper work area (Linebarger, et al., 2004) .................. 29
List of Excerpts

Excerpt 3.1 ................................................................. 71
Excerpt 3.2 ................................................................. 73
Excerpt 4.1 ................................................................. 93
Excerpt 4.2 ................................................................. 94
Excerpt 4.3 ................................................................. 99
Excerpt 4.4 ................................................................. 104
Excerpt 4.5 ................................................................. 110
Excerpt 4.6 ................................................................. 110
Excerpt 4.7 ................................................................. 112
Excerpt 4.8 ................................................................. 112
Excerpt 4.9 ................................................................. 113
Excerpt 4.10 ............................................................... 119
Excerpt 4.11 ............................................................... 122
Excerpt 4.12 ............................................................... 123
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Chapter One: Review of the Literature

1.1 Introduction

Aphasia is an acquired language disorder resulting from brain damage which can cause impairments in verbal comprehension and production, reading, and writing (Chapey & Hallowell, 2001). Each of these language modalities can be impacted to varying degrees in individuals with aphasia. There are various presentations of aphasia, and many treatment methods have been developed for each type of aphasia. Of particular interest in this study is nonfluent aphasia, which is characterized by slow, effortful speech with relatively short utterances. A computer software program, previously referred to as a communication system (CS; Linebarger, Schwartz, Romania, Kohn, & Stephens, 2000, Linebarger, Schwartz, & Kohn, 2001, Linebarger, McCall, & Berndt, 2004) and now called Sentence Shaper, has been developed as a language remediation tool for this type of aphasia. This software works as a processing prosthesis to support individuals with nonfluent aphasia in sentence production and allows the user to record his or her voice to produce longer utterances and to build these single utterances into longer narratives. Previous studies have shown that following an extended use of this program, some individuals with nonfluent aphasia demonstrated increased structural and grammatical complexity in narrative production.

The impact of aphasia can have far-reaching effects. The ways in which language impairments affect a person with aphasia in his or her everyday life is a complex issue and is dependent on each person’s life situation. Aphasia can have devastating effects on an individual’s ability to participate in work and social activities (Hinckley, 2002).
Relationships and social roles are often affected as well as the individual's perceived life satisfaction, confidence, and self-identity (Shadden, 2005). Clearly, treatment of aphasia involves more than language remediation, but also includes supporting the individual, so that communicating in everyday life with his or her current language ability is possible. Sometimes the natural speech of a person with aphasia is not sufficient in adequately expressing his or her message. In these instances, individuals with aphasia may rely on alternative and augmentative communication (AAC) to supplement or replace their existing natural speech. Because Sentence Shaper allows users to record and save messages they have created, there is the potential that the program could be used for more than language remediation. Of interest in this study is how Sentence Shaper could be incorporated into the communication strategies of an individual with nonfluent aphasia to facilitate everyday communication.

Traditionally, treatment of aphasia focused primarily on the remediation of language impairments. This medical model approach to healthcare concentrates on fixing the problem, but, with a chronic impairment such as aphasia, a complete recovery is often not possible. In the past two decades, there has been a movement in healthcare to adopt a more holistic, social approach to assessment and treatment of health conditions. With this change, the emphasis shifts from merely “fixing” the impairment to an overall assessment of how a person is able to function in society. Treatment of aphasia is now frequently conducted under the framework devised by the World Health Organization’s (WHO) International Classification of Functioning, Disability and Health (ICF) which incorporates ideas from both the medical and social models (WHO, 2001). In the revised ICF, the focus has shifted from the “consequences of disease” to an emphasis on
The revised ICF is clearly an important change in the way we view health and disability. While the ICF is not a social model, it considers health in a social context which was lacking in previous healthcare frameworks. The social aspect of the ICF encourages clinicians to address issues such as quality of life and social functioning. However, Hewitt and Byng (2003) caution that our therapy goals for people with aphasia should not be entirely focused only on the functional aspects of living, but rather should help people with aphasia become ‘engaged’ in life. To them engagement has many aspects, but overall it means “being involved in something which has real purpose, feels personally meaningful and valuable” and provides “a sense of real connection to other people with whom you can identify” (p. 63). The ICF and the social model of healthcare suggest that people with aphasia should not be viewed in isolation, but rather as members of a community, and therapy should therefore be focused on improving participation and engagement within that community.

To explore the impact of Sentence Shaper on language remediation and on communication in everyday life, several areas of literature must be reviewed in order to fully understand this topic. A thorough explanation of the ICF framework is necessary to describe the different factors which contribute to an individual’s health and level of functioning. In addition, the principles underlying a social approach to healthcare will be reviewed. Following this, a description of the impairments, activity and participation limitations and treatment approaches associated with nonfluent aphasia is provided.
Theoretical accounts of nonfluent aphasia are discussed in the context of the treatment approaches described. Subsequently, a discussion of AAC is presented with regard to acceptability and usability, as well as recent advances in AAC technology for individuals with aphasia. These topics will be covered in the first chapter.

The purpose of this study is to investigate the ways in which Sentence Shaper can be used. The first objective of the study is to partially replicate and extend previous language treatment studies done with this program. The second objective is to further explore the possibility that Sentence Shaper could be used in everyday life to aid in communication. Accordingly, acceptance and usability issues will also be explored.
1.2 ICF as an Organizing Framework

1.2.1 Description

The World Health Organization (WHO) is a department within the United Nations with the mandate to ensure that all people are able to obtain the highest level of health possible (WHO, 2001). The WHO’s Constitution defines health as including not only the physical aspects of health, but mental and social well-being as well. The International Classification of Functioning, Disability and Health (ICF) is a classification system devised by the WHO which serves many purposes (WHO, 2001). It is extremely relevant to researchers within health disciplines as it provides a scientific framework for studying health. Also, the ICF aims to improve communication among health professionals by establishing a universal language to use when discussing and describing health and health-related states.

The revised ICF is composed of two parts: functioning/disability and contextual factors. A person’s functioning and disability is conceptualized as a dynamic interaction between his or her health condition, the environment, and personal factors. Within the ICF, functioning is defined as “all body functions, activities, and participation” (WHO, 2001, p. 8) and disability encompasses “impairments, activity limitations, or participation restrictions” (p. 8). Body functions are defined as “the physiological functions of body systems” and impairments are problems with these functions (p. 10). In relation to language, an example of a body function would be the “the specific mental functions of recognizing and using signs, symbols and other components of a language” (p. 58). Activities are specific tasks or actions done by an individual and activity limitations are difficulties executing those actions. Finally, participation is defined as an individual’s
“involvement in a life situation” (p. 10), and participation limitations occur when an individual has difficulty taking part in normal life situations. An example of an activity/participation aspect of language is conversation occurring with one or many people. The ICF identifies two components of contextual factors: environmental factors and personal factors. An individual’s environment includes physical, social, and attitudinal aspects which impact daily life. Personal factors are defined as an individual’s background, including factors such as gender, race, and age. The ICF regards a person’s functioning as “a dynamic interaction between health conditions (diseases, disorders, injuries, traumas, etc.) and contextual factors” (p. 8). Because a person’s health and functioning is conceptualized within the ICF framework as an interaction between individual and environmental factors, a person’s disability is not regarded as residing solely within the individual. In this classification system, each component contains a list of domains which can be quantified in terms of their level of functioning or disability. Thus, the ICF provides a framework for the assessment and treatment of health conditions in which each level (i.e. impairment, and activity and participation) can be targeted.

The ICF regards activity and participation as one component as it is often difficult to separate the two aspects. However, in Ross and Wertz’s (2005) discussion of the ICF and its application to aphasia, they separate activity and participation into two components which can be targeted in the assessment of and intervention for aphasia. They imply that activities focus on only the individual whereas participation is the individual’s life situation and, thus, is not isolated to the individual, but includes other
people as well. For the purpose of this study, activity and participation will be discussed as two separate components following Ross and Wertz's distinction.

1.2.2. Application of the ICF to Aphasia

Traditionally, assessment and treatment of aphasia have been based on a medical model approach to disability and functioning focusing purely on the individual with aphasia. Those who adopt a medical model view a decrease in functioning as the result of an individual's health condition, and therapy typically focuses on relieving that impairment (WHO, 2001). However, a complete recovery is often not possible (Simmons-Mackie, 2001). With its emphasis on the impairment level of disability, the medical model is limited in its application to the treatment of aphasia. This approach does not take into consideration how the person with aphasia actually functions in the real world with the help of compensatory strategies such as gesture and communication aids, and of conversation partners. Furthermore, the collaborative aspect of conversation is ignored when an individual's language ability is viewed in isolation. In the past decade, a social approach to aphasia has been emphasized. The ICF moves beyond a medical model and is defined as a "biopsychosocial" model of health (p. 20). A definition of aphasia which is consistent with the ICF framework comes from Simmons-Mackie (2001); here, aphasia is defined as "an impairment due to brain damage in the formulation and reception of language, often associated with diminished participation in life events and reduced fulfillment of desired social roles" (p. 248).

Ross and Wertz (2005) propose that assessing and treating individuals with aphasia in the context of the ICF framework will allow for "socially valid treatment" (p.
However, they state that the measures currently available may not lead to socially valid treatment as they were developed prior to the ICF. Some assessment tools may not measure a level discretely, but may also include information about other levels of the ICF, which according to Ross and Wertz, is problematic. They suggest that assessment tools addressing each level of the ICF independently as well as measures of quality of life for individuals with aphasia need to be developed.

In response to Ross and Wertz’s application of the ICF to aphasia, Penn (2005) suggests that developing standard measurements of the ICF levels will in fact limit our understanding of the intricacies of an individual’s language impairment. She argues that the constructs of the ICF cannot be measured independently as the very nature of the framework includes interaction between each level. In Penn’s view, it is not possible “to fragment and to separately delineate some of these domains” (p. 876) especially for an area as complex as language. Furthermore, Ross and Wertz fail to mention long-established qualitative methods such as ethnography and conversation analysis which have been used successfully to investigate contextual factors. In closing, Penn asserts that new measures are not required but, rather, that we need to “move to understanding and explaining things in their context, using valid and established philosophies of assessment ... that are attuned to the complexity of the human condition” (p. 878).

As previously discussed, the ICF is not a social model, but rather, an integration of medical and social models, which considers the contributions of an individual’s social environment to his or her level of functioning. The ICF is broad enough that different models of healthcare can be accommodated within the framework; therefore, adopting the framework of the ICF does not mean that assessment and treatment will necessarily
be conducted with a social approach. In the literature, the term social model or approach is often used, although rarely defined. Byng and Duchan (2005) recognized this problem and proposed five principles underlying the social model philosophy. The first principle is “equalizing the social relations of service delivery” (p. 908) which proposes that users of healthcare services should have more control over the services provided. This principle highlights an idea which is at the forefront of the social model: people with disabilities are “experts in their own conditions” (p. 907), and therefore, service providers should learn from these experts and deliver the services people with disabilities feel are necessary. Byng and Duchan’s second principle states that service users should be involved authentically in their own care. In particular, they should be able to make decisions about the services provided in their situation, as well as healthcare in general. The third principle of the social model is that clinicians should provide therapy which allows for engaging experiences for the service user. Engaging experiences are considered those which are valued by the service user and others and are also associated with activities found in daily life which are personally meaningful. The fourth principle proposes that service users should have control of organizations which provide service to them. In order for authentic control to be achieved, people with disabilities should be involved in all levels of the organization and decision making processes. The fifth and final principle states that healthcare service providers should be accountable to the service users, which “requires not only the provision of high-quality direct services but also that organizations involve, listen to, and inform users in understandable ways about various facets of the organization” (p. 909).
It is evident that the social model extends beyond the framework of the ICF to include principles which suggest ways of developing relationships between healthcare service providers and users and providing service to people with disabilities. Therefore, Ross and Wertz's (2005) claim that appraisal of aphasia within the ICF framework will allow for socially valid treatment is not entirely accurate. While the ICF takes into account social aspects relating to a person's health and functioning, there are features of the social model, as described by Byng and Duchan, which are not specified in the ICF. As a framework, the ICF describes what areas of health and functioning require consideration; however, the framework, which encompasses both social and medical approaches, does not explain how healthcare should be conducted.

1.3 The Nature of Nonfluent Aphasia

Thus far, the ICF framework and the principles of a social model of healthcare have been described with attention given to the application of this framework and model to aphasia. At this point it is necessary to describe the effects of nonfluent aphasia in terms of the impairment and activity/participation limitations, as these factors have important implications for intervention.

1.3.1 The Impairments of Nonfluent Aphasia

Individuals with aphasia may present very different impairments depending on the extent to which various aspects of language, oral production, auditory comprehension, reading, and writing have been impaired (Goodglass, Kaplan, & Barresi, 2001). In terms of production, aphasia can be categorized into two subtypes: fluent and
nonfluent aphasia. Nonfluent aphasia is characterized by effortful, slow speech output with relatively short utterances. In contrast, individuals with fluent aphasia speak with normal intonation patterns, articulation, and utterance length, but their productions often suffer from inappropriate word and sound substitutions called paraphasias. Comprehension deficits are associated with both these types of aphasia in varying ways.

Within the category of nonfluent aphasia, further differentiations have been suggested with regard to an individual’s tendency to produce or omit grammatical morphemes. Saffran, Berndt, and Schwartz (1989) attempted to describe the nature of nonfluent production and to investigate the differences thought to clinically distinguish two types of nonfluent aphasia. Agrammatic speech is characterized by the frequent omission of “some bound and free-standing grammatical morphemes” (p. 446). In contrast, individuals with nonfluent, nonagrammatic aphasia do not demonstrate this omission of grammatical morphemes in their nonfluent speech. Saffran and her colleagues developed a quantitative production analysis for aphasic speech, to determine whether the procedure could reliably differentiate the productions of individuals clinically judged to have agrammatism versus nonfluent, nonagrammatic speech. In this production analysis, the individual’s telling of a classic fairytale was analyzed in terms of various morphological and structural characteristics. The quantitative production analysis was found to be very reliable in distinguishing the participants with agrammatic speech from those with normal speech as well as from those with nonfluent nonagrammatic speech. The two groups with nonfluent aphasia were not found to differ in terms of speech rate, with both demonstrating a reduction in rate relative to normal speakers. When the productions were measured for structural elaboration of subject noun phrases
and verb phrases, both the agrammatic and nonagrammatic groups produced sentences which were much simpler than the normal control participants. Furthermore, no difference was seen in the frequency of embedding with both the agrammatic and nonagrammatic groups showing a reduction in embedding. However, Saffran et al. were able to find several measures which differentiated the two groups. In terms of morphological measures, the participants with agrammatic speech demonstrated a significant reduction in the use of closed class words, obligatory determiners, pronoun usage, verb inflection, verb usage, and elaboration of the verb. In contrast, the participants with nonfluent, nonagrammatic speech were not found to differ significantly from the normal control participants on these measures. The participants with agrammatic speech were found to have much more difficulty producing propositional utterances, while the nonfluent, nonagrammatic participants were less impaired in this measure and were not significantly different from the normal control participants. With regard to the proportion of sentences that were well-formed, all three groups performed differently. The participants with agrammatic speech had significantly more ill-formed speech than that of the nonfluent, nonagrammatic participants, who were in turn much worse than the normal control participants. Interestingly, a difference was noted in the source of the ill-formedness, with the participants with agrammatic speech failing to produce the required grammatical morphemes and the participants with nonfluent, nonagrammatic speech typically omitting the required arguments. It must be noted, however, that while each as a whole conformed to the clinical judgments made initially when the subjects were separated into groups, inconsistencies were apparent with some of the participants with agrammatic speech showing normal ability for particular
measures. Furthermore, although the two groups were statistically different, there was continuity between the groups for both the morphological and structural measures.

Saffran et al. conclude with several questions. First, given the apparent continuity between the groups of agrammatism and nonfluent, nonagrammatism, should nonfluent nonagrammatic speech be characterized as mild agrammatism or categorized separately? They also question whether all nonfluent speech contains some degree of agrammatism, thus casting further doubt on the argument for distinct categories. Clearly, further research in this area is warranted to determine whether these groups can be qualitatively distinguished in addition to the quantitative differences found by the researchers.

The categories of agrammatism and nonfluent, nonagrammatism were investigated further by Bird and Franklin (1996) in a study using the QPA methodology developed by Saffran and her colleagues. Five individuals with aphasia participated in the study: one was judged to be agrammatic, nonfluent; two were nonagrammatic, nonfluent; and two of the participants had fluent aphasia. As in the first QPA study, participants were asked to tell the story of Cinderella. The differences on the QPA measures between the two nonfluent groups reported by Saffran et al. were largely replicated in Bird and Franklin's study. In addition, the deficits of the fluent participants were found to be similar to the nonfluent, nonagrammatic participants in several measures (i.e., well-formedness, elaboration, and word-class measures). This replication adds further support to the quantitative differences found to separate the categories of agrammatism and nonfluent, nonagrammatism, but does not address the question of whether these categories are distinct.
The findings of these studies raise important issues when analyzing research done in the field of nonfluent aphasia. First, if these disorders are qualitatively different, it is possible that the language impairments seen in agrammatism and nonfluent, nonagrammatism should be targeted with different interventions. Secondly, in evaluating existing research, descriptions of participants are often unclear in regards to precisely what the language characteristics are. Different assessment tests and various labels (i.e. Broca’s aphasia, nonfluent aphasia, agrammatism) are used when assessing and describing the participants in these studies. Thus, it is often difficult to determine what type of aphasia the results of the studies were based on, making comparability across studies challenging.

1.3.2. Effects of Nonfluent Aphasia at the Activity/Participation Level

Clearly the categories of agrammatism and nonfluent, nonagrammatism within nonfluent aphasia are problematic. However, it is not only at the level of impairment where variability in the speech characteristics of nonfluent aphasia can occur, but at the activity and participation levels in different speaking contexts as well. When one examines the discourse of an individual with aphasia (consistent with the ICF’s definition of activity as a specific task or action done by an individual), several interesting observations can be made. Typically, samples of agrammatic speech are obtained through picture description, retelling a fairy tale, or a semistandardized interview (Heeschen & Schegloff, 2003). In these contexts, both substitutions and omissions have been found to occur in agrammatic speech. These elicitation techniques have the effect of maximizing the turns of the individual with aphasia as the interviewer generally withholds his or her
conversation and gives the individual with aphasia a long time to respond. However, this contrasts with normal conversation in which there is a bias for turn minimization. When examining agrammatic speech in natural conversations, it is very different from samples obtained through test-like situations. Here, agrammatic speech is characterized almost entirely by omissions of grammatical elements with almost no substitutions, resembling what is known as telegraphic speech (Heeschen & Schegloff, 2003). This phenomenon can also be explained by comparing the varying task requirements of narrative and conversation. A narrative typically necessitates the use of more formal language than a conversation and also requires the expression of perspective and tense, both of which require the use of specific morphemes and syntax, whereas in a conversation this is not a requirement. Therefore, when individuals with agrammatism are telling a narrative, substitutions may occur when they attempt to express the morphosyntactic elements the story requires. In contrast, those morphosyntactic elements may not play as integral a role in the expression of meaning in a conversation and are, therefore, typically not included.

It is evident from Heeschen and Schegloff's observations that even when picture description techniques are used to assess an individual's verbal output, a complete representation of an individual's language abilities may not be achieved. Clearly, the task demands of an interaction play an important role in determining the speech characteristics of those with agrammatism; thus, assessment of activity limitations should be done in multiple contexts.

Individuals with nonfluent aphasia often develop different strategies to adapt to their language impairment. The context of conversation is an important area to assess when analyzing the language characteristics of people with aphasia, given that it presents
an opportunity for the individual with aphasia to incorporate conversational partners as a strategy. For example, in conversation, individuals with nonfluent aphasia may have the conversational partner expand their impoverished utterances to facilitate the transfer of ideas. Some individuals may also use fillers, such as “um”, to hold their place in the conversation while they formulate an utterance. These behaviours are consistent with definitions such as Simmons-Mackie and Damico’s (1997), which define compensatory strategies as “a new or expanded communicative behaviour, often spontaneously acquired and systematically employed, to overcome a communication barrier in an effort to meet both transactional and interactional communicative goals” (p. 770). The transactional function involves the exchange of information and content, whereas the interactional function serves a social purpose of establishing and maintaining relationships (Brown and Yule, 1983). This definition was created after Simmons-Mackie and Damico observed the strategies used by two participants with aphasia in multiple contexts. The new definition they created differs in several ways from traditional definitions of compensatory strategies. Firstly, their definition suggests that these strategies serve both transactional and interactional communicative goals. Previously, compensations were thought of as performing primarily a transactional function in message transmission; however, they found that compensatory strategies were used for interaction at a social level as well. Secondly, this definition puts forth the idea that compensatory strategies are more often natural and spontaneously acquired than those trained in therapy. The results from this study illustrate that the majority of strategies were either new behaviours spontaneously used in conversation or normal communicative behaviours which occurred at a higher than normal frequency or were
used for different functions. While trained strategies were utilized, they were less frequent and used primarily for a transactional purpose. Penn and Cleary (1988) investigated the compensatory strategies used by six individuals with a closed head injury. Their findings indicate that the participants employed a wide variety of compensatory strategies; however, not all of these strategies were deemed effective. These results highlight the fact that some strategies utilized by individuals with aphasia may in fact be maladaptive or inefficient in conversation.

When analyzing the speech of individuals with nonfluent aphasia, it becomes apparent that verbal output is not the only method used to get one’s message across. Individuals with aphasia and those with whom they regularly communicate are often extremely creative in the different ways they are able to ‘talk’. Compensatory strategies such as gesture, writing, and drawing are often used simultaneously with or in place of natural speech.

Nonfluent aphasia can create activity and participation limitations in speaking, listening, reading and writing. Examples include difficulty having conversations with others, making phone calls, and reading the paper. Of course, the way deficits in these areas affect daily life is dependent on each individual’s life situation. Individuals with aphasia may attempt to overcome these deficits by developing compensatory strategies. As Simmons-Mackie and Damico’s study suggests, the strategies individuals with aphasia develop on their own are often used more often and more effectively than those suggested by the speech-language pathologist.
1.3.3 The Social Impact of Aphasia

A social model of aphasia requires therapy goals which move beyond focusing on the impairment. Simmons-Mackie (2001) suggests that intervention of aphasia should “promote membership in a communicating society and participation in personally relevant activities for those affected by aphasia” (p. 246). This statement broadens the view of aphasia therapy to consider the individual within a social environment, with research in this area motivated by the need to understand the social impacts of aphasia and how best to support people living with those effects.

The social consequences for an individual affected by aphasia can be devastating. A person’s ability to work and participate in social activities, as well as his or her perceived life satisfaction (Hinckley, 2002), confidence and identity (Shadden, 2005) can all be affected by aphasia. Furthermore, Kagan (1995) claims that feelings of reduced competency may also result because people with aphasia are often no longer able to demonstrate their social and cognitive competencies through communicating with others. Ross and Wertz (2002) reviewed research which indicates that adults with chronic aphasia score significantly lower on quality of life (QOL) measures than non-brain-injured adults (Ross, 1999, as cited in Ross and Wertz, 2002); however, they report that this decrease in QOL is not closely associated with language ability. Drawing on work by the WHO Quality of Life Group, QOL is defined as people’s “perceptions of their position in life in the context of the culture and value systems where they live and in relation to their goals, expectations, standards, and concerns” (Ross & Wertz, 2003). The World Health Organization’s Quality of life Instrument (WHOQOL-100) identifies 24 facets contributing to QOL grouped into six domains: physical, psychological,
independence, social, environment, and spiritual. In an effort to determine which facets are most relevant for individuals with aphasia, Ross & Wertz (2003) compared the results on the WHOQOL-100 between groups of individuals with aphasia and non-brain-injured individuals. They found that the domains of independence, social relationships, and environment differentiated the two groups. More specifically, within the area of independence, activities of daily living, getting around, and working were distinguishing factors between the two groups. In the domain of social independence, satisfaction with support from friends and with their sex lives were distinguishing aspects of QOL, and within the environment domain, accessibility of information, health services, and transportation separated the aphasia and non-brain-injured groups. However, there is an important caveat to this research finding in that the researchers compared individuals with aphasia to non-brain-injured people. With this comparison, it is not possible to separate the contribution of aphasia to QOL versus that of a brain injury without language impairment. Furthermore, as the WHOQOL-100 was not developed to specifically measure the effects of communication on QOL, it is questionable, for instance, whether difficulties “getting around” stem from deficits in communication or from physical impairments.

Another study exploring QOL for people with aphasia used assessments developed specifically to explore the effects of communication on QOL. Code (2003) used the Social Network of Aphasia Profile (SNAP) and the Communicative Effectiveness Index (CETI) to investigate the relationship between aphasia and social activities. In this study, Code makes the assumption that the time people spend taking part in different activities outside the house contributes to one’s “functional outcome,
subjective well-being, and social support” (p. 388). The results from 38 people with chronic aphasia reveal that they spent an average of 20 hours per week out of the house, with individual results ranging from 1.5 to 60 hours. In contrast to Ross and Wertz’s findings, severity of aphasia was the most significant factor contributing to these results, with age and physical and motor limitations as additional related factors. Overall, these studies suggest that specific factors which contribute to one's quality of life can be affected negatively by aphasia.

An important component missing from the previous studies is the voice of the people with aphasia. Scores on assessment tests and calculations of time spent in social activities provide a rather limited account of the quality of life of those living with aphasia. What is needed is research which explores the perspectives of people with aphasia by discussing these topics with them. Although interviewing people with aphasia is not an easy undertaking, Le Dorze and Brassard (1995) investigated perceptions of the consequences of aphasia by interviewing eleven pairs of individuals with aphasia and a relative or friend. The “handicaps” or participation limitations identified by the participants with aphasia included difficulties in communication and interpersonal relationships, loss of autonomy, restricted activities, and stigmatization. Furthermore, the researchers reported that the majority of these consequences were related to the participant’s language impairments. These results are important as they begin to illuminate what people living with aphasia view as the consequences of their communication impairment. Clearly, an individual’s language impairment can have devastating effects on many aspects of daily life and on the ability to participate fully in society. Consideration of the impairments and activity and participation limitations
associated with nonfluent aphasia has led to a number of treatment approaches, which will be discussed in the next section.

1.4 Treatment of Aphasia

1.4.1. Treatment within an ICF Framework

The ICF proposes that in order to overcome disability, each component of a person’s health condition (i.e., impairment, activity, and participation) must be addressed. Therefore, when developing a treatment plan for someone with aphasia, the aim should be improvement in functioning in all components of the ICF. However, treatment of aphasia typically targets recovery of language function at the impairment and activity levels only. Intervention at these levels is often based on improving verbal output, but may also target reading and writing. What this type of intervention fails to address is how the individual with aphasia is able to function in his or her life situation. Often a full recovery of functioning at the impairment and activity levels is not possible and individuals with aphasia are left with a chronic language impairment which can significantly affect their lives. Intervention at the participation level is required to find ways to facilitate the involvement of an individual with aphasia in his or her home and community life in ways that are important to that person.

1.4.2 Treatment Addressing the Impairment

One model that has proven central to many interventions of agrammatism is Garrett’s model of speech production (e.g., Byng, Nickels, & Black, 1994; Jones, 1986; Lesser, 1990). In this model, Garrett proposes three levels in the speech production
process: a conceptual level, a language-specific sentence level, and a motor level (Fromkin & Bernstein Ratner, 1998). The conceptual level is the level at which the message is generated. The sentence level is composed of two levels: the functional level and the positional level. At the functional level, lexical selection and thematic role assignment occur. This information is then used in the positional processing stage, where lexical items are mapped onto the morphosyntactic structure of the sentence and receive phonological representation. Finally, the motor level is responsible for the motor commands necessary to produce the articulatory movements of speech sounds in the vocal tract.

Researchers and speech-language pathologists have attempted to treat agrammatism at the impairment level in a number of different ways; some are based on empirical observations of sources of difficulties for individuals with nonfluent aphasia while others are based on theoretical accounts of agrammatism. In a review of treatment literature, Schwartz, Fink, and Saffran (1995) suggest that the following language areas could be targeted in intervention: “morphosyntactic production; retrieval of verbs and verb-stated mapping rules; assignment of thematic roles to syntactic constituents (i.e. mapping)” (p. 105). These components can be seen as loosely reflecting the functional and positional levels proposed in Garrett’s model of speech production.

Schwartz et al. allude to several different types of techniques aimed at treating morphosyntactic production. For instance, behavioural or direct-production therapy targets morphology by shaping production of specific responses. An example is Helm’s Elicited Language Production Program for Syntax Stimulation (HELPSS) which focuses on retrieval of morphosyntax (Helm-Estabrooks, Fitzpatrick, & Barresi, 1981). It is based
on the assumption that retrieval of specific forms will improve by having individuals with agrammatism hear and say a variety of sentences of a particular syntactic form. The program consists of 11 ranked sentence types of increasing difficulty (i.e. imperative intransitive, imperative transitive, Wh-interrogative, declarative transitive, declarative intransitive, comparative, passive, yes-no questions, direct and indirect object, embedded sentence, and future). This hierarchy is based on a study done by Gleason, Goodglass, Green, Ackerman, and Hyde (1975) in which 14 sentence types were elicited from a group of individuals with Broca’s aphasia. These results allowed the order of difficulty for the sentence types to be empirically determined, in contrast to approaches in which the order of difficulty is established on theoretical grounds (e.g. Friedmann & Grodzinsky, 1997, Hagiwara, 1995, Schwartz et al., 1987).

While improvements in sentence production following intervention with HELPSS are documented (Helm-Estabrooks & Ramsberger, 1986), there is currently no evidence suggesting that these improvements generalize to untrained syntactic forms or to spontaneous speech. In fact, results from a study done by Doyle, Goldstein, and Bourgeois (1987) demonstrate that improvement was limited to the sentence types trained using HELPSS; generalization did not occur to untrained sentence types, and the effects on spontaneous speech were not explored.

Verb retrieval approaches to intervention are exemplified by Marshall, Pring, and Chiat’s (1998) case study which involved a treatment program used to facilitate verb retrieval and sentence production. The participant’s speech was characterized as agrammatic with a significant verb deficit. When cued with a verb, the participant was more successful at producing a correct sentence than if cued with a noun. Therefore, it
was hypothesized that therapy aimed at improving access to verbs would also benefit sentence production. In the experiment, 35 verbs, from five semantic categories, were treated. Production of these verbs and 35 control verbs from the same five categories were tested pre- and post-treatment by a picture description task. Treatment of the verbs began with comprehension and reading tasks, in which the participant was asked to match a written verb to a picture and choose from a series of verbs which one was the odd one out. After this was completed, the participant was presented with a noun and asked to say an associated verb and was asked to produce a verb after hearing a scenario. Following 20 hours of treatment, the participant’s verb naming of the trained verbs increased significantly and a small, though nonsignificant increase was also found for the control verbs. In addition, although never treated directly, sentence production involving both the treated and control verbs increased significantly in the picture description task.

Mapping therapy, another treatment approach, is based on the hypothesis that individuals with agrammatism have a deficit in their ability to map thematic roles onto sentence constituents (Thompson, 2001); in other words, there is a breakdown from the functional to positional level in Garrett’s model. Treatments based on mapping theory focus explicitly on training the relationships between verbs and their arguments. This deficit has been targeted in different ways in a variety of research studies. One study by Jones (1986) targeted the mapping deficit through written sentences. The program involved multiple steps in which the participant was asked to identify the verb, the agent, and the object, facilitated by prompting the participant with ‘who’ or ‘what’ questions. Once the participant could consistently identify these aspects, verb structures were introduced which could be prompted with the questions ‘where’, ‘when’, ‘why’, and
‘how’, and the complexity of the sentences was increased. In this program, the participant was not required to produce any of the targeted structures, and verbal production was discouraged during therapy. Following this therapy, the participant’s sentence comprehension improved and spoken language became more structurally complex.

These examples of therapies targeting morphosyntactic production, verb retrieval, and mapping of thematic roles focus on different aspects of language affected by agrammatism and are similar in that each focuses on the impairment level. These therapies aim to improve processing and production of a specific language component, more specifically, retrieval of morphosyntax, retrieval of verbs, and mapping of thematic roles.

1.4.3. Treatment Focusing on the Activity Level

With activity level interventions, attention to the task is particularly relevant for individuals with agrammatism in light of the variability in speech output in different interactional tasks (i.e., narratives versus conversation). Heeschen and Schegloff’s observations suggest that conversation supports the use of telegraphic speech by individuals with agrammatism. In contrast to the impairment level therapy approaches previously discussed, which attempt to increase the structural and grammatical complexity of speech, other treatment approaches focus on compensating for the impairment rather than reducing it and are thus considered activity level interventions. A technique based on this principle is Reduced Syntax Therapy (REST; Schlenck, Schlenck, & Springer, 1995, as cited in Van de Sandt-Koenderman & Bonta, 1998). In REST, people with severe agrammatism are supported in combining words to create
agrammatic utterances. Emphasis is placed on choosing words which will provide the most information as opposed to trying to produce complete sentences.

REST is based on Kolk’s idea of agrammatism in which he suggests that the “telegraphic speech” of individuals with agrammatism is a “positive symptom” (Van de Sandt-Koenderman & Bonta, 1998, p. 218). Kolk argues that there is no loss of syntactic knowledge or ability in agrammatism, but rather a slowing of the system that handles the computation and retrieving of grammatical morphemes (Kolk, 1995). He proposes that this slow-down of syntactic computation can lead to desynchronization during syntactic tree formation. This also leads to an asynchrony between the time when a syntactic slot is produced and the time when the grammatical morpheme is retrieved. Therefore, many errors occur when individuals with agrammatism attempt to produce morphemes that come from a complex part of the syntactic tree. Kolk hypothesizes that because of this slowing down, the sentence production system must adapt. This adaptation is thought to occur at the message level of Garrett’s model, which is the “level at which the ‘what-is-to-be-said’ is represented in conceptual terms” (p. 293). Due to these individuals’ reduced resource capacities, there is an overload on the system at this level which results in a tendency to select simpler message level verb-argument structures. The agrammatic speech these individuals produce is a strategy adopted as a way to adapt to this difficulty. Kolk (1998) proposes that adaptation to the timing deficit occurs in two ways: simplification and restarts. Restarts occur when a speaker attempts to say the same thing multiple times, thereby benefiting from the activation remaining from previous attempts and reducing the time needed to reach the activation threshold. Kolk (1995) suggests that telegraphic speech is chosen because it reduces the load on short-term memory. The other
option available to individuals with agrammatism is to use very slow, simplified, grammatical speech; however, Kolk argues that this would present too much difficulty for the limited short-term memory capacity. From a treatment perspective, Kolk proposes that therapy should rather stimulate this adaptive strategy instead of focusing on increasing complexity of sentence production (Van de Sandt-Koenderman & Bonta, 1998). However, as Kolk’s account of agrammatism addressing the impairment of nonfluent aphasia, consideration of the task is important when using this intervention approach, in light of Heeschen and Schegloff’s (2003) findings.

1.4.4. Targeting Impairment and Activity Limitations through a Processing Prosthesis

Recently a software program has been developed for individuals with nonfluent aphasia, of both the agrammatic and non-agrammatic type, to use in language remediation. This program, originally referred to as a communication system (CS) (Linebarger, Schwartz, Romania, Kohn, & Stephens, 2000, Linebarger, Schwartz, & Kohn, 2001, Linebarger, McCall, & Berndt, 2004) and now called Sentence Shaper, was designed to support these individuals in the production of longer and more grammatically complex utterances. Sentence Shaper is regarded as a ‘processing prosthesis’ which provides a form of compensation for the users by decreasing the processing demands of language production; thus, Sentence Shaper can be considered a therapy tool that addresses activity limitations. However, language improvements have been found to occur in users’ unaided speech following extended use of the program, so in addition to addressing activity limitations, the program also can be considered to target the impairment level.
Linebarger et al. (2001) suggest that by having processing support provided, individuals with nonfluent aphasia will be able to access sentence structure unavailable to them in their unaided speech. This idea builds on Kolk’s hypothesis that individuals with aphasia have reduced resource capacities which results in their impoverished speech. However, unlike Kolk, who suggests that individuals with nonfluent aphasia should be encouraged to use telegraphic speech, Linebarger et al. propose that providing these individuals with processing support will allow them to produce more complex sentences. These proposals contrast with linguistic approaches to the intervention of agrammatism, such as mapping therapy and HELPSS, which suggest that the impaired linguistic structures should be targeted directly in therapy.

Sentence Shaper is able to provide processing support by allowing users to “maintain sentence elements long enough to assemble them into larger structures and to monitor and complete these intermediate structures without the time pressure of normal conversation” (Linebarger, et al., 2000, p. 419). The software program allows users to record their own speech which is then represented on the computer screen by a visual icon. The user can replay the message by clicking on the icon and can also add more to the message, building it into sentences and narratives. Sentence Shaper also has two forms of lexical support. There is a word finder which allows the user to access a “hierarchical list of printed words and phrases” (Linebarger and Schwartz, 2004, p. 5). In addition, there are side buttons found on both sides of the work space which display frequently used prepositions, verbs, pronouns, and question words. For both tools, the user clicks on the button to hear the word and then he or she must record the word to put
Sentence Shaper supports language production in a number of ways. The system provides users with memory support because they are able to replay what has already been recorded. This allows the user unlimited time to construct his or her message and helps to alleviate the processing load. The program allows the individual to avoid typing as it can be a difficult activity for individuals with aphasia who often have some form of right side paresis; in addition, individuals may also have difficulty with retrieval of written words. Furthermore, speaking into a microphone is faster than typing which increases the time efficiency of this program. In order to aid with word finding
difficulties, Sentence Shaper also has the preprogrammed lexical support in the form of the word finder and side buttons (Linebarger & Schwartz, 2004). A significant benefit of the program is that the recordings are generated by the individual with aphasia and are not dependent on input from family members or caregivers. In the study investigating the AAC device, PROSE, the fact that the narratives were constructed by family members was found to be limiting for the person using the device (Waller, Dennis, Brodie, & Cairns, 1998).

Studies investigating Sentence Shaper have found some promising results. In one study, six individuals with agrammatism used Sentence Shaper for approximately 15 sessions, creating narratives on topics of personal interest, before being tested on narrative production (Linebarger, et al., 2000). The participants were then asked to watch silent-film videos and produce free narratives and narratives using Sentence Shaper, but without the linguistic support available in the side buttons and word finder. For five out of the six participants, the results indicated that Sentence Shaper significantly facilitated production of morphosyntactic structure. It was noted that the one participant who did not show significant improvements in language production performed at chance on a grammaticality judgment task while the other participants performed well above chance. These language improvements indicate that the program may be beneficial for language therapy and suggest that direct intervention of linguistic structures may not be required.

In a second study, two participants took part in a treatment program which involved using Sentence Shaper and another language therapy program incorporating natural language understanding (Linebarger, et al., 2001). The therapy program, in which locative and directional modifiers were trained, was preceded and followed by
approximately 15 hours of practice in which the participants used Sentence Shaper at home with little instruction from the experimenters. As in Linebarger et al.’s (2000) study, the word finder and side buttons were disabled so that no linguistic support was provided, and participants were instructed to construct narratives of personal interest. Both participants showed improvement in their production, with increases in median length of utterance and mean sentence length. Furthermore, the participants demonstrated increases in complex argument structure as well as improvements in verb naming. Linebarger et al. hypothesized several possible reasons for these improvements. Firstly, it is possible that the program was able to teach the strategy of “chunking” output into small units of word or phrase size, thus reducing the demands on short-term memory. This strategy also encourages the user to move forward despite word-finding difficulties. Secondly, the language improvements may have resulted from the large amount of practice these participants had in producing free narratives, rather than simple picture descriptions. Finally, it was speculated that the processing support provided by Sentence Shaper may have allowed the participants to use structures that they had previously been unable to access except in very constrained tasks.

A third study involving Sentence Shaper required two individuals with nonfluent aphasia to use the program for 11 weeks independently after a training period (Linebarger, et al., 2004). Each week, participants were asked to watch a different episode of a television program and then use Sentence Shaper to narrate the episode. In contrast to the preceding studies, participants had access to both the word finder and the side buttons to aid in narrative production when needed. Results of the study found significant improvements in one participant’s production of unaided spoken narratives.
involving more structured and informative speech. The second participant, who had a more severe lexical impairment, did not show the same improvements for unaided speech, but with the lexical support provided by Sentence Shaper, he was able to produce more structured narratives. Clearly, with the proper support, the second participant was able to improve his communicative ability.

In each of Linebarger et al.'s studies, narratives were used as the focus of intervention, with participants instructed to create narratives using Sentence Shaper about personally relevant topics or television episodes. However, it is interesting to note that the effect of narratives on language remediation was not discussed in these studies. Peach and Wong (2004), drawing on Garrett's model of speech production, questioned whether addressing the message level in treatment could influence sentence level processes. After a therapy program which involved the retelling of narratives, the individual with agrammatism was found to have improved expressive syntax, although the results of their study do not clearly identify the influence of narratives on intervention. In Peach and Wong's (2004) and Linebarger et al.'s (2000, 2001, 2004) studies, narratives are targeted in intervention; however, the effect of the treatment on narrative structure is not investigated, leaving the interaction between sentence processing and supra-sentence level processes (i.e., story schema) unexplored.

Linebarger and Schwartz (2005) discuss the possibility of Sentence Shaper as an AAC device. They suggest that technology developed for people with aphasia can provide two types of support: direct and indirect. Similar to the Sentence Shaper's word finder and side buttons, direct support provides linguistic information to the user in the form of words, phrases, sentences, or structural templates, to the user. Indirect support, in
contrast, helps the user take advantage of his or her preserved language production abilities. In addition to providing direct lexical support, Sentence Shaper is also considered a form of indirect support as the program offers processing support to facilitate production of longer and more structurally complex utterances. As Linebarger et al.’s (2000, 2001) studies demonstrate, some users of technology may only require indirect support to overcome some or all of their difficulties. However, for other individuals with more severe aphasia, support in the form of linguistic information may be needed to help compensate for their language impairments. As was the case with the second participant in Linebarger et al.’s (2004) study, the language improvements made with the use of technology may not transfer to an individual’s unaided speech; thus, in order to maintain this increased language ability, technology may be necessary to augment communication in everyday life.

1.5 AAC and Aphasia: Focusing on Participation

With the focus of language therapy becoming broader to encompass not only work at the impairment level, but at the activity and participation levels as well, alternative and augmentative communication (AAC) strategies may help people with aphasia communicate more effectively and facilitate their participation in social contexts. AAC strategies range on a continuum from low to high tech. Gesture, drawing, communication books, and alphabet boards are examples of low tech AAC approaches. In contrast, high tech approaches to AAC have incorporated electronic technology (Hux, Manasse, Weiss, & Beukelman, 2001). In some cases, electronic devices (e.g. Dynavox, Lingraphica) have been developed specifically as communication aids. As computer
technology has become prevalent in everyday life, there has been increasing interest in developing software programs or otherwise adapting existing technology to meet the needs of individuals with aphasia.

AAC strategies can replace, supplement, or scaffold remaining natural speech (Hux et al., 2001). When considering AAC options for an individual with aphasia, the person’s lifestyle and communication capabilities must be taken into consideration (Garrett & Beukelman, 1998). Moreover, potential AAC users differ in the severity of their communication disorder and how the deficits “affect individual abilities to meet current needs and to participate in communication exchanges” (Garrett & Beukelman, 1998, p. 338). As a group, speech-language pathologists tend to view AAC as a method for replacing natural speech when an individual has failed to regain enough language in order to “convey even the most basic messages” (Hux et al., 2001, p. 677). These individuals with severe disorders would be considered “basic choice communicators”, requiring help from their communication partners to make basic choices (Garrett & Beukelman, p. 338). Efficient use of augmentative and/or alternative communication systems, particularly those involving technology, by an individual with aphasia requires training and practice. Unfortunately, speech-language pathologists tend to introduce AAC systems much too late, often when the client is nearing the end of his or her therapy, thus leaving insufficient time for the required training and practice (Hux et al., 2001). Historically, due to this insufficient instruction and preparation, there has been little success in AAC replacement therapy.

In contrast, research investigating the type of AAC system used to supplement natural speech rather than replace it has shown greater success (Hux et al., 2001). The
type of individual with aphasia able to use such a system has been labeled the
"comprehensive communicator" by Garrett and Beukelman (p. 341). This communicator
is defined as someone who needs support in order to communicate effectively as his or
her retained speech and language skills are limited and inconsistent. Typically,
comprehensive communicators have a variety of compensatory strategies, such as
drawing and gestures, which allow them to get across their meanings to some extent.
These communicators may benefit from an AAC program that enables them to talk about
their personal interests and also deals with their own individual communication needs
and participation patterns. A high-tech AAC device could be a useful addition to the
comprehensive communicators’ repertoire of communication strategies. Unfortunately,
these communicators are often overlooked by speech-language pathologists as possible
AAC users (Hux et al., 2001). It is possible that the reason for this is until recently, high­
techn AAC devices have been designed primarily as alternative rather than augmentative
systems.

Despite the promise of AAC systems, many factors are involved in the acceptance
and use of an AAC device. Lasker and Bedrosian (2001) describe their AAC Acceptance
Model as involving three components: milieu, person, and technology. Each area
involves several factors which relate to the overall acceptance of AAC systems. For
instance, the area of milieu contains factors such as the communication partner, the
communication environment, and available funding options. Within the person
component of Lasker and Bedrosian’s model, factors including the characteristics of the
user’s medical condition, attitude, personality, age, skills, needs, and intervention history

35
can all contribute to the possible acceptance of an AAC system. Finally, various
characteristics of the technology itself play an important role in acceptance.

Van de Sandt-Koenderman (2004) discusses several factors which have been
found to contribute to the successful use of low-tech AAC. As in Lasker and Bedrosian’s
model, the type of aphasia and cognitive abilities of the user influence potential success
with the AAC system. Acceptance of the AAC system is obviously imperative to its
effective use, as is the role the AAC system is expected to serve. The AAC user should
be supported in developing realistic expectations for the system as no AAC system can
entirely replace natural speech. In addition to these factors, vocabulary which is relevant
to the user’s needs and appropriate training are essential. Communication partners also
play an important role and should be trained to support the individual with aphasia in
using his or her AAC system. Van de Sandt-Koenderman suggests that these factors also
influence the success of high-tech AAC devices. Many interacting factors have been
identified as contributing to the potential level of use of an AAC system. Clearly, finding
an appropriate AAC system for an individual with aphasia is not simply a case of
matching a system to an individual’s language abilities.

Despite the apparent promise of these systems to support the communication of
individuals with aphasia, people’s attitudes towards AAC devices have been a hindrance
to their use. A study by Lasker (1997) as cited in Hux et al. (2001) was conducted in
which three groups of people - adult peers, speech-language pathologists, and family
members - listened to an individual with aphasia tell stories, first using unaided natural
speech, then a communication notebook, and finally a digitized speech output device.
Overall, the three groups reported that it was easiest to understand the person with
aphasia when he/she was using the high-tech speech output device. However, attitudes between the groups differed when asked to rate which system they would prefer if they were the communication partner. The adult peer group preferred the digitized speech output device, while the SLPs and family members favored natural speech. The preference for natural speech was found to result from the belief that with further therapy and effort, the person with aphasia would be able to communicate without using the AAC system. Therefore, even though the high-tech AAC device produced the highest efficiency and understanding, attitudes of family members and SLPs towards AAC systems may limit their use.

Currently, AAC technologies have been underutilized in aphasia interventions (Mollica, 1999). This is often due to limitations of the AAC system with regard to available vocabulary, physical design, and complexity of the system. Furthermore, some individuals are unable to handle the trade-offs that occur with high-tech AAC systems. For instance, increased flexibility of the AAC system and faster access to messages often require the user to deal with increased mental load. Moreover, there is the issue of generalization from the therapy environment to daily life. Although AAC interventions have been proven to improve communication in therapy, generalization often fails (Jacobs, Drew, Ogletree, & Pierce, 2004). Clearly, the acceptance and effective use of an AAC system is a very individualized process involving many contributing factors. Researchers and clinicians need to take these issues into account when designing AAC systems and recommending them to their clients with aphasia.
1.5.1 Conversation and the Impact of AAC

The structure of conversations is typically quite predictable (Beukelman & Mirenda, 1998). Conversations usually begin with a greeting and small talk and may then proceed to a period of information sharing, although others may remain at the level of small talk. Following this, the conversation ends with wrap-up remarks and a farewell. The different stages of conversation each come with their own demands and requirements for the AAC user. For instance, in order for small talk and social etiquette to be effective, these remarks must be communicated in a prompt and accurate manner (Stuart, Lasker, & Beukelman, 2000). While small talk and social etiquette are generally predictable and generic, information sharing is often unique, which means that the AAC device should be capable of creating novel messages. The ability to tell narratives adds further requirements in that original stories must be created and stored for future use either by the AAC user or by a facilitator. In order to be successful in conversation, AAC users must be able to adapt to the various stages of conversation and have systems which are flexible and broad enough to meet the demands each stage puts forth.

In addition to contending with the variety of requirements posed by each conversational stage, AAC users must also attempt to satisfy the social norms of conversation with regard to timing and rate. In everyday conversations, people typically speak at a rate of 150-250 words per minute; however, AAC users are much slower than this, communicating at a rate of approximately 8 words per minute (Beukelman & Mirenda, 1998). A person’s ability to respond quickly and to interject are important factors in determining how well he or she will be able to participate in a conversation (Hine, et al., 2003). In all conversations, interlocutors are constrained by “the temporal
imperative" in which "the participants must provide a public account for the passage of time in their individual parts of that action" (Clark, 1996, as cited in Higginbotham and Wilkins, 1999, p. 51). A public account includes actions such as talking, gesturing, or using an alphabet board. Higginbotham and Wilkins suggest that once there is a pause in the conversation, as occurs when an AAC user creates a message in silence, there is no longer a public account of actions. In English, pauses tend to be kept to a minimum and typically last no more than one second. However, AAC users are often required to pause for much longer than this when preparing a message, thus violating the constraint of temporal imperative. Higginbotham and Wilkins (1999) state that these pauses can often lead to inattention from the conversation partner and may cause reluctance on the part of the interlocutor to enter into conversations with someone who uses AAC. Thus, problems with timing can have very real social impacts on individuals who use AAC.

It was previously discussed that language can be thought of as serving two purposes or functions: transaction and interaction (Brown & Yule, 1983). Brown and Yule report that the majority of everyday conversation consists of mainly interactional rather than transactional language use. For example, interactional language is used to "negotiate role-relationships, peer solidarity, the exchange of turns in a conversation, and the saving of face of both speaker and hearer" (Brown & Yule, 1983, p. 3). Hine, Arnott, and Smith (2003) report that a large part of conversations involves sharing stories, expressing opinions, and gossiping, all of which serve a social function. They suggest that as much as three-quarters of conversation is devoted to these purposes. Clearly, the social function of language plays an important role in conversation. Light (1988) proposes that communicative interactions accomplish four purposes, two of these
“communication of needs/wants, information transfer” are transactional and the other two “social closeness, and social etiquette” are interactional (p. 76). However, she notes that in the past the majority of AAC technological developments have been concentrated in the areas of communication of needs and wants and information transfer. This suggests that there is a mismatch between what AAC systems have been designed to accomplish and the reality of conversations in everyday life. While AAC systems may be effective in the transactional function of language, the majority of conversations serve an interactional function of which social closeness and etiquette are important parts. It is evident that AAC users face a number of challenges when conversing with others. Not only must they contend with the different stages of conversation and their requirements, they must also attempt to enter into those stages with appropriate timing. Furthermore, AAC users may be attempting to do all of this with a device that is not suited for conversations in everyday life.

1.5.2 Recent Advances in AAC Technology

Designers in AAC technology have begun to recognize the need for devices which will enable AAC users to participate in conversations at an interactional level. These recent advances in AAC technology provide users with a means of communicating more than just their needs and wants. Currently there are several types of computer-based AAC devices available for the comprehensive communicator, which have been designed to support particular aspects of speech that are difficult for these individuals. However, the AAC device should not be expected to replace speech entirely, as the comprehensive communicator has already developed strategies that aid in message transmission. One
example of such a device is the Predictive Retrieval of Story Extracts (PROSE; Waller &
Newell, 1997)). This program was designed to allow individuals with aphasia to tell
narratives. With this program, users can retrieve different stories they have developed.
The effect PROSE had on conversations was investigated for one participant and it was
found that with PROSE, there was an increase in initiation and topic expansion, thus
allowing the individual with aphasia to have more conversational control. Family
members reported that the program made conversations easier as they knew the topic of
conversation. Furthermore, the reported frustration for both the individual with aphasia
and the family members was decreased by use of PROSE. This illustrates that AAC
devices have the ability to help people with aphasia become more active participants in
conversations. One limitation of this device is the fact that the user must rely on others to
input the narratives, and therefore, the user is restricted to telling narratives which are
known by the people who are inputting them.

Conversational control has also been examined with the use of TalksBac, a
predictive communication device designed for individuals with nonfluent aphasia
(Waller, Dennis, Brodie, & Cairns, 1998). With TalksBac, a person close to the person
with aphasia enters new utterances into the program and deletes old ones. The user is
then able to select different conversational utterances by going through a series of
potential choices on the computer screen to come up with the appropriate utterance.
Waller et al. examined whether TalksBac was able to augment communication by
comparing unaided and aided conversations with both familiar and unfamiliar partners.
Typically, conversations with an individual with aphasia are controlled by the non-
impaired partner. With the use of TalksBac, the individuals with nonfluent aphasia who
participated in the study demonstrated improvements in their conversational ability; there were increases in their ability to initiate new conversational topics and elaborate on topics, and fewer conversation breakdowns occurred compared to unaided interactions. Furthermore, there was less responding and less asking for confirmation from the partners without aphasia leading the researchers to conclude these partners were controlling the conversations less. The PROSE and TalksBac studies illustrate that AAC devices have the ability to allow individuals with aphasia to become more active participants in conversations. Similar to PROSE, users of TalksBac are limited in that they are dependent on other people to input conversational material into the device.

1.5.3 Sentence Shaper: Further Possibilities

Although not initially designed as an AAC program, there have been hints of promise that Sentence Shaper could be used for more than just language remediation. Most of the participants liked using Sentence Shaper, and one even used the program to give a speech to over a thousand people (Linebarger et al., 2000). Another person from the same study felt that Sentence Shaper would be helpful to use everyday. The participant used Sentence Shaper to produce this message: “I need verbalizing. I need it bad. The therapy’s working, it’s working. I enjoy therapy. I need it. I need the computer [to] record the message I want every day. I can’t stand my stroke…” (p. 425).

Furthermore, questionnaire results from Linebarger and Schwartz’s study (2005) indicated that participants were willing to use Sentence Shaper in the long term and were interested in using it independently. Eighty-two percent of the participants “expressed a lot of interest in continuing to use the CS following completion of the study” and 63%
"expressed the desire to work on the CS with little or no assistance" (p. 16). The question that remains is whether Sentence Shaper can be integrated into functional contexts as this will be the main motivating factor for individuals with aphasia to continue using Sentence Shaper (Linebarger & Schwartz, 2005).

Davies, Marcella, McGrenere, and Purves (2004) had a similar question regarding PDA (Personal Digital Assistant) technology. They explored this topic by using an ethnographic approach to learn how a man with nonfluent aphasia integrated a PDA with communication strategies already used. This type of approach was important because, while previous studies such as those exploring PROSE and TalksBac have investigated the effects each can have on conversations, they have not looked in detail at how individuals with aphasia are actually able to incorporate technology into their everyday lives and communication strategies. This time-intensive approach revealed important details regarding the strengths and limitations of the PDA system and its usability in the real world. Conducting a similar ethnographic study with Sentence Shaper would be a beneficial addition to the current research on this processing prosthesis.

1.6 Research Objectives

This study has two primary research objectives. The first objective is to partially replicate Linebarger, McCall, and Berndt’s (2004) language remediation study involving Sentence Shaper, extending their question of the efficacy of Sentence Shaper with respect to morphosyntax, to investigate the effects of Sentence Shaper on narrative structure. The second objective is to explore in more depth the possible uses of Sentence Shaper in everyday life, as this information is unknown at this time.
The rationale behind component one is that while previous research has demonstrated that Sentence Shaper can facilitate improvements in the morphosyntactic ability and informativeness and efficiency of narratives, those studies did not explore the impact of Sentence Shaper on story structure. Furthermore, as the previous studies were conducted with a relatively small number of participants, documenting the language profile characteristics of another user adds further to the understanding of the impact of this program on different types of nonfluent aphasia.

With respect to component two, the rationale is that previous studies of Sentence Shaper have left unanswered and unexplored the question of how this processing prosthesis can be integrated into the lives of those living with aphasia. Because the ICF suggests that intervention should focus on the participation of people in contexts which are meaningful to them, investigating whether the Sentence Shaper can improve communicative effectiveness and diminish the negative impact of a communication disorder on one’s quality of life will be an important contribution. This is particularly relevant as technology is becoming increasingly available to those living with aphasia. This understanding will be important for clinicians recommending this program to their clients in the future.

Furthermore, while investigating the benefits Sentence Shaper may have for the communication of an individual with aphasia, the study will also explore the barriers faced when using the program. Knowledge of these barriers will be important for guiding further development of the program and its use in different contexts. For example, currently Sentence Shaper is not fully portable as it needs to be run on a home computer or laptop. This study will look at the implications this has for the user and the limitations
it may have on the contexts in which he or she wishes to use the program. Researchers of TalksBac found that even though the program was available on a laptop, this was not sufficiently portable for everyday situations away from home (Waller et al., 1998). Understanding the limitations will help determine the usefulness of putting the program on a handheld device. Moreover, Sentence Shaper is also an off-line program which means that users will have to prepare messages in advance and then access them when they are having a conversation. The study will look at what implications this may have on conversations and how a user can actually incorporate Sentence Shaper into his or her interactions with others.

The following chapter will describe the methodology as it was conceptualized at the outset of the study. In a qualitative design, the unique characteristics of the participants often shape the study, and therefore, these details are not known advance. Chapter Three will provide a description of the study as it evolved following the identification of the participants.
Chapter Two: Methodology

2.1 Introduction

This chapter begins with a description of case study methodology. From there the overview of the study, the participant guidelines, ethical considerations, and communication profile assessments are explained. Following this, the data collection and analysis procedures are outlined separately for each component, namely, the language remediation component and the ethnographic component. In relation to the ICF framework discussed in the first chapter, the language remediation component explores changes at the impairment and activity levels of functioning, whereas the ethnographic component seeks to investigate whether Sentence Shaper can facilitate change at the participation level of functioning and to explore the contextual factors which impact the use of Sentence Shaper.

2.2 The Case Study

A case study approach was chosen for the study as this paradigm is particularly well suited to the exploratory nature of the research objective. Stake (1995) defines the case study as “the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances” (p. xi). As the potential uses of Sentence Shaper in everyday life have not been previously explored, relevant parameters contributing to its use were not known in advance, necessitating a descriptive approach. A single case study is beneficial in this circumstance as it allows for extremely broad and deep description of the participant’s use of Sentence Shaper and the context in which it
took place. Stake distinguishes between two types of case studies: intrinsic and instrumental. In the intrinsic case study, the case is already given and a choice is made to study that particular case. The instrumental case study, in contrast, begins with a research question and a case is found to investigate that question. This study was motivated by an initial research question; therefore it is considered an instrumental case study. Stake states that the purpose of the case study is “particularization, not generalization” (p. 8). In this study, I examine the particular variables that influence the ways in which Sentence Shaper can be used in one person’s unique life situation. This is not an attempt to explain how the program could be used for all people with aphasia, but is rather a description of its use in a specific context. This information will guide future research in this area and will also provide insight for clinicians working with people who have nonfluent aphasia.

2.3 Overview

This study was conducted over a four month period with an individual with aphasia and a communication partner. Each component in the study addresses one of the two objectives discussed at the end of the first chapter. The first component was a partial replication of a previous treatment study involving Sentence Shaper, extending their investigation of the effects of Sentence Shaper on morphosyntax to also examine the impact on story structure (Linebarger et al., 2004). In order to meet this first objective, a pre-post treatment comparison of narratives with and without Sentence Shaper was undertaken. Quantitative and qualitative measures were used to investigate whether there were any improvements to language ability following use of the Sentence Shaper, comparing them to those obtained by Linebarger et al. (2004) in their study of Sentence
Shaper. The second component of the study used a qualitative case study approach (Stake, 1995). I assumed the role of a moderate participator in this study (Spradley, 1980), that is, I was an “insider” in the sense that I was interacting with the participants, but also remained an “outsider” in that I do not have aphasia, nor am I involved with a close family member with aphasia. The qualitative design of component two fits well with a social model of intervention as qualitative methods are particularly useful for obtaining the perspectives of the participants. The purpose of this component was to investigate how Sentence Shaper could be incorporated into the communication strategies of an individual with aphasia and used in his or her everyday life.

2.4 Participants

2.4.1 Initial Participant Guidelines

Participants were recruited through local speech-language pathologists. The following guidelines were provided to assist the speech-language pathologists in identifying possible participants:

1. One participant should have non-fluent aphasia. This is defined as difficulty with grammatical language production, but with relatively spared comprehension. This was defined using criteria from Linebarger et al.'s (2000, 2001, 2004) research.
   a. Participants had chronic nonfluent aphasia (i.e., agrammatic or nonagrammatic). Saffran, Berndt, and Swartz (1989) describe agrammatic speech as having omissions of some bound and free-standing grammatical morphemes, while nonfluent, nonagrammatic speech does not have these same errors but is still structurally impoverished.
b. The participants in Linebarger et al. (2004) had a rate of speech below 107 words/minute, which was considered to be characteristic of nonfluent aphasia.

2. The participant with aphasia must have a close family member or friend with whom he or she communicates regularly (the second participant).

3. The primary language spoken in the home is English.

4. Both participants must live relatively close to the researcher to make repeated meetings possible.

5. The participant with aphasia must have a home computer on which Sentence Shaper could be installed.

When the speech-language pathologist identified a potential participant, the individual with aphasia was given an information letter with an invitation to contact the researcher for a meeting with both the individual with aphasia and his or her proposed communication partner. This meeting served two purposes. First, on the basis of listening to the speech of the individual with aphasia, his or her language ability was screened to ensure appropriateness for use of Sentence Shaper. Second, the outline of the study was explained and both participants were made aware of the time commitment involved if they decided to participate. If the language screening met the criteria, both the individual with aphasia and the communication partner were invited to participate in the study and were asked to give consent.
2.4.2. Ethical Considerations

The ethical considerations involved in this study were two-fold. First, it was important to ensure that the participant with aphasia was giving informed consent. To facilitate comprehension of the consent form, an aphasia-friendly consent form was prepared with larger font size, pictures, and simplified language. The participant with aphasia was also given help reading the consent form and asked for verification of understanding throughout the process. Consent forms are found in Appendix A.

The second ethical consideration was with regard to the confidentiality of the participants. To ensure confidentiality, pseudonyms were used in all transcripts and fieldnotes presented in this thesis for the participants and any people mentioned in those documents. Furthermore, any mention of specific identifying information was deleted or made more general.

A third ethical consideration was with respect to introducing a system that the participant with aphasia might wish to incorporate into his or her communication strategies at the end of the study. In order to prevent the removal of a device which might prove useful for the participant, the participant with aphasia will be offered the program upon completion of the study.

Approval for this research was obtained through the Behavioural Research Ethics Board at the University of British Columbia. A copy of the approval form is included in Appendix B.
2.4.3 Communication Profile

After the individual with aphasia and family member agreed to participate in the study, further analysis of the communication abilities of the individual with aphasia and of the communication interaction between both participants was undertaken. The overall purpose of the communication profile was to fully characterize the comprehension and production abilities of the participant with aphasia, and was not intended as a measure to determine participant appropriateness for the study. Test selection was based on Linebarger et al.’s (2004) study to facilitate comparison of the participants’ language abilities. Comprehension was tested using subtests of the Psycholinguistic Assessments of Language Processing in Aphasia, in particular, the spoken word-picture matching, sentence-picture matching: written version, and written comprehension of locative relations subtests (PALPA; Kay, Coltheart, & Lesser, 1992) and of the Boston Diagnostic Aphasia Examination, specifically, reversible possessives and embedded sentences subtests (Goodglass, Kaplan, & Barresi, 2001). Lexical retrieval was also tested using the Boston Naming Test (Kaplan, Goodglass, & Weintraub, 2001) as well as the Noun/Verb Naming test (Zingeser & Berndt, 1990). Results of these assessments helped to characterize the comprehension and lexical retrieval abilities of the participant with aphasia. Participant observation facilitated a comprehensive description of the communication strategies that the individual with aphasia and the communication partner were using before Sentence Shaper was introduced.

The Quality of Life Communication Scale (QCL; Paul et al., 2004) and the Communicative Effectiveness Index (CETI; Lomas, et al., 1989) questionnaires were also completed as part of the communication profile assessment to gain some insight into
the perspectives of both the participant with aphasia and the communication partner. However, unlike the other communication profile assessments, these questionnaires were also completed at the end of the study to measure any changes that may have occurred. The Quality of Communication Life Scale (QCL) provides a measure of “the impact of a communication disorder on an adult’s relationships; communication interactions; participation in social, leisure, work, and education activities; and overall quality of life” (Paul, et al., 2004, p. 1). The QCL is completed by the participant with aphasia and is designed and written in an aphasia-friendly manner. The Communicative Effectiveness Index consists of a number of questions detailing a person’s communicative ability in day-to-day situations as perceived by the communication partner (Lomas, et al., 1989). The communication partner is asked to indicate the person’s ability on a scale ranging from “not at all able” to “as able as before stroke”.

2.5 Component One: Procedures

2.5.1 Sentence Shaper Training

Following baseline assessments, Sentence Shaper was installed on the aphasic participant’s computer. Training of Sentence Shaper was conducted only with the participant with aphasia and was based on the training procedure in Linebarger et al’s (2001, 2004) studies. The participant was instructed on how to record sound files, replay them on Sentence Shaper, and save them. The participant was also shown how to use the side buttons which contain frequently used verbs and pronouns and the word-finding tool. The training took place over approximately five hours. In the language remediation component of the study, the participant with aphasia was expected to practice recording
messages using Sentence Shaper over a course of approximately ten weeks. During this
time, the researcher met regularly with the participant and was available to assist with
message production by giving feedback on how to use the program more efficiently.

2.5.2 Data Collection

2.5.2.1 Narrative samples.

Language samples were elicited by having the participant narrate a familiar fairy
tale and *The Cowboy Story*, an eight-picture story sequence (Joanette & Goulet, 1990).
*The Cowboy Story* was chosen as an additional task as it provides a story structure
analysis based on normative data. These narratives were completed at the beginning and
end of the study as a way to characterize the speech of the participant with aphasia and to
measure changes in language ability following use of Sentence Shaper. The participant
was also asked to record the same narratives using Sentence Shaper at the end of the
study. The participant was free to use the word finder and side buttons when necessary.
In order to reduce practice effects from repeated narrations of the same story and to
counterbalance the aided and unaided narratives, the participant with aphasia was asked
to narrate *The Cowboy Story* unaided and the fairytale aided by Sentence Shaper on one
day; the reverse was done three days later. These tasks allowed for a comparison between
unaided and aided language characteristics
2.5.3 Data Analysis

2.5.3.1 Morphosyntactic analysis.

All narrative samples were transcribed. Quantitative Production Analysis, a standardized analysis procedure, was utilized for morphosyntactic analysis (Saffran, Berndt, and Schwartz, 1989). Analysis began by determining the number of words in the sample (at least 100 words) and from there determining the number of narrative words or those words representing propositional speech. Following this, the narrative words were segmented into utterances and the utterances were coded into different syntactic types. Saffran et al. define an utterance as “words that appear to form a coherent unit” taking into consideration syntactic and prosodic markers, pauses, and semantics (p. 470). The utterances were then further analyzed by counting different types of words found in each utterance (i.e. open class words, nouns, verbs pronouns, etc). After this step, a structural analysis of each utterance examined aspects such as embeddings and constituents within sentences. Finally, the number of words per minute was calculated. This analysis provided measures of the morphological and structural characteristics of the participant’s speech production. Inter-rater reliability checks were conducted on all measures.

2.5.3.2 Informativeness and efficiency analysis.

To investigate the informativeness of the narratives and efficiency with which informative content was communicated, a procedure developed by Nicholas and Brookshire (1993) was used. In this analysis, the words of the narrative sample were counted excluding all nonword fillers and unintelligible words. Following this, correct information units (CIU) were identified. Nicholas and Brookshire define CIUs as “words
that are intelligible in context, accurate in relation to the picture(s) or topic, and relevant
to and informative about the content of the picture(s) or the topic” (p. 15). From these
counts, the total percentage of CIUs in the sample and the CIUs/minute were calculated.

Inter-rater reliability was determined by having two raters score at least 15% of
the samples independently and then compare the results of this scoring to ensure
reliability. This procedure was completed for both the QPA and CIU analysis.

2.5.3.3. Story structure analysis.

An additional analysis of the Cowboy Story was completed to examine the story
schema and informative content of the participant’s narrative (Joanette & Goulet, 1990).
The Cowboy Story contains three components, that is, the setting, the complication, and
the resolution, which must be included in the narrative in order to be complete. A
description of the setting of the story should include mention of a tired cowboy coming
into town, getting off his horse, resting on a bench, and holding his horse’s bridle. The
complication component of the story deals with a young boy exchanging a small wooden
horse for the cowboy’s horse and running away with the real horse. Finally, the
resolution involves the cowboy waking up to find that he is holding the small toy horse
and being surprised at the change in the horse. Joanette and Goulet’s analysis of the
informative content contains a list of 32 core propositions detailing the content expected
to be in the narrative. The expected version of The Cowboy Story is based on the authors’
narratives and the narratives produced by groups of individuals with right-hemisphere
brain damaged and non-impaired individuals. This allowed for a comparison between the
content included in the participant’s narrative to the expected content.
2.6 Component Two: Procedures

In the second component of the study, participant observation was conducted with
the individual with aphasia and the communication partner. Using a participatory design,
I worked together with both participants to assess the strengths and weaknesses of
Sentence Shaper, as well as to investigate different ways the program could be used. A
second purpose of our meetings was to learn more from the participants about
communicating with aphasia. I observed and described as comprehensively as possible
the different communication strategies used by the participants in daily life and how
Sentence Shaper could be incorporated into those strategies. The data emerging from the
sessions allowed for a rich description of verbal and nonverbal communication of the
participant and also detailed the environment in which Sentence Shaper could be used.

2.6.1 Data Collection

2.6.1.1 Participant observation.

Throughout the four months of data collection, I participated in regularly
scheduled meetings with the participants. Most sessions were recorded with a Sony
MiniDisc player with an external bi-directional stereo microphone. Of the sessions that
were recorded, only the first 80 minutes or the length of one minidisk was recorded. The
minidisk recorder was somewhat intrusive and changing the disks would have been
disruptive; so to reduce the impact of the recorder, only one disk per session was used.
Very brief field notes were written during visits with participants. Detailed field notes
were taken after every visit. Audio-recordings were also reviewed following each session
to help with documenting the field notes.
2.6.1.2 Interviews.

At the beginning and end of the data collection period, I conducted brief interviews with each participant. The purpose of the interviews was to learn about the participants’ perceptions of the participant with aphasia as a communicator and to enrich understanding of the communication interaction between the participants. The questions focused on communication challenges faced by the two individuals and communication strategies used. The final interviews included questions about Sentence Shaper, specifically, the benefits of and barriers to its use. At the beginning of each interview, the participant with aphasia was encouraged to use whatever strategies were useful to facilitate communication (i.e., gesture and writing). The list of interview questions is provided in Appendix C.

2.6.1.3 Sentence Shaper log.

The participant with aphasia was asked to keep a log detailing the use of Sentence Shaper. The participant was asked to record the date, length of time Sentence Shaper was used, purpose of use (practice, conversation, or e-mail), and presence of others during use. It was important to know the total time the participant with aphasia spent using the program, first, in order to compare this to the time the participants in Linebarger et al.’s (2004) study used Sentence Shaper, and second, to facilitate description of the ways in which Sentence Shaper was used.
2.6.1.4 Quality of Communication Life Scale and Communicative Effectiveness

These assessments were conducted at the beginning as part of the communication profile and at the end of the data collection period with the participant with aphasia and her communication partner. The final questionnaires were completed by the participants without having them first review their answers from the first questionnaire. This was done to help prevent a positive bias in the participants’ answers. After the participants had finished the final questionnaires, their answers were compared to those from the first questionnaire, and they were asked if they felt the changes were accurate. At this point, they were able to alter any of their responses. Comparisons of initial and final questionnaires were carried out to explore any changes that may have occurred.

2.6.2 Data Analysis

An important aspect of data analysis in this study was the integration of different forms of data as each played an important role in exploring the communication strategies used by the participant and the incorporation of Sentence Shaper into these strategies. By interpreting each type of data in the context of all others, a more in-depth picture could be obtained. This analytic strategy of exploring the data as a whole can uncover patterns and consistencies and inconsistencies within certain contexts, and this leads to correspondence, which Stake (1995) defines as “the relationship of one variable to others” (p. 170). Furthermore, finding convergence among different sources of data, or triangulating the data, contributes to the internal validity of the study (Creswell, 1994).
The following sections detail how the different sources of data for both components of the study were analyzed.

2.6.2.1 Analysis of fieldnotes and interviews.

The fieldnotes and interviews were analyzed for meaning using thematic analysis (Luborsky, 1994). A significant benefit of this type of approach is that it allows for a representation of the participants' perspectives. It was important to record and analyze each participant's perspective as this interpretation was critical to the results of this study. Luborsky makes a distinction between themes and patterns, suggesting that themes reflect the perspectives of the participants, whereas patterns reflect the researcher's perspective. Luborsky proposes two approaches to theme identification. The first approach is to look for repeated statements made by the participants. The second is to identify statements which appear to be meaningful or significant to the participant. In contrast, patterns are repeated observations made by the researcher that may or may not be apparent to the participants. This differentiation helps identify the findings in the data that are from the perspective of the participants versus those that reflect the researcher's perspective.

Analysis of the fieldnotes and interviews had several steps. Fieldnotes and interviews were initially bracketed into sections and given a code. Codes were not generated in advance, but rather emerged as the data was analyzed. Codes (e.g. "technology", "response to Sentence Shaper") were used to describe more generally what was happening in each section of the fieldnotes or transcripts. Once the data was coded in its entirety, the codes were listed and then grouped into categories which allowed themes
and patterns to emerge from the data. For example, codes of “customizing the word finder and side buttons”, “creating Sentence Shaper messages”, and “motivation to create messages” were grouped into the category of “use of Sentence Shaper”. This grouping allowed for the pattern of “the participant as an independent user of technology” to emerge. Alternatively, larger codes were broken down into more specific codes. For instance, the code of technology was coded more specifically as “independent use of technology”, “barriers to technology”, and “current technology used by participant”. In this way, coding of the data was bidirectional, being both bottom-up and top-down. This process was repeated several times to ensure completeness of coding. Finally, interaction of codes was examined to provide a clearer description of how patterns and themes were connected and related. For example, a pattern which emerged from the data was the participant’s dependence on communication partners. Codes relating to this were “difficulty generating ideas to talk about” and “the effort of communication”. In addition, the code, “helping behaviour demonstrated by the communication partner” was seen as interacting with these codes.

2.6.2.2 Transcription of conversations.

An additional source of data for analysis was conversations recorded with the participants. As the majority of visits with the participants were recorded, many hours of conversation were available for transcription. Because the primary purpose of transcribing conversations was to convey the nature of participants’ communication and to aid in the description of communication strategies used by the participants, it was not
necessary to transcribe the entire set of recordings. So conversations were selected on the basis of their contribution to the description of the participants' communication.

However, the process of transcription presents several challenges for researchers. As a rule, transcription is "a selective process reflecting theoretical goals and definitions" (Ochs, 1979, p. 44). It is selective in the sense that it is almost impossible to include every aspect of a conversation. However, the details of a transcript often provide important information and meaning. Clearly, a balance must be met so that an adequate representation is obtained without overwhelming the reader with unnecessary details. Transcription also becomes selective when an audio-recording is used. Obviously, this type of recording is unable to capture a person's use of gestures, which are often an important form of communication for individuals with aphasia. In order to partially compensate for this, an effort was made to note any particularly important gestures as they occurred and these were later added to the transcripts. However, the limitations of using fieldnotes for transcription purposes are acknowledged as some important details are inevitably lost in this process (Psathas & Anderson, 1990).

Recorded conversations were transcribed using a subset of codes from the transcription coding system developed by Gumperz and Berenz (1993). The codes chosen for this purpose were those which enhanced the meaning of the conversations and contributed to analysis. For instance, audible exhalations were included in the analysis because the participant with aphasia often indicated frustration by an audible sigh. The list of transcription codes used is given in Appendix D.
2.6.2.3 Analysis of QCL and CETI.

The QCL and CETI were analyzed by comparing the scores on the pre and post measures. In order to interpret these findings, participants were asked to compare the pre and post questionnaires and to provide an explanation for items which had changed in score.

2.7 Relating Findings to the Research Objectives

Data from fieldnotes, transcripts, and questionnaires was compiled during the analysis procedure. These findings were integrated or triangulated by reviewing each set of data separately for themes and patterns and then combining the evidence from each source of data to better support the themes and patterns which emerged. This analysis was then related back to the initial research objectives in an attempt to explain the reasons behind the way in which Sentence Shaper was used to augment communication. In addition, results from the qualitative investigation were used to support the findings in the treatment component of the study.
3.1 Introduction

In a qualitative case study, many details of the study begin to take shape only after the participants are identified. In this way, the study evolves from its initial conceptualization to include aspects of each participant's unique characteristics and life situations. This chapter begins with a description of the participants and the baseline assessment results of the participant with aphasia. This is followed by an outline of the study and a description of the data set obtained from the four months of data collection. The chapter ends with a discussion of the challenges involved in interviewing an individual with expressive and receptive communication impairments.

3.2 Study Participants

Nicole, a woman with aphasia, and Eileen, her mother, agreed to participate in this study. Nicole is a 31 year-old woman who had a stroke approximately four years prior to the study. Her stroke occurred during aneurysm surgery and resulted in right hemiparesis and non-fluent aphasia. Following her stroke, Nicole received speech therapy during her stay in acute care. She also had speech therapy for 3-4 months as an inpatient at a rehabilitation hospital and for three months as an outpatient. According to Eileen, Nicole’s verbal output was limited to a single word ("bathroom") for an entire year following her stroke, and has since improved to her current state of one-to-two word utterances with some highly routine phrases.
Nicole was born in India and moved to Taiwan at age five. The family immigrated to Canada when Nicole was 12 years of age. English and Mandarin were historically the languages spoken at home; however, Nicole has not spoken Mandarin since her stroke. Prior to her stroke, Nicole was employed at a bank and had a high school education with some post-secondary level courses. Following the stroke, Nicole’s mother retired from her job in order to care for her daughter. Nicole lives with Eric, her partner of seven years, but spends most days at her mother’s house. Nicole is active in a weekly stroke club in her community and spends several hours a week doing language related activities with volunteers who come to Eileen’s home.

3.2.1 Communication Profile Results

At the beginning of the study a detailed assessment of Nicole’s language production and comprehension abilities was completed. Her rate of speech ranged between 4-8 words/minute as measured from her narrative samples and is considered nonfluent when compared to the normal fluency range (107-232 words/minute). Using the Saffran et al. (1989) criteria, Nicole’s speech is considered to be agrammatic in that there was an omission of both bound and free-standing grammatical morphemes. In addition, her narratives had a complete absence of story structure. Communication assessments included subtests from the PALPA and BDAE. Nicole’s scores are presented in Table 3.1.
Table 3.1 Nicole’s assessment scores

<table>
<thead>
<tr>
<th>Assessment Tool</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>PALPA sentence-picture matching subtest (written version)</td>
<td></td>
</tr>
<tr>
<td>• Active sentences</td>
<td>0.67</td>
</tr>
<tr>
<td>• Passive sentences</td>
<td>0.50</td>
</tr>
<tr>
<td>• Reversible sentences</td>
<td>0.55</td>
</tr>
<tr>
<td>• Non-reversible sentences</td>
<td>0.75</td>
</tr>
<tr>
<td>PALPA spoken word-picture matching</td>
<td>0.95</td>
</tr>
<tr>
<td>PALPA locative relations subtest</td>
<td>0.38</td>
</tr>
<tr>
<td>BDAE auditory comprehension of reversible possessives</td>
<td>0.70</td>
</tr>
<tr>
<td>BDAE auditory comprehension of embedded sentences</td>
<td>0.30</td>
</tr>
<tr>
<td>The Boston Naming Test</td>
<td>0.27</td>
</tr>
<tr>
<td>Noun/Verb Naming Test</td>
<td></td>
</tr>
<tr>
<td>• Nouns</td>
<td>0.80</td>
</tr>
<tr>
<td>• Verbs</td>
<td>0.77</td>
</tr>
</tbody>
</table>

In comparing Nicole’s assessment scores with subjects from Linebarger et al.’s (2004) study, similarities and differences are noted. As with Nicole, both subjects from Linebarger et al.’s study had relatively intact auditory comprehension of single words. They were also similar in their ability to comprehend reversible sentences. Nicole demonstrated superior production of verbs compared to the other participants and was also better in her production of nouns than the first participant from Linebarger et al.’s study. In contrast, Nicole’s discourse ability demonstrated in the pre-treatment narratives was much more impoverished than the Linebarger et al.’s participants’ narratives.

3.2.2 Nicole as a Communicator

Results of Nicole’s language assessments revealed impairments in both comprehension and expression. However, assessment scores cannot fully depict the communicative ability of an individual with aphasia. In this section, a description of Nicole’s communication style is provided. This data was obtained through participant observation of Nicole’s interactions with Eileen and me prior to the introduction of
Sentence Shaper, from the brief interviews conducted with both participants at the beginning of the study, and through the QCL and CETI questionnaires.

Observing the participants' communication interactions revealed important details about Nicole as a communicator. It was apparent that despite Nicole’s relatively high score on the Noun/Verb Naming Test, she experienced difficulty with word retrieval in conversation. However, she compensated for this difficulty in various ways. Eileen mentioned that Nicole had several communication strategies, such as gesture, writing, and facial expression. Her use of gestures as a strategy to augment her communication was illustrated when she used gestures and single words to tell me about the exercises she did at the pool. Nicole also used gestures to cue herself to say particular words. While doing the locative relation subtest of the PALPA, she often demonstrated the correct gesture for the preposition; however, she was unable to transfer this to help her comprehend the relations. As the majority of Nicole’s utterances consisted of one noun or a short phrase of two-to-four words, she often relied on her communication partner to expand her utterances. An example of this occurred when Nicole said “plants” which prompted Eileen to offer me some of their plants they were giving away (FN03/14: 3-4).

At the initial meeting, Eileen often spoke for her daughter when I asked a question; however, Nicole did not seem bothered by this behaviour. I also noticed that in conversation, Eileen often asked Nicole questions to which Eileen already knew the answers. For instance, when we were discussing Nicole’s stroke, Eileen asked Nicole questions, such as “when did you have your stroke”, which seemed to facilitate Nicole’s word retrieval. If Nicole was unable to answer the questions Eileen had posed, Eileen answered for Nicole.
The QCL and CETI also provided useful information about Nicole’s communication. There were several items on the QCL which Nicole rated quite negatively (below 3 on a scale of 1 to 5). For instance, “It’s easy for me to communicate” and “I am confident that I can communicate” were both rated at 2. The QCL also highlighted that Nicole’s communication difficulties have affected her ability to understand television shows and movies and have made her feel less included in conversations with others, as indicated by the very low scores on those items. However, despite these difficulties, Nicole rated that she likes to talk with people quite positively. The statement “In general, my quality of life is good” was scored as a 3 which suggests that she perceives her quality of life as neither overly good nor overly bad, but rather average. Eileen’s responses on the CETI suggested that several aspects of conversation were difficult for Nicole since her stroke. For instance, Eileen gave low ratings to Nicole’s abilities to be involved in group or one-to-one conversations, to initiate conversations, and to discuss a topic in detail. These answers corresponded with the way Nicole had answered her questionnaire, suggesting that Eileen’s perceptions of Nicole’s communicative ability are consistent with those of her daughter’s. Clearly, Nicole’s aphasia has had an impact on her ability to communicate with others and her perception of her quality of life.

3.3 Outline of Study

The two components of the study were carried out concurrently. Following the initial assessment and observation period, the training phase was conducted in which Nicole was trained in the use of Sentence Shaper and was given practice time to become
an efficient user of the program. The training sessions were also used as an opportunity to interact with the participants and to explore what communication strategies they were currently using. The training period took approximately two weeks during which I spent about three hours per week with Nicole. Following the training period, I typically met with Nicole twice each week. It was Nicole and Eileen’s preference that I meet with them on weekday afternoons. Meetings typically lasted for 1 ½ hours and we met for a total of four months. Approximately 54 hours were spent meeting with Nicole. During the meetings, Eileen was usually present at the beginning and the end for discussion. There were two meetings in which Eileen spent the entire session with Nicole and me. Meetings most often occurred at Eileen’s home with Nicole and I seated at a table with her laptop computer. I also had the opportunity to attend a local stroke club on two occasions and visit with Nicole at her apartment. We also went out for lunch with a mutual friend to a restaurant of Nicole’s choice. A schedule of the meetings is given in Appendix F.

At the end of each meeting, Nicole was asked to make a message using Sentence Shaper before the next meeting. At the beginning of the study, I gave Nicole more specific topics for Sentence Shaper messages. As the study progressed, I attempted to reduce these suggestions to more general ideas; however, I was not always able to do this. Nicole required more support in generating ideas for messages than originally anticipated at the onset of the study. She also had a tendency to work with others, such as Eileen, when creating messages on Sentence Shaper. In the Sentence Shaper manual, the designers suggest that for maximum improvement, the program should be used independently (Linebarger, 2005), so I often suggested to Nicole and Eileen that Nicole should try to work independently when using Sentence Shaper. In this way, the role I had
originally envisioned changed with the characteristics of the participants. I not only facilitated the use of Sentence Shaper by suggesting ways to use the program more effectively, but I also helped generate ideas and encouraged independent use of the program.

3.4 Data Set

3.4.1 Narrative Samples

As previously mentioned, unaided narrative samples were taken at the beginning and end of the study. Nicole chose to tell The Three Little Pigs for the fairytale narrative, but had some difficulty beginning her narrative. Saffran et al. (1989) suggest that a picture book can be used when a story is not well known, so when Nicole spontaneously found the story in a workbook, I allowed her to look at the pictures, but asked her not to read any of the words. For the final narrative, she did not use her workbook. Nicole was also asked to narrate The Cowboy Story picture sequence which seemed somewhat easier than the fairytale as the pictures could aid in word retrieval.

Following use of Sentence Shaper, Eileen stated that during conversation, Nicole had been saying unaided some parts of the messages she had recorded. In light of this development, I asked Nicole to tell me about her trip to Mexico which had been the topic of a Sentence Shaper message recorded earlier. This added an additional narrative sample to the data set.
3.4.2 Interviews, Conversations, and Sentence Shaper Messages

Both initial interviews with Nicole and Eileen and the final interview with Nicole were audio-taped and transcribed orthographically for further analysis. Eileen preferred not to have her final interview audio-recorded; therefore field notes were taken instead. In addition, a selection of conversations from the audio-recordings of each session was transcribed for further analysis. When possible, Eileen's comments were written down verbatim. A summary of the transcribed conversations are provided in Table 3.3; interviews are listed in the summary of data collection in Appendix E. From this point, quotations from interviews will be coded as “I” and conversations as “C” with the appropriate line numbers. Direct quotes from participants and specific examples recorded in fieldnotes will be identified by FN, the date they were written, and the line number. Sentence Shaper messages Nicole created are labeled with SS and the date they were recorded.

Table 3.2 Summary of Transcribed Conversations

<table>
<thead>
<tr>
<th>Date</th>
<th>Code</th>
<th>Participants</th>
<th>Setting</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr. 11</td>
<td>C1</td>
<td>Nicole, Eileen, and Erin</td>
<td>Eileen's TV room</td>
<td>0:40</td>
</tr>
<tr>
<td>Apr. 14</td>
<td>C2</td>
<td>Nicole, Eileen, and Erin</td>
<td>Eileen's TV room</td>
<td>3:29</td>
</tr>
<tr>
<td>Apr. 21</td>
<td>C3</td>
<td>Nicole and Erin</td>
<td>Eileen's TV room</td>
<td>3:00</td>
</tr>
<tr>
<td>Apr. 25</td>
<td>C5</td>
<td>Nicole and Erin</td>
<td>Eileen's TV room</td>
<td>2:20</td>
</tr>
<tr>
<td>Apr. 25</td>
<td>C6</td>
<td>Nicole and Erin</td>
<td>Eileen's TV room</td>
<td>1:58</td>
</tr>
<tr>
<td>Apr. 28</td>
<td>C7</td>
<td>Nicole, Eileen, and Erin</td>
<td>Eileen's TV room</td>
<td>0:33</td>
</tr>
<tr>
<td>Apr. 28</td>
<td>C8</td>
<td>Nicole and Erin</td>
<td>Eileen's TV room</td>
<td>1:14</td>
</tr>
<tr>
<td>May 2</td>
<td>C9</td>
<td>Nicole and Shelley</td>
<td>Eileen’s TV room</td>
<td>1:09</td>
</tr>
<tr>
<td>May 2</td>
<td>C10</td>
<td>Nicole, Eileen, Shelley</td>
<td>Eileen’s TV room</td>
<td>2:25</td>
</tr>
<tr>
<td>May 18</td>
<td>C11</td>
<td>Nicole and Erin</td>
<td>Eileen’s TV room</td>
<td>2:01</td>
</tr>
<tr>
<td>June 2</td>
<td>C12</td>
<td>Nicole and Erin</td>
<td>Eileen’s TV room</td>
<td>0:40</td>
</tr>
<tr>
<td>June 6</td>
<td>C13</td>
<td>Nicole and Erin</td>
<td>Eileen’s TV room</td>
<td>1:36</td>
</tr>
<tr>
<td>June 9</td>
<td>C14</td>
<td>Nicole, Mira, and Erin</td>
<td>Eileen’s TV room</td>
<td>1:24</td>
</tr>
<tr>
<td>June 20</td>
<td>C15</td>
<td>Nicole and Erin</td>
<td>Eileen’s kitchen</td>
<td>1:22</td>
</tr>
<tr>
<td>June 22</td>
<td>C16</td>
<td>Nicole and Erin</td>
<td>Eileen’s kitchen</td>
<td>1:36</td>
</tr>
<tr>
<td>June 29</td>
<td>C17</td>
<td>Nicole making Sentence Shaper message</td>
<td>Eileen’s TV room</td>
<td></td>
</tr>
</tbody>
</table>
I had the opportunity to observe Nicole working with Shelley, one of her volunteers. This created a group situation in conversation nine and provided an excellent example of Nicole’s interactional style in those contexts. The majority of the conversations took place in Eileen’s TV room as this is where Nicole kept her laptop. In Appendix F, a description of the Sentence Shaper messages Nicole chose to share with me is provided.

3.5 Challenges of Communicating with Nicole

Although a key component of this study was to understand the perspectives of the participants, several challenges arose in my interactions with Nicole. Her limited verbal output made it difficult for her to express her opinions and perspectives as clearly as she probably would have liked. Furthermore, her comprehension deficit often made it difficult for her to understand the questions I was asking, even with simplification. Initially, I attempted to ask open-ended questions, but these were often too difficult for her to understand and answer. If I did not have success with an open-ended question, I often resorted to a yes/no question. However, I was aware that this created leading questions. In this way, I gained a somewhat limited picture of Nicole’s perspectives as her responses focused on issues I had deemed important, and not necessarily on issues that were important to Nicole. This situation is illustrated in the following exchange:

Excerpt 3.1

11. E: When when talking to people like what are some challenges or
12. N: some hard things that you
13. N: Hard things
14. N: Hard things um um um um um arms arms and leg leg and leg
15. N: um arms I mean um um moving moving moving
16. E: Okay
Furthermore, a strategy Nicole used in conversations was to have the conversation partner expand on her one or two word utterances. This strategy often requires the conversation partner to guess at the gist of the message and then the individual with aphasia either confirms or disconfirms the interpretation. While this was a strategy I often used with Nicole, once again it often created a leading situation. My elaborations were also problematic in that I was often unclear whether Nicole had understood my message.

In getting to know Nicole over the course of four months, I learned important information about her perspectives and life which helped me in analyzing the transcripts. In many cases, without this background information, I would have been at a loss in trying to interpret her meaning. For example, in the initial interview, I wanted to find out which situations were more difficult for Nicole’s communication. This example demonstrates
how easy it was for communication to break down, and in this case a repair was not possible:

Excerpt 3.2

146. E: Okay and .. you told me some the .. things you like to do like you
147. like going to the stroke group..
148. N: Stro stroke group uh what
149. E: Stroke group
150. N: Yeah
151. E: Like the Vancouver stroke group
152. N: Vancouver stroke group yeah yeah
153. E: So is that .. a a place that you is easy for you to talk
154. N: Yes yes yes okay yes yes okay uh uh stroke group yeah yeah uh uh
155. yes uh yes yeah
156. E: So are there places that you go to or things that you do
157. N: Yeah
158. E: Like in the week
159. N: In the week yeah
160. E: That you find like more difficult
161. N: Difficult yeah yeah I mean um diffic I mean um difficult uh uh I
162. mean I mean uh uh okay I mean um um um speak with uh uh
163. uh speak with uh uh me and uh me and uh uh and uh uh Eric no no
164. I mean I mean uh uh uh Allison Allison uh
165. E: Um hmm
166. N: I mean uh uh Allison yeah?
167. E: She’s one of the volunteers?
168. N: Volunteers yeah volunteer yeah and then uh uh bin bingo bingo
169. names oh I mean um names yeah yeah
170. E: Um hmm
171. N: And then I mean um um um um um ho ho hockey hockey
172. um um yeah hockey yeah no no
173. E: What’s with hockey? So is that hard
174. N: Hard
175. E: Something hard to talk about or
176. N: Um yes yes yeah
177. E: When do you like to talk about hockey like ...at at at bingo or at at
178. the stroke group
179. N: Stroke group I mean uh uh .. uh um .. like I mean um games games
180. games
181. E: Uh mm
182. N: Yeah
183. E: Okay
184. N: Games uh games uh um um um lunch lunch uh I don’t know
Okay so I think maybe we're talking about two different things right now.

Later I found out that Nicole plays hockey and bingo and has lunch at the stroke group. This knowledge gave me a better understanding of what Nicole was trying to communicate to me in this passage. She was clearly not answering the question I had asked about difficult communication situations, but was rather telling me about the activities she does at the stroke group.
Chapter Four: Results

4.1 Use of Sentence Shaper: Overview

Nicole was introduced to Sentence Shaper with a five-hour training phase. After this period, she demonstrated the ability to use the program independently to produce messages, although she often chose to work with others. These messages were made on topics of Nicole’s choice with some input from Eileen and me. Nicole was also able to independently use the side buttons and word finder to aid in message production. Throughout the study, Nicole and I worked together to customize the lexical support available in Sentence Shaper to better suit her needs. Over the course of the four months, Nicole spent a total of 35.75 hours creating Sentence Shaper messages. Of this time, she worked independently for only 8.75 hours and the remainder was spent creating messages with Eileen or me. In comparison, the participants in Linebarger et al. (2004) were reported to have practiced using Sentence Shaper independently for approximately one-hour per day. Overall, Nicole practiced less than the other participants and typically used the program with help from other people.

4.2 Component One

The first component of the study investigated whether a change in the narrative abilities of the participant with aphasia occurred following extended use of Sentence Shaper. In relation to the ICF framework, the results of component 1 reflect changes to the impairment and activity levels of functioning and disability. Structural analysis of the narrative samples was completed using the Quantitative Production Analysis (Saffran et
al., 1989). The narratives were further analyzed for content using the Correct Information Units (CIU) analysis (Nicholas & Brookshire, 1993). An additional content and story structure analysis was completed on *The Cowboy Story* using the methodology described by Joanette & Goulet (1990). The results for these analyses for both the pre- and post-treatment unaided narratives and aided narratives will be presented. All narratives are provided in Appendix G.

4.2.1 Quantitative Production Analysis

4.2.1.1 Preparation of the data.

Before an analysis of the language structure within the narrative samples was carried out, a second rater and I independently identified the utterances to be analyzed in each sample. Results were compared and any discrepancies were reviewed and resolved by the two raters. In the QPA procedures, Saffran et al. state that all repetitions should be eliminated from the sample prior to analysis. However, the nature of the narrative task in this study made such a procedure problematic because each story contains repeated elements and because Nicole used repetition as a strategy for putting sentences together. It was often difficult to determine whether an utterance was a repetition of old information or an attempt to describe the repeated parts of the story. For example, in *The Cowboy Story*, it was possible that Nicole repeated “the dog is switching” because in multiple pictures, the dog (small horse) is still being switched by the boy for the cowboy’s horse. In this case, multiple repetitions of “the dog is switching” were included. If on the other hand, it appeared Nicole was still talking about the same picture, the repetitious utterances were not included. Therefore, if an argument could be made
that a repeated utterance was actually referring to a later part of the story, the utterance was included in the analysis. However, if it was determined that the repeated utterance appeared to be a retelling of what was previously said as a strategy for constructing sentences, it was eliminated from the analysis. Once utterances were agreed upon by both raters, an independent QPA was done by the first rater of the entire narrative sample and more than 15% of the sample was analyzed by a second rater. Following a comparison of the analyzed samples, inter-rater reliability of the QPA was demonstrated to be between 0.9 and 1.0.

4.2.1.2 QPA analysis of unaided narratives.

Selections from the unaided narrative samples that characterize the productions are given in Table 4.1. Full narratives are given in Appendix G. Results of the QPA for The Three Little Pigs and The Cowboy Story narratives are presented in Table 4.2, including the results from Linebarger et al.'s participants for comparison. Following use of Sentence Shaper, Nicole demonstrated improvement in her morphosyntactic ability in several areas. Increases in median utterance length and mean sentence length were found for both narratives. There was a striking increase in production of sentences with Nicole demonstrating an increase greater than 80% in sentence production for both post-treatment narratives. This increase in the proportion of sentences is partially related to the large improvement in verb usage. Furthermore, the proportion of sentences which were well-formed was also seen to increase following use of Sentence Shaper. Morphological errors, such as improper verb inflection (i.e. blowed) and omission of determiners, and other errors, such as verb-argument violations, were found to be the main causes of
ungrammatical sentences. However, in spite of these errors, verb inflection and use of determiners also showed notable improvements in both narrative tasks. In comparison, the participants in Linebarger et al. also demonstrated morphosyntactic improvements in their narratives; however, S1 demonstrated only minimal gains compared to S2. Furthermore, unlike Nicole, not all morphosyntactic measures showed improvement for S1 and S2’s narratives. For S2, significant gains in structural measures were reported; however, the majority of morphological measures remained unchanged. In contrast, both the structural and morphological QPA measures of Nicole’s narratives showed substantial increases.

Table 4.1 Excerpts from *The Three Little Pigs* pre and post narratives. Underlined portions are those words included in the QPA.

<table>
<thead>
<tr>
<th>Pre-treatment</th>
<th>Post-treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Okay um .. um .. [hh] yeah yeah? yeah [hh] and then oh I mean um .. um um um um pig uh pigs pigs um um pigs um um blow uh uh blow blow them blow them yeah yeah and yeah and then and then I mean uh two people two people and oh um [hh] [heh-heh] um yeah I mean um um ... glass no I don’t know I mean I mean um I mean .. uh I don’t know ( ) no yeah and then I mean uh um ho [hh] and then um um .. um um uh ( ) um um uh three ( ) three and and um um three um um um three and um um three and um um brick brick = =</td>
<td>Um and the wolf .. blew the okay the wolf blewed uh uh blew the hay .. the wolf blew th ( ) uh uh the okay the wolf um um um the wolf um is .. no okay the wolf blew um um hay .. stop And um um um uh the wolf okay the pigs the pig the pig um um ran ran um ran away ran away Okay the um uh the uh okay okay the wolf um um blow .. uh the stick ... and and um and um um um three no one one two uh three no one one two uh three no one two two pigs uh uh away uh uh okay the okay wait the wolf .. the uh the uh pigs pigs uh uh ran out ran out</td>
</tr>
</tbody>
</table>

(Pigs1: 43-49) (Pigs2: 11-21)
Table 4.2 QPA analysis results for Nicole’s unaided narrative samples pre/post use of Sentence Shaper.

<table>
<thead>
<tr>
<th></th>
<th>The Three Little Pigs</th>
<th>The Cowboy Story</th>
<th>Linebarger et al. (2004) subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Structural</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median length of utterance</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Mean sentence length</td>
<td>0</td>
<td>4.13</td>
<td>3.0</td>
</tr>
<tr>
<td>Prop. of utterances that are sentences</td>
<td>0</td>
<td>.80</td>
<td>.05</td>
</tr>
<tr>
<td>Prop. of words in sentences</td>
<td>0</td>
<td>.85</td>
<td>.08</td>
</tr>
<tr>
<td>Number of verbs</td>
<td>1</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Morphological</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prop. of narrative words that are closed class</td>
<td>0.07</td>
<td>.38</td>
<td>.28</td>
</tr>
<tr>
<td>Prop. of sentences that are well-formed</td>
<td>0</td>
<td>.75</td>
<td>0</td>
</tr>
<tr>
<td>Prop. of verbs that are inflected</td>
<td>0</td>
<td>.33</td>
<td>.50</td>
</tr>
<tr>
<td>Prop. of determiners used in obligatory contexts</td>
<td>0</td>
<td>.90</td>
<td>.19</td>
</tr>
</tbody>
</table>
4.2.1.3 QPA analysis of aided narratives.

At the end of the study, Nicole was asked to create narratives about *The Three Little Pigs* and *The Cowboy Story* using Sentence Shaper. The QPA results are presented in Table 4.3. The Sentence Shaper messages are presented in Table 4.4.

Table 4.3 QPA analysis results for aided narrative samples following use of Sentence Shaper.

<table>
<thead>
<tr>
<th></th>
<th>The Three Little Pigs</th>
<th></th>
<th>The Cowboy Story</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unaided</td>
<td>Aided</td>
<td>Unaided</td>
</tr>
<tr>
<td><strong>Structural</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median length of utterance</td>
<td>4</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Mean sentence length</td>
<td>4.13</td>
<td>6.25</td>
<td>4.35</td>
</tr>
<tr>
<td>Prop. of utterances that are sentences</td>
<td>.80</td>
<td>1.00</td>
<td>.89</td>
</tr>
<tr>
<td>Prop. of words in sentences</td>
<td>.85</td>
<td>1.00</td>
<td>.95</td>
</tr>
<tr>
<td><strong>Morphological</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prop. of narrative words that are closed class</td>
<td>.38</td>
<td>.40</td>
<td>.50</td>
</tr>
<tr>
<td>Prop. of sentences that are well-formed</td>
<td>1.0</td>
<td>1.0</td>
<td>.65</td>
</tr>
<tr>
<td>Prop. of verbs that are inflected</td>
<td>.33</td>
<td>1.0</td>
<td>.93</td>
</tr>
<tr>
<td>Prop. of determiners used in obligatory contexts</td>
<td>.90</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Table 4.4 Sentence Shaper Narratives

<table>
<thead>
<tr>
<th>The Three Little Pigs</th>
<th>The Cowboy Story</th>
</tr>
</thead>
<tbody>
<tr>
<td>The wolf tried to blow hay. The pig ran. The wolf tried to blow sticks of the pigs. The wolf tried to blow the house.</td>
<td>The man is riding on the horse. The man is yawning. She is sleeping. The boy is switching around. The horse is moving around. The dog tried switching next by the dog. The boy is leaving. The cowboy switch the dog. The horse is leaving.</td>
</tr>
<tr>
<td>(SS06/26)</td>
<td>(SS06/29)</td>
</tr>
</tbody>
</table>
A comparison of *The Three Little Pigs* narratives in the aided and final unaided conditions reveals several interesting findings. The aided narrative had far fewer utterances (4), than the unaided (10); however, the proportion of words in sentences was higher (1.0) in the aided versus the unaided condition (.85). Despite the fact that Nicole had access to the side buttons and word finder when producing the aided narratives, *The Three Little Pigs* aided narrative was more morphosyntactically complex on several but not all measures compared to the unaided narrative. The aided narrative was found to have a greater inflection index and elaboration of verb phrases, a larger mean sentence length, and a greater proportion of utterances that are sentences and words in sentences than the unaided narrative.

*The Cowboy Story* final unaided and aided narratives showed a similar pattern to *The Three Little Pigs* narratives in that the unaided version was much longer (19 utterances), than the aided version (9 utterances). In contrast to *The Three Little Pigs* narratives, however, *The Cowboy Story* narratives were more comparable in terms of morphosyntactic complexity.

### 4.2.2 Correct Information Unit Analysis

#### 4.2.2.1 CIU analysis of unaided narratives.

The CIU analysis was completed to investigate any changes in the informativeness of the narratives and the efficiency with which this information was communicated by the participant with aphasia (Nicholas & Brookshire, 1993). Again, inter-rater reliability measures were completed and agreement was found to be 100%.
Results of the CIU analysis are presented in Table 4.5. Again, Linebarger et al.'s results are included for comparison.

With *The Three Little Pigs* narrative, Nicole demonstrated an improvement in the proportion of CIUs to overall words and in efficiency of production of CIUs. For both, measures tripled from the pre- to post-treatment narratives. In contrast, similar improvement was not found in *The Cowboy Story* narratives, with pre and post measures remaining relatively unchanged. In comparison to the Linebarger et al. participants, both S1 and S2 demonstrated a higher proportion of words that are CIUs than Nicole in both the pre- and post-treatment narratives. Again, S1 showed minimal improvement, while S2 demonstrated a significant increase in proportion of words that are CIUs.

<table>
<thead>
<tr>
<th></th>
<th>Nicole</th>
<th>Linebarger et al. (2004) participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td><strong>The Three Little Pigs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total time of narrative</td>
<td>3:10</td>
<td>3:57</td>
</tr>
<tr>
<td>Number of words</td>
<td>186</td>
<td>172</td>
</tr>
<tr>
<td>Number of CIUs</td>
<td>13</td>
<td>39</td>
</tr>
<tr>
<td>Prop. of words that are CIUs</td>
<td>.07</td>
<td>.22</td>
</tr>
<tr>
<td>CIUs/minute</td>
<td>3.47</td>
<td>9.87</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>The Cowboy Story</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total time of narrative</td>
<td>4:35</td>
<td>9:05</td>
</tr>
<tr>
<td>Number of words</td>
<td>180</td>
<td>388</td>
</tr>
<tr>
<td>Number of CIUs</td>
<td>29</td>
<td>69</td>
</tr>
<tr>
<td>Prop. of words that are CIUs</td>
<td>.16</td>
<td>.15</td>
</tr>
<tr>
<td>CIUs/minute</td>
<td>6.33</td>
<td>7.04</td>
</tr>
</tbody>
</table>

Table 4.5 CIU analysis results for Nicole's unaided narrative samples pre/post use of Sentence Shaper. Results presented Linebarger et al. (2004) are provided for comparison.
4.2.2.2 CIU analysis of aided narratives.

The results of the CIU analysis of the aided narratives are provided in Table 4.6.

Table 4.6 CIU analysis results for Nicole’s aided narrative samples. The time required to create the narratives is also included.

<table>
<thead>
<tr>
<th></th>
<th>The Three Little Pigs</th>
<th>The Cowboy Story</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total time to create narrative</td>
<td>40 minutes</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Total time of narrative</td>
<td>0:43</td>
<td>1:47</td>
</tr>
<tr>
<td>Number of words</td>
<td>25</td>
<td>45</td>
</tr>
<tr>
<td>Number of CIUs</td>
<td>25</td>
<td>33</td>
</tr>
<tr>
<td>Prop. of words that are CIUs</td>
<td>1.0</td>
<td>.84</td>
</tr>
<tr>
<td>CIUs/minute</td>
<td>34.72</td>
<td>21.35</td>
</tr>
</tbody>
</table>

One of the benefits of Sentence Shaper is that it gives the user the opportunity to revise his or her utterances. In Nicole’s case, it allowed her to eliminate the filler words and repetitions from her utterances which resulted in the higher CIU proportions in the aided narratives; however, as indicated by the time required to create the narratives, this was a lengthy process for Nicole.

4.2.3 Analysis of Story Schema and Informative Content in The Cowboy Story Unaided and Aided Narratives

Using the methodology described by Joanette and Goulet (1990), the story schema and informative content of Nicole’s Cowboy Story narratives were analyzed. In the story schema analysis, the narrative was examined to determine whether each of the main components, (i.e. the setting, the complication, and the resolution) were included. In all versions of Nicole’s Cowboy Story, she mentions a dog when referring to the toy horse. Clearly, she mistook the toy horse for a small dog when looking at the pictures. As this error was the result of a misperception and not a language error, mention of the dog
in her narratives was not coded as incorrect. Table 4.7 presents the percentage of core propositions mentioned for the setting, complication, and resolution in each unaided and aided narrative.

Table 4.7 The percentage of core propositions found in the setting, complication, and resolution of *The Cowboy Story* unaided and aided narratives.

<table>
<thead>
<tr>
<th>Story Component</th>
<th>Unaided Pre</th>
<th>Unaided Post</th>
<th>Aided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting (n = 10)</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Complication (n = 18)</td>
<td>5</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Resolution (n = 4)</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total (n = 32)</td>
<td>8</td>
<td>8</td>
<td>7</td>
</tr>
</tbody>
</table>

The utterances defined for the QPA were used in comparison to the core propositions developed by Joanette and Goulet. There was no change in the total percentage of core propositions mentioned between the pre- and post-treatment unaided narratives. A slight difference occurred in the setting and complication in the post-treatment unaided narrative in which Nicole was able to add additional information to the setting, but failed to include one of the complication concepts described in the pre-treatment narrative. In both unaided narratives a total of only 25 percent of the expected content was mentioned. Even though her utterances were much more grammatically complex, the amount of informative content included in the narrative remained stable.

With regard to the post-treatment unaided and aided narrative there was no change in the amount of informative content included. In some respects, the aided narrative appears more impoverished than the unaided ones. For instance, in her aided
narrative, Nicole failed to discuss the resolution of the story even though she was able to describe parts of the resolution in her unaided versions. Overall, Nicole’s unaided and aided narratives include the three main components of the story; however, her description of those components is only partially complete and much of the information expected to be included in the narrative is missing.

4.2.4 Listeners’ Perceptions

The findings of component one had contrasting results in that the QPA measures indicated a substantial improvement, whereas for one narrative (The Cowboy Story), the CIU measures remained relatively unchanged. It was evident from the CIU analysis of the unaided Cowboy Story narratives that although there was an increase in the number of CIUs, there was also a corresponding increase in filler words which resulted in a similar proportion of CIUs in the pre- and post-treatment narratives. In addition, it was apparent that the narratives produced by Nicole with the aid of Sentence Shaper did not have a more complex story structure than the post-treatment unaided narratives. In fact when The Three Little Pigs and The Cowboy Story final unaided and aided narratives are compared, more aspects of the story are mentioned in the unaided compared to the aided versions.

These findings prompted an additional investigation involving listeners’ perceptions of the pre- and post-treatment unaided narratives and the post-treatment unaided and aided narratives. These perceptions were obtained to help determine which differences, if any, between the pre- and post-treatment unaided narratives are meaningful for listeners. In addition, the comparison of the unaided and aided narrative
allowed for the effect of Nicole’s filler words on the narratives to be examined. Four peer
group listeners (i.e., female and similar in age to Nicole, but with no experience of
aphasia) and four speech-language pathologists were asked to make two judgments. First,
they were asked to listen to The Three Little Pigs and The Cowboy Story pre- and post-
unaided narratives and give their perceptions as to which story they perceived as better.
Listeners had the option of rating the narratives as the same if neither narrative was
deemed to be better. The presentation of narratives was counterbalanced to rule out order
effects. In the second judgment task, listeners were asked to compare The Three Little
Pigs and The Cowboy Story post-unaided narratives to the aided narratives. It was
explained to listeners, prior to the second judgment task, that the delivery of the aided
narrative was clearly superior to the unaided, but that the question they were meant to
answer was still which narrative was a better story. Perspectives from the two groups
(i.e., the peer group and the speech-language pathologists) were obtained as it was
possible that due to their training, speech-language pathologists may have listened for
different aspects of the narratives compared to the peer group.

4.2.4.1 Perceptions of pre- and post-treatment narratives.

Table 4.8 presents the listeners’ perceptions of The Three Little Pigs and The
Cowboy Story unaided narratives.
Table 4.8 Listeners’ perceptions of *The Three Little Pigs* and *The Cowboy Story* unaided narratives.

<table>
<thead>
<tr>
<th>Listeners</th>
<th>Pre-treatment is better</th>
<th>Post-treatment is better</th>
<th>Narratives are the same.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>The Three Little Pigs</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speech-language pathologists</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Peer group</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>The Cowboy Story</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speech-language pathologists</td>
<td>25%</td>
<td>50%</td>
<td>25%</td>
</tr>
<tr>
<td>Peer group</td>
<td>50%</td>
<td>50%</td>
<td>0%</td>
</tr>
</tbody>
</table>

It is clear that both the speech-language pathologists and peer group listeners perceived a difference between *The Three Little Pigs* pre-treatment and post-treatment unaided narratives with all listeners rating the post-treatment narrative as better. One peer group listener reported that the post-treatment narrative was “significantly better” and another listener stated that the ideas were clearer and that the story was narrated with more confidence. The peer group listeners also mentioned that the post-treatment narrative had more complete sentences. The speech-language pathologists made reference to the increase in content words, the decrease in filler words, the increased grammatical complexity, and the more complete sentence structure in the post-treatment narrative.

In contrast to the listeners’ perceptions of *The Three Little Pigs*, the same level of agreement did not occur for their perceptions of *The Cowboy Story*. In general, most listeners reported experiencing more difficulty rating *The Cowboy Story* narratives.
compared to *The Three Little Pigs* narratives. One peer group listener noted that even though the sentence structure was more complex in the post-treatment narrative, the pre-treatment narrative was easier to follow and better in terms of conveying the ideas. Another peer group listener commented that the conclusion in the pre-treatment version was better stating that Nicole conveyed the cowboy’s surprise in the pre- but not the post-treatment narrative. In contrast, one peer group listener stated that even though more patience was required to listen to the post-treatment narrative, it was better in that Nicole had a larger vocabulary and used more complex language. One of the speech-language pathologists also commented on difficulty listening to the post-treatment narrative because of its length, but still found that version to be better as more content was communicated. She mentioned that the pre-treatment narrative seemed more efficient, but that without the pictures it would have been more difficult to understand the story in the pre-treatment versus the post-treatment version. The one speech-language pathologist who rated the narratives as the same reported that even though the post-treatment narrative had more complete sentence structure, it did not add more information than the pre-treatment narrative. Another speech-language pathologist commented on the speaker’s effort involved in producing the more complex sentence structure found in the post-treatment narrative and suggested that this may not be the most efficient way of communicating in conversation for Nicole.

4.2.4.1 Perceptions of post-treatment unaided and aided narratives.

Table 4.9 displays the results of the listeners’ perceptions of *The Three Little Pigs* and *The Cowboy Story* post-treatment unaided versus aided narratives.
Table 4.9 Listeners' perceptions of *The Three Little Pigs* and *The Cowboy Story* post-treatment unaided narrative versus the aided narrative.

<table>
<thead>
<tr>
<th>Listeners</th>
<th>Unaided is better</th>
<th>Aided is better</th>
<th>Narratives are the same</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Three Little Pigs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speech-language pathologists</td>
<td>75%</td>
<td>0%</td>
<td>25%</td>
</tr>
<tr>
<td>Peer group</td>
<td>75%</td>
<td>25%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>The Cowboy Story</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speech-language pathologists</td>
<td>25%</td>
<td>50%</td>
<td>25%</td>
</tr>
<tr>
<td>Peer group</td>
<td>25%</td>
<td>75%</td>
<td>0%</td>
</tr>
</tbody>
</table>

In comparing *The Three Little Pigs* post-treatment unaided narrative to the aided narrative, the majority of listeners rated the unaided version as better. In general, the peer group listeners reported that the unaided version had more information (i.e. discussed the three types of houses), although one listener commented that the aided version was easier to understand. The speech-language pathologists also reported that the unaided narrative conveyed more of the events of the story and one remarked that the sequence of events was clearer in the unaided narrative. The one peer group listener who rated the aided narrative as better reported that the aided narrative was clearer, whereas the unaided version was so long that she forgot parts of the story. Similarly, the speech-language pathologist who considered the two narratives to be the same also commented on the length of the unaided narrative and said that it was difficult to listen to the unaided version.
In *The Cowboy Story* comparison, the majority of peer group listeners preferred the aided version stating that it was easier to follow; however, one listener found that even though it was harder to listen to the unaided version, it described the events more thoroughly and thus, was a better story. The one speech-language pathologist who rated the unaided version as better stated that although it was easier to listen to the aided version, the content was less clear and parts of the narrative were incorrect (i.e. “the cowboy switched the dog”). One listener judged that the unaided version was better as the “punch-line” was conveyed, but she reported that this decision was difficult as there were many other aspects of the unaided version which made it much worse than the aided narrative. The speech-language pathologists who rated the aided version as better reported that it was more coherent, sequentially easier to follow, and put much less stress on the listener. One speech-language pathologist rated the narratives as the same because she stated that the unaided version had more content, but the narrative was so long, that it was difficult to remember what had been said. She found the aided version to be easier to listen to, but stated that it contained less information.

Overall, the many listeners commented on the effort involved in listening to Nicole’s unaided narratives, and in some instances, this impacted listeners’ perceptions of the narratives. However, the majority of listeners were able to focus on the narratives and make their decisions based on the information conveyed in each narrative.

### 4.2 Component Two

In the second component of the study, the possible uses of Sentence Shaper in everyday life were explored through four months of participant observation with Nicole
and Eileen. In this section, the findings which emerged from the analysis of fieldnotes, interviews, conversations, and questionnaires are presented. First, a description of the ways in which Sentence Shaper was used is given, differentiating between uses I suggested versus those generated by Nicole and Eileen. Following this, an interpretation of the reasons for these differences are presented, including a description of the communicative environment in which Sentence Shaper was used and the themes and patterns which emerged from the hours of observation within this environment. Finally, the outcomes of the study are described with regard to the QCL and CETI questionnaires and Nicole and Eileen’s ideas for future use of Sentence Shaper.

4.2.1 Participation Opportunities: Uses of Sentence Shaper in Everyday Life

This study was motivated by the question of how Sentence Shaper could be expanded beyond its initial conceptualization as a language therapy tool to a device able to augment everyday communication. At the beginning of the study, I envisioned two potential uses. First, the use of Sentence Shaper messages for e-mail was a possibility as the messages can be sent as sound files attachments in an e-mail. This is an attractive alternative as many individuals with aphasia experience difficulty writing. A second potential use for Sentence Shaper was in conversation, although it was difficult to predict how such a device, which is offline, could be used in an on-line conversation. However, I anticipated that while the program would not be appropriate for all forms of conversation, it could be used to generate messages that a participant with aphasia might want to share with many people. Use of Sentence Shaper in these ways moves beyond impairment and activity level intervention and has the potential to promote participation in social
contexts, thus addressing the level of participation within the ICF framework. The following sections present an overview of the training phase and Nicole’s eventual uses of Sentence Shaper.

4.2.1.1 The training phase.

The augmentative communication goals helped shape the structure of the study and were explained clearly to the participants at the onset of and throughout the study. However, before these ideas for Sentence Shaper could be explored, a training phase was needed to introduce the program to Nicole. Initially, Nicole made messages using Sentence Shaper about events that she had recorded in a scrapbook. Her scrapbook, developed as part of an earlier speech therapy program, contained photos of the event with a written description of what had occurred. From the beginning, Nicole was encouraged to use the Sentence Shaper side buttons when creating her messages. When cued to use the side buttons, she was often successful in narrowing her search to one or two possibilities. An example was noted in our first session with Sentence Shaper, when I cued her to listen to the side buttons; she was able to narrow her choice down to ‘from’ and ‘with’ and after saying the sentence for her using the two prepositions, she was able to choose the correct preposition. During the training period, I noticed that Nicole was tempted to read the entries she had written in her scrapbook and record those sentences while using Sentence Shaper. I encouraged her to refrain from doing this as I explained that she would not always have written material with which to make messages. However, despite my requests, Nicole continued to use the written material to make messages as I noticed that many of the sentences in her messages were ones she had written in her
scrapbook. This prompted me to suggest that she use Sentence Shaper to tell me about things she had done on the weekend. This step was beneficial as it encouraged Nicole to generate messages without relying on written material. The word finder was also introduced to Nicole. She showed immediate interest in the word finder and spontaneously began listening to all the words and repeating them.

4.2.1.2 Nicole’s strategies for creating Sentence Shaper messages.

When making messages with Sentence Shaper, Nicole’s strategy was to repeat and expand the utterance until it reached a level of complexity that satisfied her. Instead of using the Sentence Shaper desktop as a work area, she tended to use that space as a prompt. For instance, she often recorded parts of the sentence and listened to those recordings to help her say the whole sentence at once. This situation is illustrated in the following excerpt:

Excerpt 4.1

1. N: The man the okay okay the horse (RECORD ON) the horse .. is uh
2. .. uh a uh a go a go (RECORD OFF) no no okay okay uh the uh
3. horse is um walking wu wu okay the horse is the horse is um the
4. horse is .. the horse is um going (RECORD ON) the horse is going
5. (RECORD OFF) the horse is
6. Sentence Shaper: THE HORSE IS GOING <7>
7. Sentence Shaper: THE HORSE IS GOING ...
8. Sentence Shaper: THE HORSE IS GOING
9. N: The horse is the horse is leaving (RECORD ON) the horse is going
10. (RECORD OFF) no no okay the horse
11. Sentence Shaper: THE HORSE IS GOING
12. Sentence Shaper: THE HORSE IS GOING
13. N: The horse is leaving (RECORD ON) the horse is leaving
14. (RECORD OFF)
15. Sentence Shaper: THE HORSE IS LEAVING

(C17: 1-15)
This strategy was interesting as it differed from the way in which the designers of Sentence Shaper had predicted individuals with aphasia would use the program. Instead of recording each word or few words of the sentence and arranging those words in the sentence shaping area, Nicole used an internal workspace to expand her utterances and with each attempt was often able to increase the length and complexity. She then recorded the entire sentence when she was satisfied with her production. When a sentence involved difficult words, I often suggested that she split the sentence in two and record each part. However, when possible, Nicole tended to record one sentence per icon and arranged those icons in the sentence shaping area. Therefore, one narrative button could contain several sentences.

A similar strategy of repetition and expansion was observed for Nicole’s final unaided narratives. Excerpt 4.2 demonstrates how she was able to achieve a target sentence incorporating the strategy she used when making messages with Sentence Shaper.

**Excerpt 4.2**

Okay um pigs um okay um .. mm .. mm .. um .. pi uh there is uh no there is there is um .. uh uh there is .. there is um .. okay um there is .. there is uh .. there is three pigs

(Pigs2: 7-9)

In this example, Nicole had several attempts before she was able to say “there is three pigs”.

**4.2.1.3 Use of Sentence Shaper with e-mail.**

Once Nicole had spent several hours (6.5 hours) practicing using Sentence Shaper, I decided to introduce the possibility of using Sentence Shaper with e-mail. In the
first e-mail, Eileen and I supported Nicole by helping her with the parts of an e-mail (i.e. introduction and closing) and with generating ideas for the e-mail. Following this, Nicole sent a number of e-mails to family members, volunteers, and friends. Initial feedback for Nicole’s e-mails was very positive. For instance, Mira, a former volunteer who had worked with Nicole, wrote in an e-mail “Nicole it was nice to hear your voice” (FN04/14: 8-9), and one of Nicole’s family members wrote “We just listened to your homework and loved it” (FN04/21: 19). It was apparent that Eileen was pleased with this feedback when she shared that the family was very impressed with the e-mails Nicole had been sending them. She reported that hearing Nicole’s voice was quite emotional for one family member, saying that he had phoned Eric to say how much he liked the e-mail and had started crying. Nicole also responded positively to the e-mails she was sending. After we had sent one e-mail message, Nicole repeated some of the message she had just sent and then said “nice...whole sentence”. When asked if she liked sending the e-mail, she said “yes” (FN04/18: 54-56).

4.2.1.4 Use of Sentence Shaper messages in conversation.

The next step was to encourage Nicole and Eileen to use Sentence Shaper in conversation. There seemed to be some reluctance on their part to use the program in this way. After my encouragement, Eileen thought of several people with whom Nicole could use Sentence Shaper, explaining to Nicole that she could use it with her volunteers, with people at the stroke group, and even with family members. However, Nicole rarely used the program spontaneously in this way. Part of the problem may have been that she was not sure what to talk about when using Sentence Shaper. For instance, when I suggested
she use Sentence Shaper to share a message with the people at the stroke group, Nicole said “speak speak .. what happens”, answering “yes” when I asked her if knowing what to talk about was a problem (FN04/21: 62-63). However after making a message about her holiday in Mexico, Nicole was motivated to share her Mexico message with others, so we chose this as a good message to share at the stroke group and decided to play the message for Mira as a trial run. From my perspective, this use of Sentence Shaper was quite successful:

Nicole played the Mexico message for everyone and as it was playing she spoke the words aloud as well. People in the group made comments as it was playing and laughed at the funny parts (i.e. the tequila). Nicole was smiling the whole time (FN06/15: 19-23).

4.2.1.5 Sentence Shaper as language therapy.

In contrast to the uses I suggested of Sentence Shaper as an augmentative communication device, many of the ideas Nicole and Eileen generated were related to Nicole’s language therapy. For instance, Nicole used a Sentence Shaper message to help her with a homework exercise she had from the speech-language pathologist at the stroke group. For homework, she was asked to write about her trip to Mexico; she listened to the Sentence Shaper message about her trip and wrote down what she had said. After I had introduced the word finder to Nicole, we made a new category of present-past tense verbs. She seemed very motivated to add to this list and often had new words to add. Nicole also came up with ideas for additions to other categories of words in the word finder:

She went to the word finder and went to the preposition section. She got out her workbook and showed me that the word finder did not have all the prepositions that she had in the workbook.... then Nicole went to the adjective section and
then the colour section and said “pink and then”. She turned to another page in her workbook that had many colours listed (FN06/13: 60-68).

The way that Eileen saw Sentence Shaper being used was as a device to improve Nicole’s unaided speech. For example, not far into the study Eileen wondered if Nicole could practice repeating the messages so that she could say them without Sentence Shaper. She said that she wanted to see how close Nicole could get to those messages. To her, the main goal of working with Sentence Shaper was that she should be able to say the messages again and again without the help of Sentence Shaper.

As described previously, Nicole spent a total of 35.75 hours making messages using Sentence Shaper, of which only 8.75 hours were independent use of the program. Working with other people in my absence was something Nicole spontaneously chose to do from the start. I was cognizant of the fact that the participants in Linebarger et al.’s (2004) study had worked independently, and in partially replicating the design of that study, I thought it was important to stay as close to their method as possible. For this reason, I encouraged Nicole to spend at least part of her practice time recording messages by herself. Despite Eileen telling me that she thought it was better when Nicole worked by herself, she continued to help Nicole with the Sentence Shaper messages throughout the study.

4.2.2 Contextual Factors

In the ICF, contextual factors, which contribute to a person’s functioning and disability, are separated into personal and environmental factors. A description of these factors is necessary as the context in which Sentence Shaper was placed strongly
influenced how it was used. Many of these factors were not apparent at the beginning of the study and only became clear through the course of the study.

4.2.2.1 Personal factors: Nicole as a communicator.

In describing the context into which Sentence Shaper was introduced, an in-depth description of Nicole as a communicator is required. This description expands on the initial communication profile which was based on observation before Sentence Shaper was introduced. In the initial interview with Eileen, she revealed that Nicole often required prompting to aid in word retrieval: “I found that there she can uh she can come up with lots of words if you ask ask the right question” (I2: 48-49). Eileen mentioned that Nicole was more successful when talking about familiar activities. This was apparent in many of the conversations Nicole initiated with me. At most meetings, she repeated the same questions, such as “would you like tea or coffee” (FN03/14: 2) or “how was school” (C11: 1). This suggests that she has more success talking about regular activities with their own scripts (i.e, “a standard sequence of events that describes a situation” as defined by Brown and Yule, 1983). In the final interview, Eileen was asked further about communicating with her daughter. It was apparent that Eileen felt that something was missing from the conversations she held with her daughter. She commented that she and Nicole do not really talk about anything other than Nicole’s needs and wants. In Eileen’s words, it is “not really conversations” (FN06/29: 93-95).

Observing conversations between Nicole and Eileen was an important source of information about Nicole as a communicator. From the beginning of the study, it was clear that Eileen tended to cue her daughter to talk about certain things by asking her
questions and, when this strategy failed, she often spoke for her daughter. However, other strategies were observed as the study progressed. For example, when Nicole said a one word utterance, Eileen sometimes modeled the full sentence for Nicole to imitate. This strategy of helping Nicole expand her utterances was a method that she seemed to like. At one meeting, she asked me if I would like a cookie by pointing to the cookies and saying “cookie”. After this occurred, she asked me how she would say that in a sentence (FN04/14: 80-82). This strategy was also used by the organizers and volunteers at the stroke group. When Nicole was collecting everyone’s nametags she said “name tag please”. One of the volunteers told Nicole to say “pass me your nametag please”, and she was able to say this; however, when she needed help, she would look to me to repeat the phrase (FN06/15: 69-73).

In addition to needing help with production, Nicole required assistance with comprehension. Eileen attempted to compensate for this difficulty by repeating what others had said. For example, when Nicole, Eileen, and I were talking, Eileen often repeated what I had said to make sure Nicole understood. Eileen also used gestures to help her daughter understand. One particular instance occurred when we were discussing which days I should meet with them; Eileen helped Nicole understand what days we were talking about by counting the days with Nicole on their fingers. While I was talking with Nicole, I attempted to help her understand by only saying part of a sentence and waiting for her confirmation that she had understood before continuing with the rest of my message, as illustrated in the following excerpt:

Excerpt 4.3

15. E: We did Father’s Day on Saturday
16. N: Yes yes
Instead of Sunday
Oh yeah yeah yeah
My parents were busy on Sunday
Okay yeah yeah
= = So we went out for breakfast
Oh break oh breakfast yeah yeah yeah
Um .. to .. this restaurant called Havana
Tovana?
Havana
Oh yeah
On Commercial Drive ... on Commercial
Commercial Commercial oh oh
Yup
Oh oh oh

(C15: 15-30)

In this example, Nicole confirmed her understanding by either saying “yeah” or by repeating part of the utterance I said. Another strategy I used was writing down key words for Nicole when we were having a conversation. For example, when Nicole had a question about how Sentence Shaper could be used in conversations, I wrote down the steps she would need to take which helped her understand the process.

My perception of Nicole was of a person with a strong desire for social connection. This was demonstrated in her very social nature, which was observed on a number of occasions, but was particularly evident at the stroke group in the way in which she greeted the members as they arrived and in her involvement in the group activities. Her social nature was also apparent in the way she preferred to work with others, such as her mother and volunteers, on her language therapy activities. However, another important characteristic of Nicole as a communicator was her dependence on her communication partner, in these social situations. Eileen highlighted this issue in the initial interview: “I’m doing more talking than she is ... I’m asking questions and she just has to say yes or no” (I2: 10-12). This comment conveys a sense of the unequal balance
that occurs in conversations with Nicole, in which the conversation partner often has to contribute much more to the interaction and also plays a greater role in controlling the direction of the conversation.

Throughout the study, Nicole was observed using strategies to augment her communication with others. She often used gestures to help when she was having difficulties with word retrieval. For example, she pointed to her computer desktop to indicate that she wanted Sentence Shaper to have a shortcut on the desktop. Another strategy Nicole incorporated into her communication was the use of objects to start conversations. For example, she was able to initiate a conversation about her former job by showing me her old business card. She also used her daytimer to help with word retrieval, as on one occasion, when I asked her about what she had done on the weekend, she used her daytimer as a prompt. In addition, she had a notebook with questions and phrases written in it. Although I never saw her use this spontaneously in conversation, she did use it once when making a message about her partner, Eric, to help say the phrase “Eric and I have been together for a long time” (FN04/28: 56). Nicole also incorporated drawing as a communication strategy three times in my presence. For example, in telling me about a visit her family had made to the graveyard, she mentioned the food they left at someone’s grave and then drew a picture of an incense stick and started blowing. At the stroke group, one of Nicole’s tasks was to call out the numbers for bingo. To facilitate her retrieval of numbers, she had a page with all the numbers written down, and with this she was generally able to say the correct number aloud. She also facilitated her verbal expression of numbers by first writing them down. This strategy was demonstrated several times; in one case, Nicole wrote down the numbers 1 ½ to help her say the
number of years she worked as a loans officer. Clearly, these strategies were an important form of communication for Nicole, and they contributed greatly to my understanding of what she was trying to communicate.

Taken together, this description allowed for a deeper understanding of the context in which Sentence Shaper was used. A number of important issues are apparent, namely, Nicole and Eileen’s style of communication, Nicole’s social nature, her dependence on conversational partners, and the strategies Nicole used to augment her communication. These issues had implications for the use of Sentence Shaper and will be discussed further with regard to the themes and patterns found in the data analysis.

4.2.2.2 Environmental factors: The social context.

The ICF defines environmental factors as “the physical, social, and attitudinal environment in which people live and conduct their lives” (WHO, 2001, p. 10). With respect to Nicole’s use of Sentence Shaper, the social environment was a particularly important factor. Nicole’s weeks were structured with various activities. On weekdays, she spent the day with her mother at her mother’s house. In the evenings, she went home to her apartment which she shared with her partner, Eric. During the weekdays, Nicole did several activities with her mother: they worked out at a gym, went swimming, worked on scrapbooks together and, in Nicole’s words, “study language” (FN03/10: 34). Once weekly, Nicole spent the morning at a stroke group. She had a number of tasks she performed at this group. She handed out the nametags and collected them at the end, took the lunch orders and collected the money, and called out the numbers for bingo. Nicole also had the opportunity to work with a speech-language pathologist, Allison, at the
stroke group. In the two sessions I observed at the stroke group, Allison and Nicole reviewed written homework Nicole had completed at home and then Allison provided Nicole with new worksheets to do for next time. Eileen had also arranged for Nicole to practice her language skills with a number of volunteers who came to the house. Nicole generally had one, or sometimes two, sessions with volunteers per day. The volunteers often helped Nicole complete her homework from the stroke group. It was evident that the majority of this language practice focused on Nicole’s reading and writing skills. The majority of her worksheets concentrated on choosing a correct preposition to describe a picture, answering yes/no questions, categorizing nouns, and putting a single word into a sentence.

Nicole also had several programs on her laptop designed to provide her with either language therapy or support. For instance, she used Kurzweil 3000 to help her read the e-mails she received. She also had KP Typing Tutor for typing practice, Sights ‘n Sounds, and Puzzle and Word Games. From Eileen, I learned that Nicole was very motivated to practice her language and that she spent a large portion of her day working on her language skills. Clearly, “studying” language, as Nicole and Eileen referred to it, was very important to Nicole and her days were structured to allow her to do this.

Another aspect of Nicole’s social environment during this study was our relationship. I was acutely aware of our respective roles. During our time together, I tried to maintain the role of a researcher in a participatory design study. Initially, I had envisioned Nicole and me taking equal roles in guiding the course of the study and in determining different ways in which Sentence Shaper could be used. However, this was not the way in which my role evolved. From Nicole and Eileen’s perspective, I was a
clinician providing Nicole with language therapy. I distinctly felt the unequal power balance of the clinician/patient roles in that I was often required to guide the structure of the meetings in the same way as a clinician with a lesson plan. Nicole also connected me to the role of a clinician by showing me the various language activities she did in her workbooks. At one point in the process of making an e-mail message, I asked Nicole what we did together. She responded by saying “homework and reading” (FN04/11: 93), which I considered a description of the activities she does with her volunteers, clearly placing me in the role of someone who helps her with her language. A tension existed between acting as a clinician and wanting to encourage Nicole’s independent use of Sentence Shaper. This tension was present throughout the study and is captured in the following excerpt:

Excerpt 4.4

1. E: That might be something you can = work on together =
2. (referring to prepositions)
3. N: = yeah yeah yeah yeah = yeah
4. yeah
5. E: Because I think um .. these are hard
6. N: Yeah yeah
7. E: And um ... I think that will be something that would be helpful for you Nicole
8. N: = =Yeah yeah = yeah =
9. = to know =
10. E: (C3: 1-10)

On this occasion, I recognized that Nicole was having difficulty understanding prepositions, so I tried to minimize my role as a clinician, by suggesting that she work on prepositions with her volunteers.

This description of Nicole’s social environment illustrates the individuals with whom she has the opportunity to communicate on a weekly basis. Aside from her mother,
with whom she spends a great deal of time, the majority of people Nicole sees during the
weekdays are there for the purpose of language therapy. On the weekends, she spends
time with her partner, friends, and family; however, these interactions were never
observed as Nicole and Eileen chose to schedule meetings on weekdays only.

4.2.3 Patterns and Themes: Interpretive Support

This section will describe the patterns and themes which emerged from the data.
Throughout the study, the notion of independence was an extremely influential factor in
determining how Sentence Shaper was used. The ways in which Nicole was independent
versus dependent on others and the reasons for this can be seen to interact with all other
identified patterns and themes. Thus, independence can be considered an overarching
concept and the way it interacts with the other various themes and patterns will be
discussed.

4.2.3.1 Language remediation as meaningful activity.

Within the ICF framework, the way someone is able to function or live with a
disability is of concern and warrants attention in assessment and intervention. In Nicole’s
case, she lives with her aphasia by focusing on language remediation, such that
participating in language therapy for many hours every week can be considered a
meaningful activity for her or, in other words, her occupation. This pattern resonated
throughout the study in various ways. The extent to which language therapy occupied
Nicole’s life suggests that Nicole and her mother held a view of Nicole recovering, and
the activities Nicole engaged in during the weekdays were geared towards that goal.
Another important aspect of Nicole’s language remediation is that it allowed for Nicole to obtain a social connection with others. Throughout the study, Nicole expressed that she had difficulty talking to many people she knew before her stroke, stating that it was “so fast” and “frustrating” (FN06/02: 100), thus making it difficult to gain a social connection with them. Eileen elaborated on this by saying that others often dismiss her and do not help her understand what is being said in conversations. This sentiment was also apparent in Nicole’s QCL questionnaire in which she rated her answer to the question “people include me in conversations” very negatively. As Nicole’s occupation at this time was working on her language recovery, many people in her life were there for that particular reason (i.e., her volunteers). Eileen has helped Nicole to structure her life in ways that provide her with the opportunity to communicate with people who are willing to be patient, thus providing Nicole with an important social connection.

As an important part of Nicole’s life was language therapy, Sentence Shaper was often viewed purely as a language remediation tool. This was evident in the fact that working with Sentence Shaper was often viewed as homework by Nicole and Eileen. Initially, I started by calling it homework, but attempted to move away from this label, as I hoped that Nicole would become motivated to use Sentence Shaper for communicating with others as well as for language therapy. Nicole’s messages which she sent as e-mails could be seen to undergo a transformation from being purely done as homework to e-mails which actually served a communicative purpose. In the beginning Nicole tended to label her e-mails as ‘homework’: “Hi Shelly. How are you? This is my homework. I have to e-mail somebody about Sentence Shaper. I am practicing Sentence Shaper. How do you like it? Bye.” (SS04/20: 1-2). Later her e-mails lacked this ‘homework’ label and
served a purpose of asking a question or telling someone about an event that had happened. For example, Nicole came up with the idea for this e-mail and we worked on it together: "Hi Michelle. How are you? How are Brian, Joanna, and Chris? Michelle how about Tuesday May 16th you and me go shopping together. Do you want to go to Metrotown? See you soon. Bye" (SS05/12: 1-3). However, even at the end of the study, Nicole and Eileen still seemed to view Sentence Shaper as primarily a language remediation tool. For example, towards the end of the study Eileen said that Nicole should do the Mira message for "homework" (FN06/06: 77), clearly placing Sentence Shaper in a language therapy role. Nicole also sent me an e-mail in which she recited poems that she practiced for her language therapy: "Dear Erin. How are you? I am practicing my poem..." (SS06/15: 1). This e-mail did not seem to serve a communicative purpose other than language practice. However, in light of Nicole’s focus on and motivation for language therapy, viewing Sentence Shaper primarily as a language therapy tool makes sense in the context of her life.

4.2.3.2 "Sentence Shaper is not real life".

A major focus of the study was the exploration of Sentence Shaper as a way of augmenting communication. Perhaps because an important part of Nicole’s life was language therapy, utilizing a device to augment communication at this time did not correspond with her or her mother’s goals and expectations of recovery. They may have been willing to see use of Sentence Shaper in everyday communication as a short-term goal, but Eileen was quite clear that the ultimate goal was for Nicole to not have to rely on it. This perspective remained throughout the study, and at the end of the study, Eileen
clearly indicated that she did not think Sentence Shaper was useful for augmenting Nicole’s communication. In her words Sentence Shaper is “not real life” and Nicole will not always have her computer with her to play the messages” (FN06/26: 63-64).

During the course of the study, Nicole traveled to Mexico for one week, and when she returned, we made a message about her vacation using Sentence Shaper. Following this, Eileen noticed that her daughter was able to say parts of the message unaided and was encouraged by this fact, illustrating her goal of recovery for Nicole. To explore this ability, I asked Nicole to tell me about her trip. In this unaided narrative, Nicole was able to repeat certain parts of the narrative and an improvement was observed in her ability to speak in complete sentences occasionally. In addition, an increase was noted in the amount of information she was able to communicate about her trip after first composing the message with Sentence Shaper, as compared to her description of her trip before this practice, a description which was quite limited and conveyed in one or two word utterances. The Sentence Shaper message and corresponding narrative sample are presented in Table 4.10.
In general, Nicole and Eileen appeared to accept the use of Sentence Shaper more for e-mail than for conversation. This was evident in the way they used Sentence Shaper to create and send e-mail messages on their own, in addition to the messages I had suggested. However, use of the same messages in conversation was only done at my request. Even when opportunities to use Sentence Shaper in conversation presented themselves, Nicole only spontaneously used the program in this way once. This occurred after playing the Mexico message for Mira, when Nicole chose to share with us a
message she had made about having lunch with Mira the previous week. This Sentence
Shaper message is presented in the following excerpt:

Excerpt 4.5

June 2, 2006. Mom and I visited Mira in North Van. It was a beautiful house. I
gave her presents. Mira thank you for the gift. Mira boiled some tea. We watch
pictures on the computer. Mira looks beautiful. Mira showed me her engagement
ring. It is a big diamond ring. Mira and Sam are engaged. We had lunch at Mira’s
aunty and uncles’s restaurant. I had eggplant, shrimp, and chicken. I had mango
milkshake and tea. It’s so good and delicious.

(SS06/08: 1-6)

When Nicole played Sentence Shaper messages in conversation she chose to play
each narrative button one by one as opposed to playing the entire message all at once.
This allowed for greater interaction between interlocutors as the pause in the message
allowed for the listeners to comment on the story being told. Nicole also talked along
with the recorded message as it was playing, effectively making the off-line message on­
line. The conversation which occurred between Mira, Nicole, and me while Nicole
played the Sentence Shaper message is provided in the following excerpt:

Excerpt 4.6

1. SS: (First narrative button) JUNE 2ND 2006 MOM AND I
2. = VISIT MIRA =
3. E: = Oh this is the message =
4. M: = Oh =
5. = Yeah yeah =
6. SS: IN NORTH VAN IT WAS A BEAUTIFUL HOUSE =
7. N: = Was a beautiful house =
8. SS: I GAVE HER
9. N: = = her
10. SS: = = PRESENTS
11. N: Presents
12. SS: MIRA
13. N: = = Mira
14. SS: = THANK YOU FOR =
15. N: = Thank you for = the gift =
16. SS: THE GIFT
17. SS: (Second Narrative Button) MIRA
18. N: Mira
19. SS: BOILED
20. N: Oh
21. SS: SOME
22. N: Some
23. SS: TEA
24. N: Tea tea yeah yeah
25. M: [heh-heh]
26. SS: WE = WATCH = PICTURES = ON THE COMPUTER =
27. N: = watch = = on the computer =
28. SS: MIRA LOOKS BEAUTIFUL
29. M: Oh thank you
30. SS: MIRA SHOWED ME HER ENGAGEMENT RING
31. N: Ring yeah yeah yeah
32. M: = I forgot it =
33. SS: = IT IS = A = BIG = DIAMOND RING
34. E: = [heh-heh] =
35. M: = I forgot my ring =
36. SS: = MIRA AND =
37. N: = Oh my God =
38. E: = [heh-heh] =
39. SS: = SAM ARE ENGAGED =
40. M: = I forgot =
41. SS: WE HAD LUNCH AT = MIRA’S =
42. N: = Mira’s =
43. SS: AUNTY AND = UNCLE’S RESTAURANT =
   = Uncle’s restaurant =
44. SS: I HAD EGGPLANT SHRIMP AND CHICKEN I HAD MANGO
45. MILKSHAKE AND TEA IT’S SO GOOD AND DELICIOUS
46. N: = = Delicious

When this message was played for Mira and me, it created a context for conversation to occur. In this way, the message initiated a social interaction that may not have occurred without it. Furthermore, while the message was playing, she used the recording as a cue to help her repeat the message. Sharing the Sentence Shaper messages in this way had the effect of making it seem as though Nicole was sharing the message on-line and not from a recording.
4.2.3.3 Seeking perfection.

Another pattern which emerged from the data was the tendency for both Nicole and Eileen to want the Sentence Shaper messages to be grammatically perfect. This desire for perfection was apparent with the messages Nicole sent as e-mails. Nicole and I had made an e-mail message together for her Aunt Diana. While making this message, I had attempted to keep my input to a minimum and encouraged Nicole to produce what she could on her own. The following excerpt is the e-mail message we created together:

Excerpt 4.7

Dear Diana Aunty. How are you?. On 23\textsuperscript{rd} Diana Aunty, and mom, and me let’s go to lunch. Call us. Take care.

(SS04/18: 1-2)

After finishing the e-mail and sending it, Nicole seemed pleased with what she had done saying “nice…whole sentence” (FN04/18: 54-55). However, in the following session with Nicole, I learned that she had redone the e-mail to Diana with Eileen. Her second attempt at the e-mail to Diana is presented in Excerpt 4.8.

Excerpt 4.8

Dear Diana Aunty. How are you? April 23\textsuperscript{rd}. Do you want to go to lunch on Sunday? Call us. Take care.

(SS04/20: 1-2)

Nicole’s second e-mail to Diana is more grammatically complex with the use of a “do” question. As this example demonstrates, Nicole and Eileen focused on correct grammar; however, Nicole, on her own, was often unable to correct the ungrammaticality herself. Therefore, working with others on the Sentence Shaper messages allowed Nicole to receive the help she required to make the messages perfect. Nicole also shared this
preference with me after we had made a message together in which I had provided her with considerable support.

Excerpt 4.9

1. N: Yeah yeah I mean um ja um um Erin and me uh spend time spend
2. time okay talk talk yeah yeah
3. E: Um hm
4. N: Yeah yeah alone alone one [f] oh my god .. I mean uh .. one .. I mean [hh] I mean uh
5. E: When your working
6. N: Working yeah yeah I mean yeah yes yeah I mean I mean I mean I mean uh
7. I mean okay uh uh I mean um uh um co I mean uh uh I mean uh
8. uh tal I mean um um computer yeah I mean um friends I mean uh
9. you no I mean no I mean um I mean um talking talking talking
10. [Nicole making disgusted sound]
11. E: Hmm
12. N: Yeah bad bad
13. E: So when you’re alone
14. N: Alone yeah uh Erin and me yes yeah good one yeah yeah and then
15. uh speak speak I mean uh uh s uh uh
16. E: = = So you’re pointing to this the recorder
17. N: Yeah yes yeah yeah I mean uh one one only one .. only [Nicole making disgusted sound] no good no = no I mean =
18. E: = Okay so = working on
19. 22. Sentence Shaper
20. N: Yes
21. E: By yourself
22. N: By myself
23. E: You don’t like that
24. N: Yes yes and then uh talk I mean uh uh Erin and you uh friends
25. yeah I mean uh um yes yeah
26. E: Okay

(C16: 1-29)

In this transcript, Nicole indicates that she does not like working on her own and that she prefers to work with others. Even though Nicole became quite adept at using Sentence Shaper and was able to create messages with more grammatically correct and structured language than her unaided language, she clearly did not think this was good enough. In line 12, she made a “disgusted” sound demonstrating this dislike. At one point, I asked
Nicole why she did not like working alone on the messages. She started mentioning the side buttons and the stroke group, and I realized that she was referring to when I had cued her to use the side buttons when making the message at the stroke group. Clearly, Nicole appreciated this type of help and felt that it was beneficial to the messages she produced. Incidentally, Nicole’s use of “friend” in lines 9 and 27 reflects back to the pattern of language therapy allowing for social contact.

Eileen’s preference for Nicole’s Sentence Shaper messages to be grammatically correct was evident in the way she helped Nicole with the messages. Instead of prompting her with questions or discussing ideas for the message, Eileen often provided Nicole with the words to use in the message. Later, Eileen stated that Nicole would often say one word and then not be able to expand on it. To help her daughter, Eileen often mouthed the words so that Nicole would be able to say the sentence. This helping behaviour often made it difficult to determine what parts of the message Nicole had done independently.

4.2.3.4 Nicole as a dependent communicator.

Nicole’s dependent communication was another pattern which emerged from the data. Her dependence in communication emerged as a preference in working with others when making messages with Sentence Shaper. Part of this dependence most likely resulted from, in addition to her desire for grammatical perfection, a difficulty in generating ideas for topics of conversation. This was often apparent when Nicole was making messages with Sentence Shaper to send as e-mails. She often began with her typical e-mail greeting, and then she did not seem to know what else to say. At one point,
Eileen said that Nicole had required a lot of help coming up with ideas about what to put in the e-mails. During our meetings, I was often responsible for coming up with topics to talk about. Once a topic was chosen, Nicole also demonstrated difficulties expanding on that idea. This was often apparent when she wanted to e-mail someone. She could decide on whom to e-mail, but had difficulty knowing what to say in the e-mail. Once Nicole had an idea for a message, she often had difficulty expanding those ideas into sentences, as I noted in this fieldnote excerpt:

I saw that she was jumping from one idea to the next and often came up with good sentences but never recorded them. She seemed to have a hard time expanding the one word ideas into sentences.

(FN04/28: 70-75)

Although, Nicole could occasionally generate ideas on her own, it was nonetheless a major source of difficulty during the study.

In order to support Nicole in message structure, I began asking her to tell me everything she could about a message she wanted to create. I then wrote down her ideas, which were typically represented as single words. She then worked from her list of ideas putting them into sentences. I found this method particularly useful as it allowed Nicole to see the organization of the story.

The difficulties Nicole had when making a message with Sentence Shaper were both effortful and quite frustrating for her. Because this frustration was very evident, it is not surprising that Eileen wanted to help her daughter, even though she knew I preferred Nicole to work independently:

Eileen said that she thought it was better when Nicole worked by herself, but that it took her a very long time and it was frustrating for her. She said that it was much easier for Nicole when she works with her because she could cue her with gestures.

(FN04/11: 37-44)
Because of the effort and frustration involved in creating messages with Sentence Shaper, I began to notice Nicole becoming reluctant to make messages with me, which may have been due in part to the fact that I provided less support than her mother. Her expressions very clearly demonstrated this reluctance. On one occasion, she made a face that showed me that she preferred not to work with Sentence Shaper, but in the end, agreed to make a message. In addition, Nicole began to voice her preference at working with Eileen on the messages. I suggested that she should try to work independently, but she repeated that she intended on practicing with her mother. I finally realized that as an equal partner in this project, Nicole had the right to make the Sentence Shaper messages as she saw best, and clearly, she felt that working with others to create the messages was the best situation for her. This realization allowed me to feel comfortable helping Nicole with her messages, even though this departed from the Linebarger et al. (2004) methodology. Being placed in a clinician’s role was somewhat frustrating for me; however, once I accepted that this was how Nicole saw me and realized that it could not be changed, working with Nicole became much easier. By providing Nicole more support with her messages, it created a better working relationship and decreased our frustrations.

Towards the end of the study, Nicole indicated that she wanted to make a Sentence Shaper message for her mother. Again, she seemed to have difficulty putting her ideas into words, so I wrote down her ideas for her. From her ideas, I realized that Nicole wanted the message to thank Eileen for everything that she does for her:

I asked her if she had difficulty saying what she really wanted to. She said yes. I could see that this was something that really affected her. She wanted to be able to express the extreme gratitude that she feels for her mom, but was unable to put it into words.

(FN06/20: 155-160)
For this message, I increased the level of support that I typically provided and helped Nicole come up with ideas and put them into words. When we were finished, Nicole seemed quite pleased with the message and said that she was going to play it for her mother. It was evident that Nicole had appreciated the help I had given her with the message, and as I was leaving, Nicole said “thank you everything”. I realized that the message she had made for Eileen was meaningful to her and that she had appreciated the help I had given her (FN06/20: 174-177). Clearly, Nicole's frustration at not being able to put her ideas into words was a motivation for working with others on her messages.

4.2.3.5 Nicole as an independent user of technology.

In contrast to her reluctance to make Sentence Shaper messages independently, Nicole was very motivated to customize the side buttons and word finder, which was something she often initiated herself. She seemed to enjoy adding more words to the different categories available in the word finder.

When we were working on the word finder or side buttons, I felt that our roles underwent a change. I no longer felt the unequal power balance of the clinician/patient roles that occurred when we were making messages with Sentence Shaper together. When customizing the word finder and side buttons, we became equal investigators of Sentence Shaper, and this may have been a source of motivation for Nicole. In this context, I was not seen as an expert in Sentence Shaper but, rather, as someone learning the program along with Nicole. The fact that I was not an expert was very clear to Nicole in my struggles to figure out different aspects of the program.
In this context, Nicole was observed taking steps to become an independent user of the technology. She appeared to be very motivated to learn about the different technology available on her computer and, with everything she learned, she wanted to know how to do it by herself. For example, not long after learning how to use the program, Nicole was already independently renaming the messages on her own. When she was learning about her new CD burner from a volunteer, Nicole often repeated the steps that the volunteer had said and then did the actions herself. Another example occurred when Nicole and I were learning how to transfer the changes we had made in one section's word finder to all the other sections, as this was not done automatically. Nicole asked me to write down the steps so she would be able to do it herself. These examples illustrate Nicole's independence when using her computer and the steps she took to allow her to be independent. Her desire to be an independent user of technology was in striking contrast to the dependence I observed when she was making messages with Sentence Shaper. Clearly, confidence with technology was not a factor which prevented Nicole from being able to make the Sentence Shaper messages independently.

4.2.4 Outcomes of Sentence Shaper

This section will present the various outcomes of the ethnographic component of the study, namely, the difference between Nicole's narrative and natural speech, the participants' final views of Sentence Shaper, the QCL and CETI results, and the participants' ideas for future use of Sentence Shaper.
4.2.4.1 Narrative versus conversational speech.

As discussed in the component one results, Nicole demonstrated structural and morphological improvements in her unaided narratives following use of Sentence Shaper. This result was somewhat unexpected as similar morphosyntactic improvements were not readily apparent in her conversational speech. This trend was demonstrated well in a conversation with Nicole towards the end of the study compared to her unaided narrative of the Mexico message. In excerpt 4.10, Nicole’s natural conversational speech is presented.

Excerpt 4.10

1. N: Yeah yeah I mean um ja um um Erin and me uh spend time spend
2. time okay talk talk yeah yeah

(C16: 1-2)

In this sample, Nicole is responding to me thanking her for working so hard throughout the study. As it illustrates, Nicole’s conversational speech is much more morphosyntactically impoverished than her speech in the Mexico narrative. In this excerpt, which was quite typical of her conversational speech, there is limited use of closed class words and her utterance does not constitute a full sentence. In contrast, her narrative speech contained sentences with inflected verbs and closed class words. However, it is evident in this excerpt that Nicole was generating her own thoughts and attempting to express them, which is noteworthy given her previously described difficulty in generating ideas.
4.2.4.2 *Final participant responses to Sentence Shaper.*

The final interview with each participant focused on her views of Sentence Shaper with regard to the benefits of and barriers to its use. To avoid leading questions as much as possible, in interviewing Nicole, I began with a very open-ended question: “Tell me what it’s like to use Sentence Shaper” (I3: 3), encouraging Nicole to tell me anything she could. One response which she mentioned several times throughout the interview was “talk more” (I3: 13). I interpreted Nicole’s utterance as meaning that she spends more time talking since she began using Sentence Shaper. I asked Nicole if she liked the word finder and side buttons. She said that she did and also mentioned “other words and and like this … write wrote and um go and went no yeah yeah yeah” (I3: 82-83). By saying “write wrote”, Nicole made reference to the present and past tense verbs category which we had added to the word finder. Nicole and I also discussed the use of Sentence Shaper with e-mail, and this was also something Nicole had liked about the program: “E-mail yeah I mean uh uh uh Michelle uh yeah yeah me uh me and um Michelle uh uh me mom uh uh Michelle like like yeah” (I3: 123-124). In this context, Nicole’s mention of Michelle, to whom she had sent several Sentence Shaper e-mails, suggests that being able to e-mail her friend was meaningful for Nicole.

In the interview with Eileen, she revealed that “Sentence Shaper is helping Nicole” in that she “is able to repeat her messages unaided” (FN06/29: 111-114). Again, this demonstrates Eileen’s view that Sentence Shaper should be used for the purpose of improving Nicole’s unaided speech. When asked what she thought the benefits of Sentence Shaper were, Eileen responded by saying that she likes that Nicole is not reading or writing, but thinking about what is in her mind and saying it, suggesting the
benefits of the program as a tool to aid in message generation. Eileen was also asked if there was anything that she did not like about the program. She stated that Nicole became frustrated by the word finder and did not know what words are found in the different categories, which further illustrates the effort and frustration Nicole experienced while making messages with Sentence Shaper. Eileen also noticed that Nicole was missing verbs and prepositions in her recordings and that she was “unable to connect the sentence” (FN06/29: 128-130). When I asked Eileen if she thought there had been a noticeable change in Nicole’s ability to communicate since using Sentence Shaper, she responded by saying that Nicole could communicate better about conversational topics used in Sentence Shaper messages, but that her communication was unchanged for topics which had not been practiced with Sentence Shaper.

4.2.4.3 The participants’ ideas for future use of Sentence Shaper.

In the final interview, each participant was asked how she saw Sentence Shaper being used in the future. In the interview with Eileen, she responded by saying that she would like Nicole to continue using Sentence Shaper so that she could make messages which she would later be able to repeat without Sentence Shaper. This idea relates to Eileen’s perspective throughout the study that Nicole’s goal should be communicating without the aid of an AAC device. Eileen also highlighted the use of Sentence Shaper as a language remediation tool by suggesting different ideas for messages that Nicole could make (e.g., about her volunteers and daily activities). It was clear that the purpose of these messages was not for use in conversation, but rather as practice for Nicole so that she would be able to say them unaided. I also asked Eileen about Nicole’s use of
Sentence Shaper with e-mail in the future. She responded by saying that there were not many people whom Nicole could e-mail, but began to think of possibilities. Interestingly, the people she mentioned were all volunteers of Nicole’s. Her emphasis on volunteers as the only possible people whom Nicole could e-mail suggests that Eileen continued to regard the function of Sentence Shaper within the context of language therapy. However, it is also possible that she recognized the social contact that the volunteers provided for Nicole and considered the Sentence Shaper messages as a way for Nicole to remain in contact with the volunteers.

Nicole responded quite differently to the question about how she would use Sentence Shaper in the future. Her answer to the question is presented in the following excerpt:

Excerpt 4.11

130. E: So Nicole do you want to use continue using Sentence Shaper ..
131. E: like in July and August September. Do you wanna continue using it?
133. N: Uh yes = yes yes yes =
134. E: = Keep using it =
135. N: Yes
136. E: And what do you wanna use it for? Like what are you gonna do?
137. N: Um um um I mean um um uh e-mail
138. E: E-mail?
139. N: Yeah e-mail um and then uh uh um um um .. e-mail yeah
140. E: You wanna use it for e-mail?
141. N: Yeah = yeah =
142. E: = yeah =
143. N: Yeah

(I3: 130-143)

The answer of e-mail was somewhat unexpected from Nicole. Although use of Sentence Shaper messages with e-mail had been quite successful from my perspective, Nicole often had difficulty thinking of people to e-mail. From this excerpt, it appears as
though Nicole could envision herself using Sentence Shaper in the future for e-mail despite this difficulty. Nicole also stated that she planned on working with her mother in the future when making messages with Sentence Shaper:

Excerpt 4.12

149. N: Um okay mom and me uh uh uh mom and me uh uh uh I mean um
150. mom and me uh uh shape okay uh Sentence Shaper um talk about
151. talk = talk talk = yeah yeah yeah
152. E: =um hmm =
153. E: Um hmm
154. N: Yeah
155. E: Okay .. so you like to use it with your mom
156. N: Yes

(13: 149-156)

It is not surprising that Nicole suggested continuing to work with her mother or volunteers on Sentence Shaper messages, as this was her preference throughout the study.

4.2.4.4 QCL and CETI outcomes.

The QCL was completed by Nicole and the CETI by Eileen both at the beginning and at the end of the study. Scores on the questionnaires are presented in Appendix H. The participants were not given their original questionnaires to view before completing the second questionnaire. This allowed for an absolute rating on the questionnaires, as it is unlikely that the participants remembered their original scores. These results were then compared to those obtained as part of the initial communication profile. Some interesting changes were noted on both participants’ questionnaire answers. In order to explore these changes further, each participant was shown her pre- and post-study questionnaires and asked if they felt the changes were accurate. If they did not consider the answers to be an accurate reflection of change, the participants were allowed to alter their answers. For the
QCL, Nicole was only asked about items which differed by two or more points from the first to the final questionnaire on the 16 items and also the final question about overall quality of life.

On the final QCL, Nicole had several items which she rated much higher than she had previously. No items decreased in score. It was interesting to note that on the first QCL, no items had received a score of five, the highest rating possible, but on the final QCL, Nicole had given 7 out of 17 items a score of five. Prior to completing the questionnaire, respondents are asked if it is an especially good, average, or especially bad day, and on both questionnaires, Nicole had indicated that she was having an average day. Therefore, it is unlikely that the increase in high scores on the final QCL was a reflection of a more positive mood. The first item which received a two point increase was “It’s easy for me to communicate”. Initially, Nicole had rated this statement as a two, and on the final QCL, it was given a four. When I asked her if she felt that it was easier now, she said “yes” (FN06/29: 44-44). “People include me in conversations” also showed a two point increase from one to three. When asked about the accuracy of this change, Nicole said “conversations conversations friends friends” and then said “Michelle talk more” (FN06/29: 48-49). She also mentioned the lunch that Mira and I had with her. From her answers it seemed as though there were more social opportunities for her with people who knew how to include her in conversations. The largest increase occurred for the item “I use the telephone” which had a three point increase from two to five. Nicole reported that this change was accurate stating that she calls Eric and her mother; however, she was not able to describe how this had changed in the past four months. The item “I get out of the house and do things” changed from a score of three to five. This
improvement was understandable as she had recently returned from her vacation in Mexico. For the item “I have household responsibilities”, Nicole had initially rated the item as a one and in the final questionnaire scored it as a three. I asked Nicole if she thought she had more responsibilities now, but she was unable to provide a clear description of the differences and decided to lower the final score by one. Finally, I asked Nicole about the increase from three to four in her response to the item “In general, my quality of life is good”. When I asked her if she was feeling better about life, she said “yes…speak more” (FN06/29: 64-65). Overall, Nicole reported that the changes she had indicated were accurate aside from the one question regarding household responsibilities. Clearly, Nicole’s answers on the final questionnaire demonstrate an increase in her perceived quality of life and communication ability.

Eileen’s answers on the final CETI also indicated several areas of perceived improvement. As with Nicole, Eileen was asked to verify the accuracy of her responses and explain if possible what changes had occurred in Nicole’s communicative ability to warrant increases in score. Again, she was allowed to change the score if she thought it was inaccurate. One of the largest increases in score occurred for the item “Having a one-to-one conversation with you”. Eileen had originally scored this item as 4.5/10 (measured on a visual analog scale of 10cm) and on the final questionnaire scored it at 8.3. When questioned about this change, Eileen said that Nicole had improved in that she was able to say more things when having a conversation; however, initially she was not able to be any more specific about what these things were. As we talked further, she said that Nicole and she do not really talk about anything and stated that their conversations focus more on Nicole’s needs and wants, adding that it is “not really conversations” (FN06/29: 125).
95). At this point, she decided to change her answer and lowered the score on that particular item to 6.7 which, though somewhat decreased, still showed an improvement from the initial score. When asked about the item “Having a spontaneous conversation”, Eileen actually changed her final score to indicate greater improvement increasing her rating by 1.3 points, commenting that Nicole is “more spontaneous now” (FN06/29: 100-101). Another item which showed a large improvement was “Understanding writing”. Initially, Eileen had scored this at 4.4 and in the final questionnaire she gave it a score of 7.0; she decided to change the final score to 8.6 to indicate even greater improvement. On the final item which asks about the “overall language and communication skill during the previous week”, Eileen had indicated an improvement from the initial to final questionnaires of 2.5 points. When questioned if this difference was accurate, she did not change her answer but was unable to describe what changes had occurred to warrant such an improvement in score.

Overall, the scores on both questionnaires indicate some positive changes at the end of the four month period. These findings will be interpreted in the context of overall results in the discussion.
Chapter Five: Discussion

5.1 Introduction

This study involved two components. The first component sought to examine the impact of an extended use of Sentence Shaper on the participant’s morphosyntax, informativeness, efficiency, and story structure. With regard to the ICF which has been used as a framework for this study, a difference in the structural and morphological characteristics of the participant’s language reflects a change at the impairment and activity levels of functioning. In component two, a broader view of Sentence Shaper and the program’s potential uses was taken compared to previous studies, allowing for the participation opportunities created from use of Sentence Shaper to be explored as well as the contextual factors relating to the participant’s use of Sentence Shaper. The case study of Nicole and Eileen provides important findings for the use of Sentence Shaper both as a language therapy tool and as an AAC device. Furthermore, findings from this study contribute important insights on treatment informed by a social model of care within the framework of the ICF. As described in Chapter One, input from both the clinician and client is regarded as equally important in a social model of healthcare. The qualitative methodology used in this study was particularly useful in gaining the participants’ input and understanding their perspectives. The results presented in the previous chapter will now be discussed in terms of the findings gained from the perspective of the researcher (i.e., an outsider’s perspective) versus those learned from the perspectives of the participants (i.e., an insider’s perspective) and will be related to literature in this area.
5.2 The Researcher's Perspective

5.2.1 Comparison of Nicole's Performance to Linebarger et al.'s (2004) Participants

In replicating Linebarger et al.'s (2004) treatment study, it is important to discuss similarities and differences between the participants at the onset of the study as well as following use of Sentence Shaper. One important caveat in comparing the participants from the two studies is that different elicitation techniques were used in obtaining the narrative samples. Linebarger et al. presented participants with a short silent video which the participants were then asked to retell. In contrast, Nicole was asked to tell a fairytale and narrate a short picture sequence story. It is interesting to note that Nicole's narrative ability in *The Cowboy Story* versus *The Three Little Pigs* was not equal. The majority of scores in both the pre and post *Cowboy Story* narratives were superior to those of *The Three Little Pigs* narratives. This trend can be explained by examining the task demands each narrative task presents. The picture sequence presented for *The Cowboy Story* created a situation which had fewer task demands than the telling of *The Three Little Pigs*, which was not supported by pictures. As Nicole had difficulty with story structure and generating ideas, it is probable that support offered by pictures allowed her to allocate more resources to sentence production, resulting in the production of more complex language. Given the apparent effect of stimulus on production, it is possible that she may have performed differently with the task used in Linebarger et al. (2004). Therefore, it is with caution that the participants' narratives are compared.
As previously described, a comparison of Nicole’s performance on the initial assessments to those completed by the participants in Linebarger et al.’s study indicates that Nicole’s scores were similar and in some cases better than the other participants. However, it is interesting to note that Nicole’s initial narrative samples were much more impoverished than those of the other participants. Except for the proportion of inflected verbs in Nicole’s initial *Cowboy Story* narrative, all other QPA measures and the CIU results of the initial narratives are well below those reported for the other participants. As her other assessment scores were similar to Linebarger et al.’s participants, one might expect her narrative samples to follow this trend. Clearly, something other than her ability to retrieve and understand single words was impairing her ability to produce narratives. Before looking at what this might be, it is important to look further at the differences between Nicole and Linebarger et al.’s participants.

Following use of Sentence Shaper, the results of the QPA indicated that Nicole’s narratives had impressive gains in morphosyntax. In comparison, the participants in Linebarger et al.’s study also demonstrated improvements in their narratives following use of Sentence Shaper; however, unlike Nicole, not all morphosyntactic measures increased. S1’s narratives were reported to show only minimal improvement compared to S2’s. Linebarger et al. explained that S1’s lexical impairment limited his ability to produce narratives unaided, but when given the lexical support available on Sentence Shaper (i.e., the side buttons and word finder) S1 was found to be quite successful in producing narratives. S2 had noticeable gains in the structural measures of the QPA, but the majority of morphological QPA measures remained stable. In contrast, both the structural and morphological QPA measures of Nicole’s narratives showed large
increases. At this point, it is important to identify differences between the participants which could provide an explanation for their different morphosyntactic outcomes following use of Sentence Shaper. It is possible that the difference in response could be based on whether the participants were agrammatic or nonfluent, nonagrammatic. S1’s speech was reported to have been agrammatic, whereas S2’s speech was determined to be nonfluent, nonagrammatic. Following the initial assessments with Nicole, her speech was found to be agrammatic. Because both Nicole (agrammatic) and S2 (nonfluent, nonagrammatic) demonstrated improvements, it appears as though the difference between agrammatic and nonfluent, nonagrammatic speech will not explain the varying responses to Sentence Shaper. It is interesting to note that Nicole’s post-treatment unaided narratives and aided narratives were characteristic of a nonfluent, nonagrammatic speaker in that she was able to include both bound and free-standing morphemes in her speech. This change demonstrates a continuity between the categories of agrammatism and nonfluent, nonagrammatism and provides evidence that nonfluent, nonagrammatism may in fact be a milder form of agrammatism, as put forth by Saffran et al. (1989). Furthermore, if there is continuity between these two apparent groups, it suggests that distinct categories are not warranted.

Although the structure and morphology of Nicole’s speech improved in her narratives, an additional factor was apparently preventing a similar improvement in the informativeness and efficiency of her narratives. Again, comparison with the participants in Linebarger et al.’s study can offer some insight into this problem. In their study, S2 demonstrated impressive increases in informativeness and efficiency, whereas S1, like Nicole, did not. Linebarger and her colleagues posited that this lack of improvement was
due to S1's significant lexical impairment. However, the initial lexical assessments indicated that Nicole had superior scores to the other participants in lexical retrieval, which suggests that this was not the source of her impairment. Clearly, other components of the study must be examined to shed light on these findings.

5.2.2 Possible Explanations for these Differences

Data collected in the ethnographic component of the study provided insight into the differences noted between Nicole's and Linebarger et al.'s (2004) subjects' narrative performances. As discussed in the results chapter, Nicole often had difficulty generating ideas of what to talk about in her Sentence Shaper messages and expanding her ideas beyond a one-word utterance. These observations suggest that in addition to impairments at the functional and positional levels in Garrett's model of speech production, Nicole had a deficit in the conceptual level defined by Fromkin & Bernstein (1998) as the level responsible for message generation. Impairment at this level could explain the difficulty Nicole had both in generating novel sentences and in producing narratives, which would not be captured in the initial assessment scores.

Marshall and Cairns (2005) discuss the possibility that the conceptual level, which they describe as "thinking for speaking" (p. 1009) may be impaired in aphasia. Drawing on Levelt's theory of speech production, Marshall and Cairns suggest that messages produced at the conceptual level have both propositional structure and perspective before being mapped onto language. Therefore, if this level of speech production can be impaired in aphasia, some individuals with aphasia "may be unable to build grammatically principled, constrained schematizations of events that can be
mapped onto their language” (p. 1011). Marshall and Cairns suggest that evidence for this locus of impairment can be found from nonverbal event judgment tasks and from the way in which some individuals with aphasia verbally describe events. For instance, when asked to name the entities taking part in an event, some individuals with aphasia will name both important and minor entities. In contrast, non-impaired individuals typically name only key elements (i.e., the agent, theme, and instrument). Furthermore, the order in which entities are named can be different. Non-impaired individuals generally name the entities as they would occur in a sentence, whereas, some individuals with aphasia demonstrate a random order to their naming. Marshall and Cairns explored this theory with a treatment experiment aimed at targeting thinking for speaking. After therapy which focused on highlighting the roles of people and objects in events, their participant was reported to have improvements in production of verbs and word order in picture descriptions, although similar improvements did not occur in narrative production. The pattern of impairment that they describe parallels Nicole’s initial assessment scores and narrative performance. While she was able to access verbs when presented with a picture of the action, her ability to produce verbs and sentences in her initial narratives was grossly impaired. Marshall and Cairns propose that if thinking for speaking is impaired, expressing multiple events or perspectives, as is required in a narrative, will be much more difficult for the individual with aphasia than expressing single events (i.e., items found on the Noun/Verb naming test).

Further evidence for a deficit at the conceptual level is Nicole’s performance on her final unaided narratives versus her narrative performance aided by Sentence Shaper. Although the CIU score on the aided narratives was higher than that for the unaided
narratives, the aided narratives did not actually contain more elements of the story. In fact, the unaided version of The Three Little Pigs contained more aspects of the story than the aided version. This comparison illustrates that while Sentence Shaper may have supported more complex language production, it did not facilitate improved story structure for Nicole. It is possible that when using Sentence Shaper, Nicole increased her focus on morphological structure which perhaps decreased the processing resources available to the production of story structure. However, there is no evidence to support this claim as there were no instances in which Nicole demonstrated good story structure. Alternatively, it is possible that Nicole’s “thinking for speaking” was itself impaired and the processing support provided by Sentence Shaper was not designed to facilitate this, therefore, organizing events and expressing them still posed a difficulty for Nicole.

Of course, personal and environmental factors could also be a source of Nicole’s difficulty with narrative production. Nicole was a dependent communicator who spent a great deal of time on language therapy focused on written rather than spoken language. Furthermore, her social environment was one in which she was often not expected to generate narratives and also involved individuals who were willing to speak for her when she was unable to do so herself. It is possible that after four years of dependent communication and a focus on reading and writing she had lost some of her ability to produce narratives.

Croteau and Le Dorze (2006) discuss the idea of overprotection and “speaking for” behaviour and the effects this behaviour can have on conversations with people with aphasia and their spouses. In the relationships of people with aphasia and their spouses, some spouses have been found to often be overprotective. Croteau and Le Dorze found
that the level of the spouses’ self-rating of overprotection was related to their tendency to speak for their spouse with aphasia. Furthermore, the presence of “speaking for” behaviour was found to limit the participation of the people with aphasia in conversation. Croteau and Le Dorze caution that if overprotection and “speaking for” behaviours by the spouse continue, language rehabilitation could be negatively affected for the individual with aphasia. While this study involved individuals with aphasia and their spouses, it is possible that these results could also apply to conversations between Nicole and her mother. Eileen was observed often to speak for her daughter in conversations. This behaviour may have limited Nicole’s participation in conversation and decreased the number of opportunities she had in developing the skills she practiced in speech and language therapy and applying them in real conversation.

5.2.3 Implications for Processing versus Linguistic Approaches to Intervention of Nonfluent Aphasia

Linebarger and her colleagues (2004) propose that Sentence Shaper’s processing support helps to alleviate the impact of “slowed retrieval and/or rapid decay of linguistic information” (p. 269). In Linebarger et al.’s (2000) study, they demonstrated that the processing support provided by Sentence Shaper without the lexical support of the word finder and side buttons allowed for greater structural and morphological complexity in the participants’ aided narratives. Although Linebarger et al.’s (2004) study included the use of lexical support in the form of the word finder and side buttons, they claim that the significant structural improvements in one participant’s aided productions is also evidence that processing support can improve the morphosyntactic ability of individuals
with nonfluent aphasia. This current study was based on the methodology used in Linebarger et al. (2004). The structural and morphological improvements Nicole demonstrated in her aided narratives add further support to the benefits of processing approaches of intervention.

Nicole’s performance also provides an interesting example of Kolk’s (1998) activation theory. As previously described, Nicole often repeated and expanded her utterances until she was satisfied with the sentence, which she then recorded using Sentence Shaper. In this way, Nicole was seen to use Sentence Shaper more as a prompt than an actual workspace for creating sentences. This strategy of restarts was also evident in Nicole’s final narratives. Kolk suggests that these restarts allow the speaker to benefit from activation remaining from previous attempts at the utterance, thereby reducing the time needed to reach the activation threshold.

In reflecting on the way in which Nicole used Sentence Shaper, the use of fillers and false starts in her speech may have been reinforced by her strategy of repeating and expanding her utterances, as this often included the repetition of many filler words and false starts. On the other hand, Nicole’s practice of saying full sentences as opposed to chunking the utterance into separate parts may have contributed to the production of morphosyntax in her unaided narratives; however, this was at the cost of increased production of filler words and false starts which detracted from the overall informativeness of the narrative. The listener perception task indicated that although listeners were sensitive to changes in morphosyntax, improvement in morphosyntax did not necessarily contribute to their perceptions of a better story. For example, Nicole’s Cowboy Story post-treatment narrative contained more complex morphosyntax which
most listeners commented on; however, many listeners did not use this factor in their judgment about which story was better. For listeners, it appeared to be the content of the stories which impacted their ratings.

However, it was evident that despite the processing support provided by Sentence Shaper, Nicole continued to have difficulties with certain aspects of language. Nicole’s initial assessment of locative relations demonstrated that this was an area of weakness for her. Many of her answers had the arguments in reverse order. For example, when presented with a picture of a chicken in an egg, Nicole chose the sentence “the egg is in a chicken”. This ability did not appear to improve over the course of the study with the use of Sentence Shaper. Nicole often seemed to realize that her sentence was missing a preposition, but had difficulty choosing the correct one from the side buttons.

Furthermore, Nicole demonstrated a deficit with verb-argument structure. This was particularly evident in her *Cowboy Story* narratives. The verb *switch* was often used incorrectly by Nicole in both the unaided and aided narratives. It was apparent that she had difficulty with the thematic role mapping for this rather complex verb. Interestingly, these deficits have a commonality in that they all involve establishing relations. Whether these deficits are best explained by reduced processing resources or specific linguistic impairments remains unclear; however, it is evident that the processing support provided by Sentence Shaper did not alleviate these difficulties. Even though Sentence Shaper provides processing support, the program does not entirely eliminate the demands of putting a sentence together. Memory demands placed on the user when organizing the icons and the user must still establish the relations in the sentence, whether it is verb-argument or prepositional relations. The question remains then whether direct
intervention targeting these areas of deficit would have beneficial effects on Nicole’s language ability.

5.2.4 Generalization to Conversational Speech

Past research has shown that the speech characteristics of individuals with nonfluent aphasia can vary depending on the task demands (Heeschen & Schegloff, 2003). As discussed in Chapter One, the speech samples obtained from picture description or fairytale retelling are often quite different from those obtained from conversations. Therefore, the finding that the improvements Nicole demonstrated in her final unaided narratives did not appear to generalize to her natural, conversational speech is not surprising. After a series of experiments, Heeschen and Schegloff reported that the use of telegraphic speech by people with agrammatism is “not an all-or-none phenomenon” (p. 242). They found that use of telegraphic speech, or non-finite utterances, occurred in normal interactions, whereas in non-interactional storytelling contexts, there was an increase in the use of finite verbs (For further discussion, see Kolk, 1995, 2001). Even when task demands were increased in the storytelling condition, telegraphic speech was not used. From this, Heeschen and Schegloff concluded that the use of telegraphic speech is an adaptive strategy which is “interactionally motivated” (p. 249). Nicole’s superior morphosyntactic performance in the narratives versus that in conversation provides support for this finding.

Perkins (2003) drawing on Clark and Schaefer’s model of conversations, provides another explanation that is relevant to the findings in this study. This model of conversation suggests that there are two components within a conversation: the
presentation stage and the acceptance stage. The presentation phase occurs when an utterance is presented by one interlocutor. The acceptance phase is then initiated by the second interlocutor and establishes that the utterance has been sufficiently understood. In this way, conversations are collaborative, and both interlocutors are responsible for the message transmission. Another important principle of this model is that interlocutors work to minimize the effort spent in either phase of the conversation. Thus, in conversations with individuals with aphasia, the dyad’s effort is minimized if the unimpaired partner takes a greater responsibility for message generation. This pattern was evident in the conversations with Nicole. Less effort was expended if Nicole’s utterances were expanded by the conversation partner than if she was required to produce the entire message herself. In contrast, the narrative condition was non-collaborative, and the responsibility for the content of the message rested solely with Nicole. In this context, her language was more structured and grammatically complex, although, this situation was much more effortful for her. Clearly, the context was an important determiner of Nicole’s language characteristics.

5.2.5 The Integration of Sentence Shaper into Conversation: Lessons from Nicole

It is difficult to comment on precisely how Sentence Shaper was used in conversation as there was only one instance of spontaneous use of the program in this way. The conversation in which Sentence Shaper was used spontaneously occurred during a situation which I had created to explore use of the program in conversation. In this situation, Nicole had already played one message for Mira and following this spontaneously chose to play another message. In this way, Nicole was seen to initiate a
new topic of conversation by playing the Sentence Shaper message. However, it is not clear how Sentence Shaper could be successfully integrated into ongoing conversation. Higginbotham & Wilkins (1999) state that use of AAC in conversation is at risk of not following the “temporal imperative” (p. 51) or, in other words, causing a disruption in the temporal flow of conversation. In the case of Sentence Shaper, the time it takes to turn on the computer and choose a message would violate the temporal imperative.

Nicole’s use of Sentence Shaper messages to initiate conversation was quite successful as evidenced by the conversation with Mira and the sharing of the Mexico message at the stroke group. As previously described, while a message was playing, Nicole talked along with the recording. This strategy had the effect of making the off-line Sentence Shaper message on-line. The participant in Waller and Newell’s (1997) study on PROSE was also found to use this strategy. “HM reads through the text on the screen while pointing at the words as if she is ‘telling’ the story to her communication partner” (p. 295). Clearly, there is motivation for users of off-line devices to attempt to make the messages on-line in conversation.

5.3 The Participants’ Perspectives

5.3.1 Changes in Communication Ability

Although the structural and morphological changes of Nicole’s conversational speech did not appear to improve following use of Sentence Shaper, the questionnaire data and feedback from Nicole and Eileen indicate that some positive change in Nicole’s ability to communicate was noticed by both participants. Two factors made it difficult to describe more precisely what these changes were. I was unable to provide an objective
measure of change in conversational abilities as my relationship with Nicole changed throughout the study. Therefore, changes I noticed in conversation could not confidently be attributed to improvement in language skill as they may have reflected a change in our relationship. For instance, Nicole’s ability to initiate conversation was seen as improving throughout the study; however, this may have be due to the fact that we knew more about each other and she felt more comfortable conversing with me. A second factor which made it difficult to assess change is the fact that conversations are context dependent. There are many factors which contribute to one’s performance in a conversation; the communication partner, topic of conversation, and fatigue are a few examples. Nicole’s conversational skills varied depending on these different factors.

From Eileen’s perspective, her interactions with Nicole were not considered to be real conversations. She stated that the majority of their interactions focused on Nicole’s needs and wants. These types of interactions are considered as serving a transactional function which is defined as the exchange of information and content (Brown & Yule, 1983). Apparently, the interactional function of language was missing from Eileen’s conversations with Nicole. This is the language function responsible for establishing and maintaining relationships. Brown and Yule report that it is interactional language, rather than transactional language, that forms the majority of our everyday interactions. It is understandable then, that Eileen should feel that something was different about the conversations she had with her daughter. The important social connection we gain through interactional language was often absent from their conversations.

Another interesting aspect of Nicole and Eileen’s conversations was the way in which Eileen often spoke for Nicole. As described previously, Croteau and Le Dorze
(2006) found that this behaviour can decrease the participation in conversation of the person with aphasia, and that "speaking for" behaviours had the tendency to occur in relationships where the non-impaired partner perceived him or herself as overprotecting the person with aphasia. In Nicole and Eileen's situation, it was apparent that neither of them considered this behaviour to be overprotective. Nicole often asked her mother to speak for her and Eileen readily provided this help when requested. Whether or not this adversely affected the generalization of structural and morphological gains seen in Nicole's narratives to her conversational speech is unknown; however, it is clear that having Eileen speak for her was something that both Nicole and Eileen perceived as valuable.

5.3.2 Acceptance of Sentence Shaper as an AAC Device

Obviously, acceptance of AAC had a considerable impact on the ways in which Sentence Shaper was used in everyday communication by Nicole. Clearly, Nicole and Eileen were reluctant to use Sentence Shaper as an augmentative device. This lack of acceptance will now be discussed in respect to Lasker and Bedrosian's (2001) AAC Acceptance Model, which outlines three contributing components: milieu, person, and technology. The area of milieu, which includes the communication partner and environment, was a major factor in the way in which Sentence Shaper was used. Use of the program as an AAC device clearly did not fit with Eileen's expectations of Nicole's language recovery, and she did not encourage Nicole to use Sentence Shaper in this way. Furthermore, Nicole's dependence in communicating created an environment which did not facilitate the use of Sentence Shaper for communication purposes. Other personal
characteristics also impacted the acceptance of Sentence Shaper as AAC. Nicole was very much still focused on language recovery and was not motivated to accept an AAC device at this time. Despite the success Nicole experienced with e-mail and the pride she clearly had in her narratives, the effort and frustration she experienced while making messages with Sentence Shaper further decreased her motivation to use the program. The technology component was a positive factor in this equation. Nicole was a very successful user of technology and seemed to enjoy this aspect of Sentence Shaper. Overall, however, the costs of Sentence Shaper outweighed the benefits, and this in turn led to the lack of acceptance of Sentence Shaper as an AAC device. Nonetheless, both Nicole and Eileen requested a copy of Sentence Shaper at the end of the study, suggesting that they are “partial/reluctant” users of AAC, according to Lasker and Bedrosian’s model.

Past research has shown that the attitudes families have towards AAC can hinder its use. A study done by Lasker (1997, as cited in Hux et al., 2001) demonstrated that despite the fact that families rated the high-tech AAC option as the easiest to understand, family members preferred listening to natural speech. The belief that language recovery would happen with further therapy and effort was seen as the cause of this preference. This sentiment, although not explicitly stated by Eileen, resounded in many of my interactions with her. She very much wanted to see her daughter communicating without the aid of Sentence Shaper.

In Waller et al.’s (1998) investigation of the TalksBac system, one participant was found to be reluctant to use the program and refused to use it with his wife even though it was successful in augmenting his communication. This situation is comparable to
Nicole’s use of Sentence Shaper. Even though she was capable of using the program to create more informative and complex narratives than she was able to with her unaided speech, she was reluctant to use the program in conversation. It is evident from these examples, that despite an individual with aphasia being capable of using an AAC device it may not necessarily be accepted by that person.

5.4 An Integration of Perspectives

Throughout the study a tension existed between wanting to promote Nicole’s independence and her dependence on others. It is paradoxical that with Nicole and Eileen’s focus on Nicole’s language therapy and goal of language recovery that many of their behaviours seemed to promote Nicole’s dependence on her communication partners. This tension is exemplified by Croteau and Le Dorze’s (2006) idea of overprotection and “speaking for” behaviours versus Perkins’s (2003) principle of economy of effort. Croteau and Le Dorze suggest that overprotection of individuals with aphasia and speaking for them will lead to reduced participation in conversation and may in fact limit the effects of therapy. On the other hand, according to Perkins’s principle, effort may be reduced in conversations with people with aphasia if the conversational partner “speaks for” the individual with aphasia. Clearly there is a tradeoff between minimizing the effort expended in conversation and promoting the independence of the individual with aphasia in conversation. In the case of Nicole and Eileen, it appears as though they have chosen to minimize their effort by having Eileen “speak for” Nicole. The question that remains is what effect this behaviour has on Nicole’s language recovery.
5.5 How Do the Principles of a Social Model Apply to this Study?

Results of the study provide insights into the use of a social model in the treatment of aphasia. There are several areas of the study met the principles of the social model philosophy outlined by Byng and Duchan (2005), and there were also many instances in which these principles were not met.

The first principle of the social model philosophy described by Byng and Duchan (2005) states that the healthcare service users and providers should work together collaboratively rather than having a relationship in which the person with the disability is dependent on the healthcare provider. The importance of this principle was clearly illustrated throughout the study in the power dynamics of the relationship between Nicole and me. Initially, I resisted Nicole’s preference to work with others on her Sentence Shaper messages. However, I finally realized that as an equal contributor to this study, Nicole had the right to decide how she was going to make her messages. Eventually, I came to respect Nicole’s decision to work with others as this clearly made sense in the context of her life.

The second principle proposes that people with disabilities should be involved authentically in all aspects of the decision making process in regard to their own health and healthcare in general. It is interesting to note that while Nicole agreed to participate in this study, she was never asked whether working on narrative production with a software program was a goal she was interested in pursuing. Furthermore, she was never consulted in regard to whether she was interested in using a high-tech AAC device. If given the choice, Nicole may have never chosen to work on her narrative ability, and this could possibly explain her reluctance to make messages with Sentence Shaper. In
addition, it is unlikely that Nicole would have chosen an augmentative communication goal for therapy. It was clear throughout the study that Nicole enjoyed customizing the side buttons and word finder. This situation was one in which Nicole could become authentically involved in the decision making process. As previously described, the power dynamics shifted in this situation to an equal relationship in which Nicole and I were both able to suggest ideas of words to be added or changed.

Byng and Duchan describe the third principle of the social model philosophy as the need to create therapies which are engaging experiences for people with disabilities. It was evident from Nicole’s reluctance to use Sentence Shaper to make messages, that this was not an engaging experience for her. However, sharing the messages as e-mails and in conversation appeared to be something that Nicole valued. Unfortunately, the processing costs of making the messages outweighed the benefit she received from sharing the messages. This point illustrates that real-life activities, such as sharing stories with others, can be very engaging, and that therapy which is able to achieve this can be very motivating for people with aphasia. In contrast, experiences which do not relate to real-life (i.e., making narratives alone on a computer) may not be engaging or motivating.

The final two principles are related to how people with disabilities should be involved in the decision making process in healthcare organizations and that these organizations should be accountable to the people they serve. These principles address issues of working with people with disabilities at a higher level than the individual client and clinician relationship explored in this study. However, a social model is certainly relevant to researchers and designers of AAC technology. Clearly, it is useful and necessary to work with people with disabilities when designing devices which will
ultimately be used by them. In this way, consumers of AAC technology have a voice in the products which are developed and the issues they feel still need to be addressed by technology.

5.6 Implications for Clinical Practice

The results of this study suggest that practice in narrative production with the processing support provided by Sentence Shaper can lead to increases in the morphosyntactic complexity of unaided narratives. In another study investigating the effects of a treatment program focused on story retelling, similar results were found (Peach & Wong, 2004). Following a 10-week program involving narrative production, the participant demonstrated improved expressive syntax. However, it was apparent in Nicole's case that the improved morphosyntactic skills she demonstrated in her narratives did not generalize to her conversational speech. Clearly, clients will need to be supported in developing these new skills in a conversational context.

In respect to the use of Sentence Shaper as an AAC device, this study highlights the importance of considering contextual factors when recommending an AAC device to a client. Personal factors such as attitudes, expectations, and communication style, and the environment in which the device will be used will contribute greatly to the acceptance of an AAC device. Attention should also be given to the communication partners, as they can also influence the ways in which an AAC device will be used.

Furthermore, the study illustrates important aspects of the social model and how this model can be applied to treatment for people with aphasia. As previously described, Nicole was never asked whether she was interested in working on narratives, and this
may have explained her lack of motivation to work with Sentence Shaper. Therapy is costly and often requires many hours of work for both the speech-language pathologist and person with aphasia. If therapy goals are not viewed as meaningful and valuable to the client, it is likely the client will not be a motivated participant in therapy.

5.7 Limitations of the Study

A substantial limitation to this study was that a stable baseline was not established prior to the beginning of the study. Therefore, changes in language measures and questionnaire scores can not with confidence be attributed solely to use of Sentence Shaper. The fact that Nicole was working on language therapy worksheets in addition to the use of Sentence Shaper was also a limiting factor in this study. It is unclear what impact these worksheets had on Nicole’s language ability and whether this type of language therapy had any effect on Nicole’s narrative ability.

In regard to the replication of Linebarger et al.’s (2004) study, an additional limitation is the fact that the narrative elicitation task differed from the tasks used in this study, limiting the comparisons which can be made across the participant’ narratives.

5.8 Directions for Future Research

Results from this study suggest that Sentence Shaper has the potential to augment communication in social contexts; however, the participants’ personal and environmental factors limited the use of the program in this way. Further studies with a greater number of participants with aphasia would be beneficial to explore how Sentence Shaper could be used as an AAC device in different contexts. This would also allow for further
investigation of the impact of Sentence Shaper on conversational speech. Structural and morphological characteristics of Nicole’s language in conversation did not appear to improve with use of Sentence Shaper. As this was not measured in Linebarger et al.’s (2000, 2001, 2004) studies, it is not known whether Sentence Shaper had a significant impact on those participants’ conversational speech. Clearly confirming whether use of Sentence Shaper can improve conversational speech is a necessary step in determining its potential as a language therapy tool.

Finally, as suggested by Linebarger and colleagues (2001), Sentence Shaper could be used in various ways depending on the participant’s language impairment. The way in which users of Sentence Shaper are able to construct utterances may shed light onto different underlying impairments and could add further to the literature on sentence processing.

5.9 Conclusion

This study set out to investigate the effects of extended use of Sentence Shaper on language structure and explore the ways in which the program could be used in everyday life to augment communication. The four-month case study with Nicole and Eileen revealed several interesting findings. Following use of Sentence Shaper, Nicole’s unaided narratives were found to be more structurally and morphologically complex, however, a similar improvement was not demonstrated in the informativeness of these narratives. While use of Sentence Shaper increased the CIU measures due to the lack of filler words, it did not facilitate the production of a more complex story structure in the final aided narratives.
This study highlights that benefits can occur from working on narratives in a therapy setting; however, in Nicole’s case, the language improvements seen in her narratives did not appear to generalize to her conversational speech. In the second component, Sentence Shaper messages were used by Nicole with e-mail and in conversation. From my perspective, these uses were quite successful; however, Nicole and Eileen were reluctant to accept Sentence Shaper as a device to augment communication in conversation. The ICF provided a useful framework for analyzing the impact of Sentence Shaper on Nicole’s communication. The qualitative measures conducted in this study facilitated the use of a social model of intervention. Within this model, people with disabilities are seen as experts in their own conditions and their input into healthcare services is viewed as a crucial component. Gaining the perspectives of the participants in this study provided an important source of data. Use of the ICF framework and social model principles allowed for a deeper investigation of the factors affecting the treatment impact of Sentence Shaper and its use in everyday communication. This type of investigation was useful in providing answers, but also in generating additional questions which have the potential to be explored further in research and in clinical settings.
References


Appendix A: Consent Forms

Consent Form for Person with Aphasia

Consent Form

Investigating Sentence Shaper:
Can a processing prosthesis augment communication?

Principle Investigator: Erin Albright, UBC Masters Student

Faculty Advisor: Barbara Purves, M.Sc, SLP(C), Clinical Professor

Purpose: This research project is part of Ms. Albright’s Masters’ thesis. The purpose of this study is to learn about how the Sentence Shaper, a story-telling tool, can be used in everyday life by individuals with aphasia, and to find out whether improvements in language ability can be seen following extensive use of the Sentence Shaper. You are being asked to take part in this study because you have aphasia.

Study Procedures: If you agree to take part in this study, Ms. Albright will be assessing your language ability. After that, she will visit you one to two times per week over approximately three to four months. These visits will take place in your home or in another place of your choosing. Each visit will last for one to two hours at a time that is best for you.

At the beginning of each visit, Ms. Albright will make sure that you are still willing to take part in the research. In the first few weeks of meetings, Ms. Albright will be asking questions to you and your communication partner to learn more about communicating with aphasia. During this time, you and your communication partner will work out with Ms. Albright when she can visit over the next three to four months.

During the fourth and fifth weeks, training of the Sentence Shaper will commence. You will be instructed on how to use the Sentence Shaper on your home computer. You will be given a log book to record how often you are using the Sentence Shaper, with whom you are using the sound files, and what the purpose is.

Following the training period, you will be asked to practice using the Sentence Shaper for approximately eight weeks. Ms. Albright will continue to visit you during this time to discuss how the program is working for you and to explore different ways the Sentence Shaper could be used. Ms. Albright will also be talking to you and your communication partner to find about what you feel the strengths and weaknesses of the Sentence Shaper are. For some of the visits, Ms. Albright will ask for permission to record the conversation with either a video camera or a tape-recorder. Everyone who takes part in the conversation will be asked for their permission to be recorded.
Consent: I understand that my consent in this study is entirely voluntary and that I may withdraw from the study or refuse to participate at any time.

I have received a copy of this consent for my own records.

I consent to participate in this study.

_________________________________________  __________________________
Subject Signature                          Date

Consent to Show Videotapes and Sound Files for Scientific and Educational Purposes (to be completed in the course of study)

I have had the opportunity to look at videotapes made of me in the course of the study and to listen to sound files created by me on the Sentence Shaper. I consent to the showing of these videotapes and sound files for scientific and educational purposes. I understand that no additional identifying information will be given with these tapes during such exhibition.

_________________________________________  __________________________
Subject Signature                          Date
Consent Form for the Communication Partner

Consent Form

Investigating Sentence Shaper:
Can a processing prosthesis augment communication?

Principle Investigator: Erin Albright, UBC Masters Student

Faculty Advisor: Barbara Purves, M.Sc, SLP(C), Clinical Professor

Purpose: This research project is part of Ms. Albright’s Masters’ thesis. The purpose of this study is to learn about how the Sentence Shaper, a story-telling tool, can be used in everyday life by individuals with aphasia, and to find out whether improvements in language ability can be seen following extensive use of the Sentence Shaper. You are being asked to take part in this study because you communicate regularly with someone who has aphasia.

Study Procedures: If you agree to take part in this study, Ms. Albright will visit you multiple times over approximately three to four months. These visits will take place in your home or in another place of your choosing. Each visit will last for one to two hours at a time that is best for you.

During the first visit, Ms. Albright will ask you to complete a questionnaire that looks at how effectively you feel you are able to communicate with someone who has aphasia. She will also ask you a few questions about what it is like to converse with the person with aphasia.

At the beginning of each visit, Ms. Albright will make sure that you are still willing to take part in the research. In the first few weeks of meetings, Ms. Albright will be asking questions to you and the person with aphasia to learn more about communicating with aphasia. During this time, you and the person with aphasia will work out with Ms. Albright when she can visit over the next three to four months.

During the fourth and fifth weeks, training of the Sentence Shaper with the person with aphasia will commence. You will not be expected to take part in these sessions.

Following the training period, the person with aphasia will be practicing using the Sentence Shaper. Ms. Albright will continue to visit you during this time to discuss with you and the person with aphasia how you feel the program is working and to explore different ways the Sentence Shaper could be used. Ms. Albright will also be talking to you to find out about what you feel the strengths and weaknesses of the Sentence Shaper are. For some of the visits, Ms. Albright will ask for permission to record the conversation with either a video camera or a tape-recorder. Everyone who takes part in the conversation will be asked for their permission to be recorded.
Investigating how the Sentence Shaper can be used in everyday life.

We want to know if the Sentence Shaper can help you.

Does it help you?  

YES  

NO  

---

166
How often?
1-2 Sessions per week.
A minimum of 2 hours per week with the researcher
For 3-4 months.

Where?
Your House

When?
to be arranged
What can you expect?

**Weeks 1-3:** A researcher will assess your language skills and talk with you to find out more about communicating with aphasia.

**Communication**

- conversing
- reading
- writing
Weeks 4-5: Training with Sentence Shaper and helping the researcher learn more about communicating with aphasia.

The researcher will show you how to use the Sentence Shaper on your computer.

Talking with the researcher about how you communicate.
**Weeks 6-14:** Practice with the Sentence Shaper. The researcher, you, and a close family member or friend will work together to find out different ways to use Sentence Shaper and talk about what you like and don’t like about the program.
Weeks 15-16: Final assessment of language skills to find out if there is any change.

At this point you can keep Sentence Shaper if you want it.
The researcher may **audiotape** or **videotape** some sessions.
Right to Withdraw

You can stop at any

It is your

It is ok to
Potential Risks:

❌ There is **NO** danger in participating in this study

✔ Everything is confidential

Will this *harm* you? **NO**
Concerns

not satisfied

If you have concerns about your treatment or rights, you can call the UBC Office of Research Services.

Research Subject Information Line: 604-822-8598
Project Title: Investigating Sentence Shaper

Project Consent:
The information on the previous 12 pages has been explained to me.

I agree to participate in this research project.

I have been given a copy of this form.

Signature of Participant

Date
Appendix C: Interview Guide

These questions were asked at the beginning of the study to the individual with aphasia:

1. What are some challenges you have when talking?

2. Do you use any strategies to help get your message across? What ones work best?
   -if this is hard I can ask more yes/no questions such as do you ever write things down, do you use gestures, etc.

3. What situations are most easy for you to communicate in?

4. What situations are hardest for you to communicate in?

5. What are some activities that you like doing?

6. How often do you use your computer?

7. What do you use your computer for?

8. Did you use a computer before your stroke?

These questions were asked at the end of the study to the individual with aphasia:

9. What do you think the benefits of the Sentence Shaper are?

10. What things about the Sentence Shaper make it hard to use?

11. Do you think the Sentence Shaper has helped you talk better?

12. Do you like using the Sentence Shaper?

13. Would you like to continue using the Sentence Shaper?

14. Do you think the Sentence Shaper has helped in your communication with ____ (communication partner’s name)?

15. Would you change anything about the Sentence Shaper?

These questions were asked at the beginning of the study to the communication partner:

1. What challenges do you face when trying to talk to ____ (individual with aphasia’s name)?
1. What situations do you think are easiest for ___ to communicate in and which situations are hardest?

2. What do you think ___ finds most difficult about having aphasia?

3. What things do you and ___ do that make it easier to understand each other? Do you have any specific strategies that make things easier?

These questions were asked at the end of the study to the communication partner:

1. What do you think the benefits of the Sentence Shaper are?

2. Is there anything about the Sentence Shaper that you don’t like or would change?

3. Do you think the Sentence Shaper has made a noticeable change to ___ ability to communicate?

4. Do you think there are any barriers to using the Sentence Shaper?

5. Do you like it when ___ uses the Sentence Shaper in conversation? (this question will only be asked if the individual with aphasia actually uses the program in conversation)
Appendix D: Key to Transcription

Timing features

.. Pauses of \( \leq 0.5 \) second

... Pauses of < 2 seconds

<\text{n}> Duration of pauses \( \geq 2 \) seconds

= Indicates overlap, placed at beginning and end of overlapped segments

== Latched utterances (i.e., immediately following but not quite overlapping preceding utterance)

Prosodic features of talk: Speech rate and stress

: : Lengthened utterance

Strategies for marking how particular features are related to talk

{[ ]} Nonlexical phenomena (vocal and nonvocal) that overlay talk

[ ] Nonlexical phenomena (vocal and nonvocal) that interrupt talk

Non-talk vocal features that accompany talk

[hh] Audible exhalation

[.hh] Audible inhalation

[heh-heh] Indicates phenomenon, not the quality, of laughter

Analyst's strategies for denoting problematic stretches of talk

( ) Unintelligible speech
Appendix E: Schedule of Data Collection

<table>
<thead>
<tr>
<th>DATE/TIME</th>
<th>PEOPLE PRESENT</th>
<th>PLACE</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar. 3, 1:00-2:30</td>
<td>Erin, Dr. Purves, Nicole and Eileen</td>
<td>Eileen's house</td>
<td>Initial meeting</td>
</tr>
<tr>
<td>Mar. 10, 10:30-12:30</td>
<td>Nicole, Eileen, and Erin</td>
<td>Eileen's house</td>
<td>Assessment</td>
</tr>
<tr>
<td>Mar. 14, 1:00-3:15</td>
<td>Nicole, Eileen, and Erin</td>
<td>Eileen's house</td>
<td>Assessment and interview with Nicole and Eileen</td>
</tr>
<tr>
<td>Mar. 17, 10:30-12:30</td>
<td>Nicole, Eileen, and Erin</td>
<td>Eileen's house</td>
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<td>Mar. 29, 3:45-5:15</td>
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<td>Eileen's house</td>
<td>Installed SS; messages about scrapbook (Nicole's computer lessons)</td>
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<td>Mar. 31, 2:00-3:45</td>
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<td>Scrapbook messages (Nicole's birthday party)</td>
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<td>Nicole, Eileen, and Erin</td>
<td>Eileen's house</td>
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<td>Apr. 7, 2:00-4:00</td>
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<td>Eileen's house</td>
<td>Introduced word finder; practiced making sentences with side buttons</td>
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<td>Apr. 11, 2:00-3:30</td>
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<td>Eileen's house</td>
<td>Conversation with Nicole and Eileen; e-mailed Mira</td>
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<td>Apr. 14, 11:00-12:30</td>
<td>Nicole, Eileen, and Erin</td>
<td>Eileen's house</td>
<td>Received e-mail back from Mira; e-mail to Dr. Purves</td>
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<td>April 15</td>
<td>Email from Nicole to Erin</td>
<td>Eileen's house</td>
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<td>Eileen's house</td>
<td>Resent e-mail to Dr. Purves; email to Aunt Diana</td>
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<td>Nicole showed me e-mails she had done to Shelley, Ella, Diana, and Scott;</td>
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<td>Date</td>
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<td>Participants</td>
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<td></td>
<td>Erin</td>
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<td>Erin</td>
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<td>May 2</td>
<td>1:30-3:00</td>
<td>Nicole, Eileen,</td>
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<td>Shelley, and Erin</td>
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<td>9:15-1:00</td>
<td>Nicole, Eileen, Erin,</td>
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<td></td>
<td>stroke group members</td>
<td>Erin’s car, and Stroke</td>
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<td>group</td>
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<td>Nicole, Eileen, and</td>
<td>Eileen’s house</td>
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<td></td>
<td>Erin</td>
<td></td>
</tr>
<tr>
<td>May 12</td>
<td>2:00-3:30</td>
<td>Nicole and Erin</td>
<td>Nicole’s apartment</td>
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<tr>
<td>May 18</td>
<td>2:30-4:00</td>
<td>Nicole, Eileen, and</td>
<td>Eileen’s house</td>
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<tr>
<td></td>
<td></td>
<td>Erin</td>
<td></td>
</tr>
<tr>
<td>May 30</td>
<td>3:15-4:30</td>
<td>Nicole, Eileen, and</td>
<td>Eileen’s house</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Erin</td>
<td></td>
</tr>
<tr>
<td>June 2</td>
<td>3:00-4:45</td>
<td>Nicole, Eileen, and</td>
<td>Eileen’s house</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Erin</td>
<td></td>
</tr>
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<td>June 6</td>
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<td>Nicole, Eileen, and</td>
<td>Eileen’s house</td>
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<td></td>
<td></td>
<td>Erin</td>
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</tr>
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<td>June 8</td>
<td></td>
<td>E-mail to Erin from</td>
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<td></td>
<td></td>
<td>Nicole</td>
<td></td>
</tr>
<tr>
<td>June 9</td>
<td>1:00-3:00</td>
<td>Nicole, Eileen, Mira,</td>
<td>Eileen’s house Restaurant</td>
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<tr>
<td></td>
<td></td>
<td>and Erin</td>
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<td>June 13</td>
<td>3:00-4:30</td>
<td>Nicole, Eileen, and</td>
<td>Eileen’s house</td>
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<td>Erin</td>
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<td>June 15</td>
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<td></td>
<td></td>
<td>and stroke group</td>
<td>Erin’s car; stroke group</td>
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<td></td>
<td></td>
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<tr>
<td>June 19</td>
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<td>Nicole</td>
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<td>June 20, 2:00-4:00</td>
<td>Nicole, Eileen, and Erin</td>
<td>Eileen’s house</td>
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<tr>
<td>June 21</td>
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<td>Nicole</td>
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<tr>
<td>June 22, 3:30-5:00</td>
<td>Nicole, Eileen, and Erin</td>
<td>Eileen’s house</td>
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</tr>
<tr>
<td>June 26, 3:30-5:00</td>
<td>Nicole, Eileen, and Erin</td>
<td>Eileen’s house</td>
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<tr>
<td>June 29, 2:00-5:00</td>
<td>Nicole, Eileen, and Erin</td>
<td>Eileen’s house</td>
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</table>
**Appendix F: List of Sentence Shaper Messages**

<table>
<thead>
<tr>
<th>Date</th>
<th>Subject</th>
<th>Length of Time to Make Message</th>
<th>People Involved in Making Message</th>
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<tbody>
<tr>
<td>March 29</td>
<td>Message about computer lessons from scrapbook</td>
<td>30 minutes</td>
<td>Nicole and Erin</td>
</tr>
<tr>
<td>April 3-4</td>
<td>Messages about events from scrapbook</td>
<td>2 hours</td>
<td>Nicole and Eileen; Nicole and Eileen volunteer</td>
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<tr>
<td>April 5-6</td>
<td>Message about Eileen and Eric</td>
<td>1.5 hours</td>
<td>Nicole and Eileen</td>
</tr>
<tr>
<td>April 7</td>
<td>Sentences using side buttons</td>
<td>2 hours</td>
<td>Nicole and Eileen</td>
</tr>
<tr>
<td>April 8</td>
<td>Visit with family</td>
<td>45 minutes</td>
<td>Nicole</td>
</tr>
<tr>
<td>April 9</td>
<td>Visit with friends; Jessica’s birthday</td>
<td>45 minutes</td>
<td>Nicole</td>
</tr>
<tr>
<td>April 11</td>
<td>E-mail to Mira (past volunteer)</td>
<td>45 minutes</td>
<td>Nicole, Eileen, and Erin</td>
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<tr>
<td>April 13</td>
<td>Stroke group activities</td>
<td>45 minutes</td>
<td>Nicole</td>
</tr>
<tr>
<td>April 14</td>
<td>Eric’s birthday from scrapbook; e-mail to Dr. Purves</td>
<td>1 hour</td>
<td>Nicole and Erin</td>
</tr>
<tr>
<td>April 14</td>
<td>E-mail to Erin</td>
<td>30 minutes</td>
<td>Nicole</td>
</tr>
<tr>
<td>April 18</td>
<td>E-mail to Aunt Diana; sentences using side buttons</td>
<td>1.5 hours</td>
<td>Nicole and Erin</td>
</tr>
<tr>
<td>April 20</td>
<td>E-mail to Aunt Diana, Ella (volunteer), Shelley, and Mark (Eric’s brother); Mira’s engagement; Valentine’s Day gift from Eric; Gym exercises</td>
<td>1.5 hours</td>
<td>Nicole and Eileen</td>
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<tr>
<td>April 21</td>
<td>Sentences using side buttons</td>
<td>1 hour</td>
<td>Nicole and Erin</td>
</tr>
<tr>
<td>April 23</td>
<td>E-mail to Erin</td>
<td>30 minutes</td>
<td>Nicole and Eileen</td>
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<tr>
<td>April 25-26</td>
<td>Stroke message</td>
<td>2.5 hours</td>
<td>Nicole and Erin; Nicole and Eileen</td>
</tr>
<tr>
<td>April 28</td>
<td>Start of Eric message</td>
<td>1 hour</td>
<td>Nicole and Erin</td>
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<td>May 3</td>
<td>E-mail to Uncle Wilson and Ella</td>
<td>45 minutes</td>
<td>Nicole and Eileen</td>
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<tr>
<td>May 7</td>
<td>Eric message; Michelle (friend) message</td>
<td>1 hour</td>
<td>Nicole</td>
</tr>
<tr>
<td>May 12</td>
<td>E-mail to Michelle</td>
<td>1 hour</td>
<td>Nicole and Erin</td>
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<td>May 16</td>
<td>Mother’s Day</td>
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<td>Nicole</td>
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<td>May 30-June 2</td>
<td>Mexico Message</td>
<td>2.75 hours</td>
<td>Nicole and Erin; Nicole</td>
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<td>June 8</td>
<td>Visit with Mira</td>
<td>1 hour</td>
<td>Nicole</td>
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<td>June 12</td>
<td>María’s birthday</td>
<td>1 hour</td>
<td>Nicole</td>
</tr>
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<td>Date</td>
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<td>Duration</td>
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<td>June 15</td>
<td>E-mail to Erin</td>
<td>45 minutes</td>
<td>Nicole and Eileen</td>
</tr>
<tr>
<td>June 18</td>
<td>E-mail to Erin (Father’s Day)</td>
<td>45 minutes</td>
<td>Nicole and Eileen</td>
</tr>
<tr>
<td>June 20</td>
<td>Thank you message to Eileen</td>
<td>1.5 hours</td>
<td>Nicole and Erin</td>
</tr>
<tr>
<td>June 21</td>
<td>E-mail to E (Nicole’s haircut)</td>
<td>45 minutes</td>
<td>Nicole and Eileen</td>
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<tr>
<td>June 22</td>
<td>Birthday message for Eric</td>
<td>1 hour</td>
<td>Nicole and Erin</td>
</tr>
<tr>
<td>June 26</td>
<td>Three Little Pigs</td>
<td>40 minutes</td>
<td>Nicole</td>
</tr>
<tr>
<td>June 29</td>
<td>Cowboy Story</td>
<td>30 minutes</td>
<td>Nicole</td>
</tr>
</tbody>
</table>
Appendix G: Transcribed Narratives

Pre-Treatment Cowboy Story Unaided

1. N: Um talk talk I mean um um I don’t know okay um <4> uh <6> um horses .. h horse .. um uh <2> I don’t know.
2. E: Just do your best to explain what’s going on in the pictures
3. N: Um .. um <3> a man and um a man <2> and um .. a man horse okay
4. E: Perfect
5. N: Yeah .. um and then um um .. hor horse and um um um and a man um .. um .. um this one [heh-heh] I don’t know
6. E: Uh huh
7. N: Um and then I mean um uh sleeping sleeping ..sleeping ..and um um .. b boy and um .. uh um gir and um man uh no no um boy boy and um .. boy and .. um <2> um oh a boy and um no a boy um and um um dog yeah and then [heh-heh] um sleeping sleeping sleeping sleeping and then yeah and then and then um oh ...
8. E: Uhhuh
9. N: And then and then I mean um um um uh no uh dog and dog and sleeping and um um this one and um .. um swish switch and I mean um I mean um um .. um um .. um hor horse leave leaving leave them and then and then um um boy um um yeah and then um okay uhhuhh I mean um sleeping and then um um dog yeah yeah this one and then um um .. boy and and boy and uh um horse oh oh oh gone gone and then and then [h] ohhh [heh-heh] um uh and then switch switch I mean I mean um um um switch this I mean switch this I mean swiptch
10. E: Um hmm um hmm
11. N: And then and then I mean um um um girl uh no uh dog and dog and sleeping and um um this one and um .. um swish switch and I mean um I mean um um .. um um .. um hor horse leave leaving leave them and then and then um um boy um um yeah and then um okay uhhuhh I mean um sleeping and then um um dog yeah yeah this one and then um um um .. boy and and boy and uh um horse oh oh oh gone gone and then and then [h] ohhh [heh-heh] um uh and then switch switch I mean I mean um um um switch this I mean switch this I mean swiptch
12. E: Perfect. Do you want to say anything else? Are you done?
13. N: No no no
14. E: Okay perfect that was great Nicole. Thank you.

Pre-Treatment Three Little Pigs Unaided

1. N: Wolf wolf no um
2. E: um hmm
3. N: Wolf wolf
4. E: Yup
5. N: Wolf okay okay okay um um hay hay okay I mean um no no no oh my God uh uh um uh um um uh pig pig um um um new ho new
6. E: house ne ne new house yeah yeah and then .. and then and then um:: oh um um um um ha I mean um um wolf and uh no no no I
mean um I mean [hh] uh uh ( ) I mean no no um I mean um hay
hay yeah hay um um um oh my God [hh] um
11. E: Keep going Nicole you’re doing really well ( )
12. N: Okay um .. um .. [hh] yeah yeah? yeah [hh] and then oh I mean um
.. um um um um pig uh pigs pigs um um pigs um um blow uh
13. uh blow blow them blow them yeah yeah and yeah and then and
then I mean uh two people two people and oh um [hh] [heh-heh]
14. um yeah I mean um um .. glass no I don’t know I mean I mean
15. um I mean .. uh I I don’t know ( ) no yeah and then I mean uh um
16. ho [hh] and then um um .. um um uh ( ) um um uh three ( ) three
and and um um three um um three and um um three and um
17. um brick brick = =
20. E: :
= = um hm
21. N: = = brick = =
22. E: = = um hm = =
23. N: And then and then um oh um um um um um brick okay
24. and um ... um ...and then oh uh safe safe safe ... okay sorry [heh-
25. heh] safe safe [heh-heh]
26. E: Okay
27. N: Safe [heh-heh] um safe yeah and then uh uh [hh] [hh] and then uh
28. uh [hh] [hh] and then [hh] [hh] [hh] and then and then uh brick
29. brick yeah uh yes yeah I don’t know ... [hh]
30. E: Um hm are you finished?
31. N: Okay yeah no no no no uh finish finish I don’t know
32. E: Okay perfect thank you so much

Post-Treatment Cowboy Story Unaided

1. N: Okay wait okay uh <4> um okay <2> the .. um the um .. um the
2. um the [throat clear] the um um uh um man is um um uh wearing ..
3. no oh okay okay the .. the okay .. the um um the um um la okay
4. um the lady no the man .. is riding .. riding ... uh the horse
5. E: Okay keep going good one
6. N: Okay .. um okay .. okay um <2> okay um okay .. the .. um kh the
7. ... um man is yawning .. uh tir uh okay the the .. um man is
8. yawning .. yawning .. and yawning yawning and and sleeping
9. sleeping okay and and okay okay .. okay uh oh .. she she sssshe no
10. uh .. he he .. is .. lying .. down no okay she is tired and oh um .. uh
11. and um and um and uh sleeping okay okay
12. N: And um::
13. E: Did you look at this one?
14. N: Oh my god
15. E: [heh-heh]
16. N: Okay okay okay okay okay okay okay the boy .. and the okay okay
17. oo okay okay sh sh okay okay um the uh um <2> the uh .. um uh ..
18. girl the um girl the um boy okay he he is .. switching seats no no

188
no she oh okay .. I mean ..okay she okay oh ... okay okay okay the
.. oh um um the um um the um um .. the horse is .. um .. the horse
is um um tr the horse is um .. um ...switching switching yeah the
horse is switching over there no okay okay the uh um the horse is
um switch ..switch switch switch
E: Okay
N: Okay okay okay um ... and and uh um and um and and um and um
.. uh and um and um and um .. um um um hor and um .. and
um um horse is um ... um switching um and um and um ... swi
okay um the horse is um um .. um leaving and um .. the dog is um
.. the dog is um switching
E: Okay um hum
N: [hh] okay the man okay .. okay the the um dog is um the is um the
dog is [throat clear] the dog is ... um um um um ... the dog is
switching .. uh o over o no no no no okay the okay the dog is
oh okay yeah the oh okay oh okay the um um the horse is uh uh
leaving leaving yeah
E: Um hum
N: Um yeah and and um the dog is uh swit switching um switching
um .. um .. the uh uh um man
E: Um hum
N: And <2> and okay um okay and um the girl the the uh the ma the
uh uh .. boy is um leaving leaving the girl is the the uh the uh uh
ma the uh uh gi um the the um boy the boy um is um uh uh si um
um quiet quiet
E: Um hmm
N: Oay and um [throat clear] and um okay the oh oh yeah ... leaving
no kay kay leaving the the uh the girl the boy is uh quiet the boy
the boy is .. on the okay the boy is .. um .. uh um qu .. um on the
um .. on the um .. um .. no no okay the man the gir the boy is qu
uh quiet
E: Um hm um hm
N: And and oh um the uh the um .. the um uh um um the .. um the um
man is ... the man is um .. um where do you where where .. um ..
where is the um .. where is the um dog? Oh no no okay the okay
wait ... the the man is um okay wait okay the dog no no the uh uh
okay switch uh no no no no .. the um ... um the um .. the um boy ..
the um uh dog is .. um ... okay okay the horse is gone and um and
.. and the uh dog is .. um [throat clear] um um switching ...
switching .. um .. switching
E: Um hm
N: Okay
E: Finished
N: Yeah
Post-Treatment *Three Little Pigs Unaided*

1. **N:** Okay [yawn] oh God [hh] um ... um ... pigs and wolf okay um the
   uh um ... um .. um I don’t know okay wait I mean .. go back yeah
   yeah yeah
2. **E:** Nope
3. **N:** No
4. **E:** No
5. **N:** [heh-heh] okay um pigs um okay um .. mm ... mm .. um ... pi uh
   there is uh no there is there is um ... uh uh there is .. there is um ..
   okay um there is .. there is uh ...there is three pigs
6. **E:** Um hmm
7. **N:** Um and the wolf .. blew the okay the wolf blewed uh uh blew the
   hay .. the wolf blew th ( ) uh uh the okay the wolf um um um
   the wolf um is .. no okay the wolf blew um um hay .. stop
8. **E:** Okay
9. **N:** And um um um uh the wolf okay the pigs the pig um um
   ran ran um ran away ran away
10. **E:** Um hmm
11. **N:** Okay the um uh the uh okay okay the wolf um um blow .. uh the
    stick ... and and um and um um three no one one two uh three
    no one one two uh three no one two two pigs uh uh away uh uh
    okay the okay wait the wolf .. the uh the uh pigs pigs uh uh ran out
    ran out
12. **E:** Um hmm
13. **N:** Ran out and and uh and uh and uh wolf wolf um um um um
    um um sh um oh okay the wolf um uh the wolf um .. um the
    wolf um .. the wolf uh .. blowed the um brick
14. **E:** Um hmm
15. **N:** Brick and .. and okay uh uh three one two three three um um pigs
    um um um uh run no uh uh ran no uh okay okay the okay the pigs
    stay stay no more
16. **E:** Okay

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**Mexico Message Unaided**

1. **E:** Can you tell me what you did in Mexico?
2. **N:** Oh oh um whole family um uh okay uh whole family um uh whole
   whole family uh um uh uh whole family um um whole family uh
   uh uh big big the the whole family um big uh big uh rent a
   room room okay rent a room rent a room = yeah = yeah
   = um hmm =
3. **E:** And um um uh uh Jacob uh Jacob and Robert are swimming
4. **E:** Um hmm
5. **N:** And uh uh I mean uh uh uh Eric uh uh uh Eric uh wearing
10. wearing a hat
11. E: Um hmm
12. N: Okay okay the hat the uh uh Eric uh Eric um wearing a sombrero
13. the hat
14. E: Um hmm
15. N: Uh uh I bought blanket, uh a blanket, rose .. rosary, uh sovernir, uh
16. uh a beautiful uh uh uh mirror and uh ... and uh uh t-shirt
17. E: Uh hmm
18. N: Uh I uh uh ka uh uh uh uh a uh uh ai um Scott uh uh
19. Scott uh Scott had a um um no okay okay happy happy no
20. kay no Scott uh uh birthday uh .. um uh okay okay my birthday
21. no kay the Scott uh um .. some some cake no no .. [heh-heh] I
22. don't know um um .. I don't know
23. E: Keep going
24. N: Um okay um .. oh um .. um um the house okay the the uh the boat
25. is uh the boat is um the boat is um um um the boat is lying um uh
26. lu lying the okay the the okay the boat uh uh the boat is fishing
27. fishing .. yeah
28. E: Um hmm
29. N: The mou the the um tunnel through the um um um .. water
30. E: Um hmm
31. N: The water I don't know I don't know no no .. the um the okay uh
32. uh stop
33. E: Okay
## Appendix H: QCL and CETI Scores

The Quality of Communication Life Scale (Paul, Frattali, Holland, Thompson, Caperton, & Slater, 2004)

<table>
<thead>
<tr>
<th>Item</th>
<th>Pre</th>
<th>Post</th>
<th>Post Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I like to talk with people.</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2. It’s easy for me to communicate.</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>3. My role in the family is the same.</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4. I like myself.</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5. I meet the communication needs of my job or school.</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>6. I stay in touch with family and friends.</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>7. People include me in conversations.</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>8. I follow news, sports, and stories on TV/movies.</td>
<td>1.5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>9. I use the telephone.</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>10. I see the funny things in life.</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>11. People understand me when I talk.</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>12. I keep trying when people don’t understand me.</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>13. I make my own decisions.</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>14. I am confident that I can communicate.</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>15. I get out of the house and do things.</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>16. I have household responsibilities.</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>17. I speak for myself.</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Mean score overall for items 1-17</td>
<td>2.8</td>
<td>4.1</td>
<td>4</td>
</tr>
<tr>
<td>18. In general, my quality of life is good.</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>
The Communicative Effectiveness Index (Lomas, Pickard, Bester, Elbard, Finlayson, & Zohhaib, 1989).

<table>
<thead>
<tr>
<th>Item</th>
<th>Pre</th>
<th>Post</th>
<th>Post Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>(scale ranging from 1-10; not at all able to as able as before stroke)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Getting someone’s attention</td>
<td>8.4</td>
<td>8.4</td>
<td>8.4</td>
</tr>
<tr>
<td>2. Getting involved in group conversation about him/her</td>
<td>0.9</td>
<td>2.8</td>
<td>2.8</td>
</tr>
<tr>
<td>3. Giving yes and no answers appropriately</td>
<td>6.2</td>
<td>8.6</td>
<td>8.6</td>
</tr>
<tr>
<td>4. Communication his/her emotions</td>
<td>7.3</td>
<td>7.1</td>
<td>7.1</td>
</tr>
<tr>
<td>5. Indicating that he/she understands what is being said to him/her</td>
<td>6.2</td>
<td>7.2</td>
<td>7.2</td>
</tr>
<tr>
<td>6. Having coffee-time visits and conversation with friends and neighbours (around, beside, or at home)</td>
<td>4.5</td>
<td>4.3</td>
<td>4.3</td>
</tr>
<tr>
<td>7. Having a one-to-one conversation with you</td>
<td>4.5</td>
<td>8.3</td>
<td>6.7</td>
</tr>
<tr>
<td>8. Saying the name of someone whose face is in front of him/her</td>
<td>6.0</td>
<td>9.1</td>
<td>9.1</td>
</tr>
<tr>
<td>9. Communicating physical problems such as aches or pains</td>
<td>7.4</td>
<td>9.2</td>
<td>9.2</td>
</tr>
<tr>
<td>10. Having a spontaneous conversation (i.e. starting the conversation and/or changing the subject)</td>
<td>3.5</td>
<td>4.5</td>
<td>5.8</td>
</tr>
<tr>
<td>11. Responding to or communicating anything (including yes or no) without words</td>
<td>7.7</td>
<td>7.3</td>
<td>7.3</td>
</tr>
<tr>
<td>12. Starting a conversation with people who are not close family</td>
<td>1.3</td>
<td>2.7</td>
<td>2.7</td>
</tr>
<tr>
<td>13. Understanding writing</td>
<td>4.4</td>
<td>7.0</td>
<td>8.6</td>
</tr>
<tr>
<td>14. Being part of a conversation when it is fast and there are a number of people involved</td>
<td>1.0</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>15. Participating in a conversation with strangers</td>
<td>1.0</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>16. Describing or discussing something in depth</td>
<td>0.9</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Overall language and communication skill during the previous week (scale ranging from 1-7; extremely poor to excellent)</td>
<td>3</td>
<td>5.5</td>
<td>5.5</td>
</tr>
</tbody>
</table>