# INFLUENCE OF EMOTIONALITY ON PRAGMATIC FEATURES OF DISCOURSE PRODUCED BY ARABIC-SPEAKING ADULTS WITH APHASIA

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#### ABSTRACT

A review of the literature indicates a facilitative effect of emotional content on communicative abilities in aphasia, including discourse production (e.g., Bloom, Borod, Obler, & Gerstman, 1992; Bloom, Borod, Santschi-Haywood, Pick, & Obler, 1996; Landis, Graves, & Goodglass, 1982; Ramsberger, 1979; Reuterskioeld, 1991). To explore how emotional content influences discourse-level pragmatic features in narratives produced by Arabic-speaking adults with aphasia, Grice's (1975) pragmatic framework for discourse analysis was adopted. The primary question addressed by the current study was whether or not discourse elicited using stimuli with emotional content (positive or negative) is superior in *quantity*, *quality*, *relevance*, and *manner* than that elicited using non-emotional content (neutral) in an aphasia group and a healthy group of adults.

Two experiments were conducted. The first experiment was designed to determine the appropriateness of the testing stimuli – a set of video-clips that had been purposefully constructed for this study. The goal was to ensure that each video-clip met specific requirements with regard to valence category, emotional intensity, logical sequence, and interest level. A group of young healthy adults narrated the events portrayed in the clips and completed an emotionality judgment questionnaire about the clips. Results of the stimulus validation experiment guided the selection of a subset of nine video-clips – three clips per emotional category: positive, negative, and neutral – that were utilized in the main experiment.

In the main experiment, discourse was elicited from a group of adults with aphasia and normal controls using the video-clips. Samples were analyzed for pragmatic features using six measures: <u>amount of production</u> and <u>communicative efficiency</u> to assess discourse *quantity*; <u>accuracy of production</u> to assess discourse *quality*; <u>coherence</u> to assess discourse *manner*; and <u>lexical</u> <u>selection</u> and <u>topic maintenance</u> to assess discourse *relevance*. Results indicated that emotional content positively influenced performance on the majority of pragmatic variables. Results also revealed that adults with aphasia were less appropriate than normal controls on the majority of discourse measures under investigation. The findings are discussed in relation to current models of emotional, cognitive, and language processing.

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# RÉSUMÉ

Une revue de la littérature indique un effet positif du contenu émotif sur les aptitudes communicatives dans l'aphasie, y compris la production de discours (e.g., Bloom, Borod, Obler, & Gerstman, 1992; Bloom, Borod, Santschi-Haywood, Pick, & Obler, 1996; Landis, Graves, & Goodglass, 1982; Ramsberger, 1979; Reuterskioeld, 1991).. Afin de savoir comment le contenu émotif influence les caractéristiques pragmatiques du niveau de discours dans les récits produits par les adultes arabophones ayant l'aphasie, le cadre pragmatique de Grice (1975) appliqué à l'analyse de discours a été adopté. L'objectif principal de cette étude était si oui ou non le discours produit en utilisant des stimuli avec un contenu émotif (positif ou négatif) était meilleur en quantité, qualité, pertinence, et manière à celui produit en utilisant le contenu non-émotif (neutre) avec un groupe ayant l'aphasie et un groupe d'adultes normaux.

Deux expériences ont été réalisées. La première expérience a été conçue pour déterminer la convenance des stimuli d'essai – une série de clips vidéo a été construite particulièrement pour cette étude. Le but était de s'assurer que chaque clip vidéo satisfait des conditions spécifiques en ce qui concerne la catégorie de valence, l'intensité émotive, la séquence logique, et le niveau d'intérêt. Un groupe de jeunes adultes normaux a raconté les événements présentés dans les clips vidéo ensuite le groupe a complété un questionnaire jugeant l'émotivité présente dans ces clips vidéo. Les résultats de l'expérience de validation de stimulus ont abouti à la sélection d'un sous-ensemble de neuf clips vidéo – trois clips par catégorie d'émotion: positive, négative, et neutre – qui ont été utilisé dans l'expérience principale.

Dans l'expérience principale, le discours a été produit par un groupe d'adultes ayant l'aphasie ainsi que des sujets-contrôles normaux utilisant les clips vidéo. Les échantillons ont été analysés afin de déduire les caractéristiques pragmatiques en utilisant six mesures: la quantité de production de discours et l'efficacité de communication pour évaluer la quantité de discours ; la précision de production pour évaluer la qualité de discours; la cohérence pour évaluer la manière de discours ; et enfin la sélection lexique et la maintenance de sujet pour évaluer la pertinence de discours. Les résultats ont indiqué que le contenu émotif a influencé positivement la performance sur la majorité des variables pragmatiques. En outre; les résultats ont révélé que les adultes ayant l'aphasie étaient moins appropriés que les contrôles normaux sur la majorité des mesures de discours sous étude. Les conclusions sont discutées en relation avec les modèles actuels de traitement émotif, cognitif, et de langage.

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#### **INTRODUCTION**

The past 25 years have witnessed increasing interest in functional communication in individuals with aphasia. One aspect of functional communication receiving particular attention by aphasiologists is discourse abilities. There is mounting evidence that discourse comprehension and production abilities in adults with aphasia are not reflected very well in their performance on standardized tests that address language skills at the word and sentence levels (Bottenberg, Lemme, & Hedberg, 1987; Brookshire & Nicholas, 1984; Glosser, Wiener, & Kaplan, 1988; Hough, Pierce, & Cannitto, 1989; Li, Williams, & Della Volpe, 1995; Mar, 2004; Pashek & Brookshire, 1982; Stachowiak, Huber, Poeck, & Kerschensteiner, 1977; Waller & Darley, 1978; Williams, Li, Della Volpe, & Ritterman, 1994). Adults with aphasia have often been found to perform better in day-to-day communicative discourse tasks than isolated linguistic tasks, prompting some aphasia experts such as Audrey Holland to affirm that adults with aphasia are able to communicate better than they are able to talk (1977). This reflects the widely-acknowledged discrepancy between linguistic abilities and communicative pragmatic abilities in aphasia.

What may be responsible for this discrepancy? A number of linguistic and extra-linguistic factors (e.g., rate of speech, listener familiarity) have been suggested and investigated in an effort to understand why adults with aphasia perform better on discourse tasks than what would be predicted considering their performance on standardized language tests (e.g., Armus, Brookshire, & Nicholas, 1989; Boyle & Canter, 1986; Glosser, Wiener, & Kaplan, 1988;

Nicholas & Brookshire, 1983; Pashek & Brookshire, 1982; Wilcox, Davis, & Leonard, 1978). One factor of interest to this investigation is *emotionality* and its potential influence on discourse production in adults with aphasia.

Emotionality may be especially relevant to explore because it has been shown to influence a variety of communicative skills; based on anecdotal or clinical observations, clinicians and caregivers often report that in emotional situations, adults with aphasia are able to produce more appropriate spontaneous speech than in non-emotional situations (for a historical review, see Lorch, Borod, & Koff, 1998). Although the number of empirical studies that have directly examined the influence of emotional content on discourse production in aphasia is limited, there is reasonable evidence to motivate further exploration of this relationship. First, a number of studies that have explored the influence of emotionality on communicative and linguistic variables below the discourse level, such as the comprehension of single words and sentences, single word repetition, and single word reading and writing, found a facilitative effect of emotional content (e.g., Hielscher, 2004; Kimelman, 1991; Reuterskioeld, 1991; Ramsberger, 1979; Landis, Graves, & Goodglass, 1982). Second, a few studies have examined the specific influence of emotionality on discourse production variables in aphasia (e.g., Bloom, Borod, Obler, & Gerstman, 1992, 1993; Bloom, Borod, Santschi-Haywood, Pick, & Obler, 1996; Borod, Rorie, Pick, Bloom, Andelman, Campbell, Obler, Tweedy, Welkowitz, & Sliwinski, 2000; Bottenberg et al., 1987). In broad terms, the empirical evidence suggests that producing discourse with obvious emotional content, such as asking a participant to speak about an emotional experience or to describe an emotional

picture, results in more informational content (Bloom et al., 1992) and more coherent productions (Bloom et al., 1996; Bottenberg et al., 1987). However, research of this nature remains scarce.

Despite the efforts to date, much remains unclear about the influence of emotional content on discourse production skills, particularly pragmatic features of discourse. For example, does emotional content have any effect – facilitative or inhibitory – on different pragmatic variables such as communicative efficiency, accuracy of production, or topic maintenance? If so, does the (positive or negative) emotional valence of this content affect pragmatic variables differently? Is this influence specific to individuals with aphasia or can it be observed in healthy controls? This study attempts to address these questions by analyzing the pragmatic features of discourse produced by adults with aphasia and a group of healthy controls using video-clip stimuli constructed and validated to represent one of three emotional valence categories – positive, negative, and neutral.

Answers to these questions will allow better understanding of the relationship among emotionality, discourse production, and associated cognitive processes including attention and memory in aphasia. Theoretically, demarcating the influence of emotional content on discourse production may inform some of the interactions which are thought to underlie communicative processes, involving linguistic, cognitive and emotive aspects of processing. In certain types of communication tasks, especially those which rely on pragmatic knowledge and involve more complex forms of language processing at the discourse level, the interaction of linguistic, cognitive, and emotive processes may be highly coordinated allowing changes in one aspect of processing (e.g., emotionality) to impact and perhaps facilitate other aspects of processing (e.g., language production). Alternatively, these processes may interact in a disruptive manner, where one impedes or obstructs another.

It is important to delineate and understand factors that affect discourse comprehension and production abilities because of their potential usefulness in the clinical setting. Aphasiologists targeting discourse abilities can tailor aphasia management programs – based on a patient's core deficit – using factors that have been documented to facilitate discourse production or comprehension. The purpose is to motivate and encourage patients by demonstrating to them their own strengths, at the same time reducing or eliminating factors that research has shown to impede performance on discourse tasks. The ultimate goal is to create an environment – linguistic, contextual, and social – conducive to providing patients with maximum opportunities for success. This can be achieved by moving beyond clinical sessions to training patients and their care providers on optimal strategies to enhance and facilitate communication by incorporating and manipulating these factors in daily communication.

More specifically, understanding the influence of emotionality on spoken discourse features, the specific conditions under which emotional features are relevant to speech production, and the categories of patients that benefit from emotionality conditions guides clinical management of aphasia. The goal is that such awareness leads to constructing more effective assessment tools and therapy materials where emotional features are purposefully manipulated. For example, if we had evidence that emotional valence facilitates a specific

pragmatic variable (e.g., discourse coherence) in aphasia, patients exhibiting a deficit in the said feature could be managed using therapy materials designed to make use of relevant emotional attributes proven to alleviate such a deficit.

To recap, the purpose of this thesis is to examine how emotional stimuli influence pragmatic features of discourse produced by adults with aphasia. The first chapter provides background information by introducing discourse concepts including genres, elicitation techniques, and approaches to analysis. Additional preparatory information about aphasia, typical communicative profiles, discourse abilities, and key factors documented to affect these abilities are also presented in the first chapter. Emotionality as an influencing factor receives particular attention in the second chapter by introducing basic concepts associated with emotions, and the impact that emotional stimuli have on vital cognitive processes. The influence of emotional content on communication skills in aphasia, particularly discourse production abilities, is also discussed, concluding with the objectives and hypotheses of the present investigation. Chapters Three and Four present the methods, results, and discussion of the two experiments included in this investigation - a stimulus validation study and the main experiment in which discourse is elicited from adults with and without aphasia in response to emotional video-clips of a positive, negative, or neutral valence. The final chapter serves to interpret the present findings in light of available literature highlighting the interaction between emotional content and discourse production.

### **Chapter One**

#### **DISCOURSE: GENRES, ELICITATION TECHNIQUES, & ANALYSIS**

Discourse is a unit of language beyond the sentence level created through the joining of smaller linguistic components. Discourse can be characterized in two main ways: first, there are structural components such as phonemes, lexemes, morphemes, and syntactic forms. These constituents unite to build a structural construct, delineating discourse as a supra-sentential linguistic structure that encompasses subordinate levels of phonology, morpho-syntax, and semantics (Coulthard, 1977). Alternatively, discourse may be characterized as composed of functional elements such as speech acts (i.e., the communicative function that an individual utterance performs) (Austin, 1962; Searle, 1969), essential story elements (e.g., setting or character attributes), or procedure steps. These components represent the pragmatic dimension of language, which is concerned with how people use language to achieve certain goals and the intentions they wish to relay.

Defined as the set of rules governing the contextual use of language (Bates, 1976), pragmatics is concerned with the functions performed by various components of language, individually and collectively. Accordingly, discourse can be characterized as a functional entity within which language, verbal and non-verbal, is used to 'do things' (Labov, 1972). Merging structural and functional perspectives leads to a more comprehensive definition of discourse as an interaction – spoken, written or signed – between sender and recipient that occurs within a context. This interaction is an integration of linguistic, cognitive, and social dimensions systematically influenced by contextual attributes of the social situation within which it occurs (van Dijk, 1997). Discourse as an interaction may be typically thought of as necessarily an exchange of verbal information. However, in a broader sense, discourse may be defined to include such categories as monologues and written transcripts. A monologue is an interaction in the sense that listeners receive the information, process it, and may ask questions in their head which they do not necessarily verbalize. Similarly, a written text is an interaction between writer and reader, where the writer considers the type of information a reader may be seeking and provides them accordingly. On the other hand, a reader may have questions about the text being read regardless of whether or not the writer becomes aware of these questions. In this sense, monologues and written texts are examples of discourse genres.

### **Discourse Genres**

Discourse genres refer to categories of discourse that are distinguishable from one another in form and function, such as narratives, conversations, reports, and interviews. Members of a language community typically recognize differences among these genres based on variations in their structural attributes and functional characteristics. This ability allows speakers and listeners to anticipate a general framework for the interaction, and respond accordingly – verbally or non-verbally. For illustrative purposes, structural and functional attributes of two of the most commonly investigated genres in aphasia, narratives and conversations, will be presented briefly.

A narrative is an act of relaying a temporally- and logically-organized series of events (Peterson & McCabe, 1991; Tomlin, Forrest, Pu, & Kim, 1998). There are several subtypes of narratives such as self-generated stories, fictional stories, and biographies. A story can be narrated from events that have been experienced, witnessed, read or heard. It can be based on events portrayed in a single picture, a picture sequence, or motion pictures. Typically, narratives are produced by a single speaker, with relatively minor intrusions, additions, or clarifications by recipients. Narratives characteristically have a recognizable story grammar, i.e., a "macrostructure" which specifies how the story events and context hold the entire narrative together (Stubbs, 1983). Story grammar is constructed of two types of structural elements, 'main line event clauses' and 'contextualizing state clauses'.

Both categories of clauses have a general function, which is to bond the narrative together (Stubbs, 1983), and more specialized functions. 'Main line' clauses serve to relay events and organize them in a plot-formulating sequence, while 'contextualizing' clauses serve to communicate attributes of the context within which main events occur (Peterson & McCabe, 1991). For example, a speaker conveying what happens next in a sequence of events such as "the man took out his car keys" illustrates a 'main line' clause, which informs of the action performed. 'Contextualizing' clauses typically specify the setting within which the events take place, such as time (e.g., "in the morning"), location (e.g., "just outside his house"), and external states (e.g. "it was a sunny day"). 'Contextualizing' clauses may also present character attributes, such as relationships to other characters, physical appearance, and personality traits

(e.g., "she was subtle"). Other examples of 'contextualizing' clauses are those that declare personal motives, resolutions, and internal states (e.g., "he was confused"). As a macro-structure, narratives have global functions, which may be to convey a moral, entertain, or simply pass time, among others. In short, narratives represent macro-structures that encompass subcomponents; each of these macro- and micro- elements has specific and well-defined structural and functional characteristics.

Conversations are a second type of discourse genre, which involve the exchange of information between at least two participants. Similar to narratives, conversations have conventional structures and functions distinguishing them from other discourse genres. Turn-taking among participants is probably the most prominent structural feature (Coulthard, 1977). Roles of speaker and listener constantly alternate between interlocutors as they exchange turns. A specific type of turn-taking is adjacency pairs, which stipulate that an utterance produced by one speaker receives a reply from a conversational partner (Sacks, Schegloff, & Jefferson, 1974). The most illustrative example is question-answer adjacency pairs (Schiffrin, 1994). A global structural feature of conversations is the dialogue topic. Topic maintenance is an essential pragmatic requirement for any conversation to proceed properly. There are conventional norms that participants must abide by, signaling their intention to shift topics. Local and global structural features of conversations work in unison to achieve specific functional goals, such as greeting, chatting, debating, arguing, and problem solving (Schiffrin, 1994).

Narratives have been investigated more frequently and more closely than other discourse genres for a number of reasons. Narratives make up a significant component of interpersonal communication (Peterson & McCabe, 1991). Narratives also have more consistent discernable structures – beginning, middle, and ending – easily recognized by most members of a community, regardless of age (Peterson & McCabe, 1991). As a result of having easily identifiable components, analysis of these components by researchers is usually less tedious and time-consuming than for other genres. Further, knowing the target of many types of narratives such as fairy tales, story retellings, or picture-elicited stories makes them easier to analyze (Ulatowska, North, & Macaluso-Haynes, 1981; Ulatowska & Olness, 1997). Narratives are also frequently studied by researchers because they tend to be more uniform and predictable, which results in ease of comparison across participants and across time (Doyle, McNeil, Spencer, Jackson Goda, Cottrell, & Lustig, 1998; Tucker & Hanlon, 1998; Ulatowska, Olness, Wertz, Thompson, Keebler, Hill, & Auther, 2001; Yorkston & Beukelman, 1980). Consequently, there is an expanding knowledge base on this specific discourse genre which may be drawn upon by researchers interested in aphasic discourse. An obvious limitation of studying the pragmatic features of narratives is that they are typically monologues and hence are not as interactive as conversations.

Conversations are also receiving increased attention primarily because they make up the majority of human interactions on a day-to-day basis (e.g., greetings, dinner conversations, telephone conversations, etc.), even more so than narratives. Because of their interactivity and relevance to daily activities,

conversations are probably more functionally relevant than any other discourse genre (Damico et al., 1999; Holland, 1978; McCarney & Johnson, 2001; Milroy & Perkins, 1992; Oelschlaeger & Thorne, 1999). Despite their obvious importance, conversations have not been analyzed as frequently as narratives partly because the target word or utterance is frequently unknown to investigators, unlike in specific types of narratives (e.g., story-retelling and folktales) where the structure and content can be controlled more easily than conversation. Thus, the unpredictability and inconsistency of conversations makes comparisons among individuals difficult (Yorkston & Beukelman, 1980). Moreover, due to their nature involving more than one participant, analyzing conversations is more taxing in that it requires paying significant attention to not only the form, content, and function of different components, but also to the different interactive styles of two or more communication partners. Interactive styles which refer to the manner by which conversationalists respond to each other are likely to vary from one conversation to another due to social subtleties such as the relationship between interlocutors, the formality of the setting in which the conversations take place, and the topic being discussed. These and other factors, while important to specify, make it challenging for researchers to analyze specific features of conversations obtained from different participants and in different settings across studies (Boles & Bombard, 1998; Damico et al., 1999).

Since narratives and conversations have received the most attention in the discourse literature in general, it is not surprising that aphasia studies have largely focused on one of these two discourse genres as well. This approach is justified by the pervasiveness and functional significance of narratives and conversations in daily communication, and by the fact that clinical tasks in aphasia assessment and treatment sessions are more likely to involve stories or conversational exchanges relative to other genres. For practical reasons, this thesis utilizes narratives as a means for examining particular discourse features of participants with aphasia because these language samples can be better controlled in terms of structural and functional attributes, allowing more reliable comparisons of how emotionality influences discourse in adults with and without aphasia.

### **Discourse Elicitation Techniques**

Another issue that is relevant to how discourse is studied is how the language samples are *elicited* in the experimental setting. Narratives and conversations have been elicited using different techniques and stimuli. For example, there are studies that have used pictures – single or a sequence – personal experience, videos, and fairy tales. Moreover, elicited samples have been analyzed using different approaches wherein each approach focuses on different aspects of these genres. This section will provide an overview of the most common methods including a brief description of each method, subtypes if applicable, in addition to advantages and disadvantages of each. In particular, this overview will discuss spontaneous productions, story retellings, using picture stimuli, and using video stimuli as elicitation techniques of interest.

There are several common techniques to elicit discourse for research purposes. One of the most common approaches to collect connected speech

samples is spontaneous discourse. Typically, this is discourse self-generated by the participant which the examiner records and analyzes in some manner. Discourse elicited by using open-ended questions about the participant and his/her life is considered spontaneous (e.g., asking participants to talk about their illness, a trip they have taken, a war experience, or their families provide a leadin to spontaneous discourse). In one study, Ulatowska et al. (2001) asked participants to narrate personal stories about frightening events and found that participants were able to recall fear-provoking events quite vividly. Depending on the researcher's goal, some of the advantages of spontaneous discourse productions are their personal relevance to the participant, their familiarity, and functionality. Additionally, the fact that these samples are relatively spontaneous means that they are more likely to reflect an individual's culture and stylistic variation. On the other hand, as noted earlier, spontaneous discourse samples pose certain challenges to researchers in the analysis phase; these samples tend to be more difficult to transcribe and analyze when the target reference is unknown increasing the time demands and effort on the part of the analyst. Spontaneous productions also tend to show greater variations in length, linguistic complexity, organization, and amount of detail across participants and across time which can act as a barrier to making group and individual comparisons.

Another method that has been used to elicit discourse samples is retellings, typically of stories. Participants are instructed to retell something they have listened to or read. Thus, retellings can be based on either auditory or visual input, or both. Retellings may be of popular fairy tales, folktales, or news stories (McNeil, Doyle, Fossett, Park, & Goda, 2001; Ulatowska et al., 1981; Ulatowska, Freedman-Stern, Doyel, Macaluso-Haynes, & North, 1983; Ulatowska & Olness, 1997). One of the main advantages of this technique is that elicited samples are better controlled across participants and across time, facilitating sample comparison. Moreover, the examiner is familiar with the target, which allows speedier and more reliable analysis. A significant shortcoming of this method, however, is that it is extremely difficult to tease apart potential difficulties in production versus comprehension as performance hinges a great deal on the ability to comprehend and retain auditory and/or visual linguistic information. Another criticism of retellings is that they are somewhat unnatural, as people do not typically narrate events expecting that their listeners will immediately retell what they just heard. On the other hand, it may also be argued that this task is functional in the sense that people often recount stories they may have heard from others. Another functional use for retellings may be that people retell what they just heard back to the original source of information, as confirmation that they have understood what was said to them.

Perhaps one of the most common methods to elicit discourse samples is by using pictures. The examiner presents a single picture or a sequence of pictures (typically ranging from 3-10 pictures per set, designed to represent a series of events) to a research participant. The participant is required to either describe what he/she sees in the picture – often resulting in descriptive discourse – or tell the examiner what is happening in the picture, with the goal of eliciting narrative discourse. A well-known example is the 'cookie theft' picture which has been used often in the aphasia literature (Menn, Ramsberger, & Helm-Estabrooks, 1994; Nicholas & Brookshire, 1993, 1995; Potechin, Nicholas, & Brookshire, 1987; Shewan & Henderson, 1988; Yorkston & Beukelman, 1980). Picture sequences often used are line drawings, comic strips, and photographs of a series of events (Potechin et al., 1987).

In designing studies, researchers weigh the benefits and challenges of presenting single pictures versus picture series according to the rationale of their investigation, as it is likely that this variable has differential effects on discourse features. For example, in a study investigating the effects of using single pictures versus picture sequences on discourse features in aphasia, Potechin et al. (1987) collected samples from ten adults with aphasia and analyzed variables such as communicative efficiency and content accuracy to determine if these features were influenced by the type of picture. Results showed that discourse elicited using picture sequences was longer than that elicited using single pictures, while single picture discourse was more efficient and accurate (Potechin et al, 1987). The finding that longer samples were produced in response to picture sequences may be simply due to the fact that there are more pictures with potentially more details to talk about. However, the results of the analysis revealed that longer samples did not necessarily provide more informational content than shorter samples (Potechin et al., 1987). Therefore, the idea that certain picture types elicit more detailed content was not supported by the results of this study.

Interestingly, discourse elicited using sequences was observed to contain more verbs than single picture discourse. A possible explanation is that displaying a series of pictures is likely to include the same characters or objects recurring throughout the sequence; thus, the primary difference between the pictures would be the *actions* performed by these re-appearing characters. In this way, participants would not be required to focus as much on the nouns, freeing up cognitive resources to attend to new actions and verbs corresponding with these actions. This is not to claim that it is more demanding to focus on nouns than verbs; however, rather than having to attend to two categories of words, participants are able to direct all of their efforts towards one category. One can speculate that the verbs stand out for participants because primary nouns recur throughout the series and thus require less attention. Accordingly, more of the participant's attention can be directed towards verbalizing actions which highlight the main differences from one picture to another.

One can argue that discourse produced in response to picture sequences tends to be better organized at the macrostructural level than that elicited using single pictures. For instance, the chronological sequence of events portrayed in the pictures could provide a framework for participants to organize their thoughts while producing discourse, thus reducing cognitive demands for organizing information through language. This added structure could allow certain participants with aphasia to focus on linguistic components of the task. Consequently, participants may be better able to attend to lexical and grammatical accuracy because they need not worry about macrostructural organization. Single pictures, on the other hand, portray two or more events happening simultaneously. As a result, participants may find it more challenging to organize the information, thus taxing their cognitive resources. There may be a tendency for participants to list or describe events as isolated actions without linking them to other events in the picture. This may result in difficulty producing discourse that is coherently organized.

In a related manner, connective devices may be easier to produce in picture sequences because they recur more frequently. For example, one or two linking devices such as "and then" and "after that" may be used throughout a picture sequence discourse production task. Participants may thus recycle the same connective throughout their discourse. For single pictures, on the other hand, participants may be required to use a wider variety of connectives, such as "during this time," "in the meantime," "while the mother was ..., the children were ..." etc., thus making the task of using connectives more challenging. These differential effects amongst types of picture stimuli are important to consider when investigators are deciding which research stimuli to select according to the goals and purpose of their investigations.

There are other task variations common in picture-elicited discourse studies that could have an effect on discourse features. For example, the examiner may arrange the pictures in the correct order or may require the participant to do so. Additionally, investigators may provide participants with ongoing access to the picture stimuli by leaving the picture(s) in front of the participant throughout the actual production of discourse. Alternatively, the study design may entail displaying the picture(s) momentarily or for a predetermined period of time and then removing it before participants start talking. Another variation in picture-elicited tasks involves the relationship with the discourse recipient. The investigator may ask the participant to talk about the picture to the investigator herself/himself, or to someone else who may be a

familiar (e.g., spouse) or unfamiliar listener (e.g., research assistant). These task variations are bound to affect the content of the language sample and how it is processed.

As discussed above, using pictures as discourse-eliciting stimuli has a number of merits such as predictability (i.e., knowing what targets should be produced). This is especially advantageous in aphasia research if participants display common aphasia characteristics, such as naming deficits, which may give rise to paraphasias (i.e., phonemic & semantic substitutions) (Graham-Keegan & Caspari, 1997). Similarly, discourse produced by individuals with reduced speech intelligibility due to associated motor speech disorders such as apraxia of speech (i.e., impaired articulatory programming) or dysarthria (i.e., a neuromuscular speech disorder caused by damage to motor pathways, Haynes & Pindzola, 1998) may be easier to analyze if pictures are used to elicit language samples. Knowing the target may make it easier for the discourse analyst to narrow down possible choices for what the participant is saying, thus making it easier to identify individual words and phrases in contrast to spontaneous discourse. An additional advantage for picture stimuli is that keeping the pictures in front of participants throughout discourse production may reduce memory demands. On the other hand, a drawback of using pictures is that people do not typically communicate by describing pictures in their daily lives, reducing the potential for generalizing what is learned from this approach to daily communication.

In some cases, researchers may use an elicitation technique combining retellings and picture stimuli. In picture story-retelling, the examiner displays a

sequence of pictures, narrates the events, and requires participants to retell what they heard while looking at the stimulus pictures (e.g., Berko-Gleason et al., 1980; Doyle et al., 1998). Thus, participants are provided with both visual and auditory support. This technique has the combined merits and drawbacks of both retellings and picture elicitation. One advantage is that samples elicited are controlled, allowing rapid and reliable analysis. Another is that providing ongoing access to pictures reduces memory demands and facilitates intelligibility since the analyst is familiar with the target (Doyle et al., 1998; McNeil et al., 2001).

Using video clips to elicit discourse samples is an alternative method to those described above. For this approach, participants view video-clips and are then required to retell the events they have seen in these clips. There are two types of video elicitation, online and offline. In online video narration, participants narrate events as they unfold in real-time on a television or computer screen (Dollaghan, Campbell, & Tomlin, 1990; McNeil, Small, Masterson, & Fossett, 1995). In offline narration, participants start speaking after the video stops. The main difference between the two types of narration is that online narration provides simultaneous visual support, a factor which may possibly influence memory demands, whereas offline narration does not provide such support. Memory may also be influenced by the number of times participants are allowed to view the videos. In another task variation, the examiner tells a story about the video and then requires participants to retell the events, thus providing participants with auditory support. Investigators select the type of video narration based on the goals of the study and the level of auditory and visual support they would like to provide to participants.

In addition to sharing some merits with picture stimuli including consistency, predictability, and having a target reference, there are a number of additional advantages of eliciting samples using videos. While controlling for the content of narratives produced by different participants and in different experimental conditions, video narration is also characterized by its high interest value (Dollaghan et al., 1990). Another major advantage of using video narration tasks is that the depicted events are dynamic, in contrast to static pictures, allowing emotional features of these events to be portrayed more vividly and naturalistically than in static pictures. As one of the critical notions tested here was how emotionality influences discourse production in aphasia, this thesis utilized video-clips to stimulate discourse in an offline video narration task. This approach seems best suited to the present goals since visible displays of emotions and emotional situations were critical for gauging discourse production abilities. These stimuli are of high interest value, and this task has certain functional advantages which are similar to retelling events seen on television or at the movies, for example.

#### Approaches to Discourse Analysis

After collecting a language sample, discourse analysis is a procedure by which stretches of spoken or written language are dissected into structural and/or functional components of interest to the researcher (Coulthard, 1977). Several approaches to analyzing discourse are available primarily because a number of disciplines developed an interest in studying connected speech. Disciplines studying discourse analysis include linguistics, sociology, philosophy, anthropology, and computer science, which resulted in over 15 approaches to discourse analysis. Naturally, each branch of study has its own set of guiding principles and scope of interest which tend to dictate the preferred areas of focus. An approach emerging within linguistics, for example, may examine lexical, morphological, and syntactic features within and across the sentence level, whereas an approach emerging within philosophy may direct interest towards how language is used to perform communicative functions. The goals and purpose of each analysis thus differ from one approach to another as will be illustrated in this section. However, despite diversity among the various approaches, it is noteworthy that all researchers attempt to describe basic constituents, how they are arranged, and the rules that govern them (Schiffrin, 1994; van Dijk, 1997).

There are two major categories of approaches to discourse analysis: structural and functional. Structural procedures identify and analyze linguistic units such as morphemes, clauses, utterances, and/or connectives between them. Utterances are parsed into constituents and patterns of combinations between them are detected according to fixed procedures (Schiffrin, 1994), while ignoring features external to the discourse such as social context. In contrast, social-pragmatic dimensions of discourse are of primary interest within functional approaches. Functional approaches aim to identify and analyze what participants do with language, interpreting meanings in light of social, cultural, personal, and contextual perspectives (Schiffrin, 1994). Functional units

targeted by the analysis may include speech acts or communicative intentions. Although the primary concern of the functional approach is pragmatic aspects of language use, semantics is also of interest. Moreover, some functional approaches analyze morpho-syntactic features in an effort to illustrate pragmatic discourse functions. Functional approaches thus seem to adopt a broader perspective than structural approaches, as indicated by Brown and Yule (1983). In light of this, perhaps an optimal viewpoint is to analyze linguistic structures within the context of cognitive and social factors that systematically influence the interaction (Armstrong, 2001; van Dijk, 1997); yet, as argued, this depends on the ultimate goals of the analysis.

This section will introduce four specific approaches – two structural and two functional – that have been applied to discourse studies in aphasia. The structural approaches under consideration are text linguistics and conversation analysis and the functional approaches are speech acts and pragmatics. The discussion will present underlying assumptions about language, methods for data collection and primary objectives of analysis for these specific approaches. After comparing advantages of each approach, this section will argue for the appropriateness of the pragmatic approach for the present investigation.

### (a) Text Linguistics (Cohesion and Coherence Analysis)

'Text Linguistics' is a structural approach that originated in the field of linguistics with a primary interest in studying how linguistic units bind a text together, known as 'textual cohesion'. This interest expanded to understanding the overall schema of the text known as discourse coherence. Cohesion and coherence will be discussed below as core interest areas of text linguistics, the scope of which is analyzing specific linguistic units and the interconnections among them.

Cohesion analysis explores the use of cohesive ties within text (Halliday & Hasan, 1976). Cohesive ties are semantic concepts that determine relations of meaning that are present in the text, allowing one item in the discourse to be interpreted in reference to another item in a preceding or following sentence. There are five types of cohesive ties, the most prevalent of which is "reference". Reference manifests in anaphors (e.g., pronouns such as 'he' & 'it', demonstratives such as 'this' & 'there', etc.) which are interpreted by means of referring these elements to other nouns in the text (e.g., 'plumber', 'car', 'downtown', etc.). Another common cohesive tie is conjunction, which refers to the connective devices between clauses (e.g., 'and', 'because'). Cohesion does not only specify the nature of the ties but also the relationship between components (Halliday & Hasan, 1976). For example, one relation is that of 'addition' realized by 'and', 'also', 'in addition', etc. Some devices represent 'contrast', such as 'however' and 'contrary'. With regard to level of functioning, cohesion pertains to surface-level elements and is considered a local property, connecting utterances that are close to each other (Hudson & Shapiro, 1991).

Alternatively, coherence refers to the progression of information that is rationally, sequentially, and causally linked and is received as such by recipients (Hudson & Shapiro, 1991). The main purpose of coherence analysis is to investigate the manner by which meanings and ideas are linked at a global level (Beaugrande & Dressler, 1981). This purpose is fulfilled by associating

underlying discourse concepts and specifying the nature of connections among elements across the entire text (Hudson & Shapiro, 1991), such as cause and effect, compare and contrast, and chronological time-lines. Coherence analysis contributed significantly to the study of discourse in recognizing the value of organizational textual patterns and revealing essential components of discourse genres, such as narratives, procedural, and argumentative discourse. For example, for narratives to be perceived as coherent, they must include essential elements – such as setting, character attributes, sequence of events, story climax, and resolution. Together, cohesion and coherence work to unify discourse as essential textual properties (Schiffrin, 1994).

Text linguistic analysis is one of the most frequently applied approaches in the aphasia discourse literature (Armstrong, 1987, 1991, 2001; Bloom, Borod, Obler, Santschi-Haywood, & Pick, 1995; Bottenberg, Lemme, & Hedberg, 1985; Peng, 1992; Piehler & Holland, 1984; Ulatowska & Bond, 1983; Ulatowska et al., 1981, 1983). For example, investigations have shown that adults with non-fluent aphasia have deficits in the production of cohesive devices such as pronouns and lexical devices, providing a smaller quantity of these devices than adults with fluent aphasia and healthy adults (Armstrong, 1991; Berko-Gleason et al., 1980; Peng, 1992; Piehler & Holland, 1984; Ulatowska et al., 1981, 1983). Ambiguity of reference is yet another common problem, as pronouns frequently have vague referents or absent referents altogether (Armstrong, 1991; Peng, 1992; Piehler & Holland, 1984; Ulatowska et al., 1981, 1983, 2001). More details will be presented in a later section dealing with discourse characteristics in aphasia.

### (b) Conversational Analysis (CA)

Conversational analysis (CA) is also a structural approach that is rooted in sociology. It was first developed by Sacks, Schegloff and Jefferson (1974) with a primary interest in revealing speaker knowledge through details of events that emerge during conversations. Similar to other approaches, CA is based on the principle that interactions are structurally organized. Therefore, this approach analyzes meanings of utterances that are situated within a sequence of utterances, an analytical process emphasizing textual context (Schiffrin, 1994). This context is vital because utterances are shaped by preceding context, and in turn, these same utterances manipulate and give rise to utterances that follow (Heritage, 1984).

Because CA was originally conceptualized in an effort to understand social constructs through the analysis of talk, one of its fundamental principles is to limit analysis to spontaneous dialogue. Thus, eliciting and manipulating conversations in predetermined ways violates the basic premise on which this approach was founded. Samples are recorded and transcribed detailing linguistic and nonlinguistic features of the dialogue. Analysts form hypotheses and reach conclusions with specific attention to units, recurring patterns, and conversational rules based on actual data. The process involves determining organizational structures within the conversation, such as adjacency pairs. Adjacency pairs refer to two neighboring utterances, each contributed by a speaker participating in the conversation. The speaker initiating the adjacency pair produces the first utterance of the pair. This first utterance requires that the other conversational partner contributes a second relevant utterance (Schiffrin,
1994). Sequences of 'summons-answer' are one example of adjacency pairs (e.g., greeting someone 'hello' is a summons; responding 'hi, how are you?' is both an answer and a summons for a new pair). Through steady recurrence, adjacency pairs demonstrate organizational patterns that facilitate the movement of conversational turns – initiate, exchange, and exit. Analysis involves identifying recurring patterns, while addressing turn-taking dynamics, including speaker dominance, overlapping speech, and signals for changing turns.

Several aphasia studies have made use of CA (Clark & Schaefer, 1987, 1989; Damico, Oelschlaeger, & Simmons-Mackie, 1999; Ferguson, 1998; McCarney & Johnson, 2001; Milroy & Perkins, 1992). This approach is favorable to aphasiologists perhaps due to the fact that samples are elicited in a spontaneous manner, which means that they do not require providing complex instructions to participants. Reduced complexity permits the use of this approach with a variety of aphasia profiles (e.g., reduced auditory comprehension abilities) and severity levels (e.g., moderate to severe). CA also incorporates behaviors prevalent in aphasia, such as pauses, perseverations, and overlapping speech.

Additionally, the process of analysis within this framework does not require comparing discourse features to samples elicited from normal populations, unlike cohesion and coherence analysis, for example. In other words, the analytical process is autonomous, eliminating the need for normative samples as points of reference. Rather, the process underscores both successful and imperfect attempts to communicate (Milroy & Perkins, 1992) by examining utterances produced by adults with aphasia and responses provided by their

conversational partners, and vice versa. Analysts extract cues for when communication has been successful and where a breakdown in communication has occurred as well as possible causes of such a breakdown. These cues highlight the strategies used by both adults with aphasia and their communication partners to overcome such breakdowns and return to the normal flow of conversation. CA is an important approach in revealing communicative competencies and limitations in day-to-day situations, and can therefore be useful in examining communication breakdowns and potential for repair in conversations involving adults with aphasia.

## (c) Speech Acts

Grounded in philosophy, speech act analysis is a functional approach stemming from the work of Austin (1962) and further developed by Searle (1969). This approach is founded on the principle that utterances usually have functions beyond stating facts and providing information. As such, uttering words is a vehicle through which actions are performed. Examples of some of these functions are to apologize (e.g. "Forgive me!"), to request clarification (e.g. "Say that again!"), and to finalize a marriage ritual ("I now pronounce you man and wife."). The most central concept to this approach is a speaker's communicative intentions which specify the function of an utterance.

Utterances are made up of three acts: (1) a locutionary act refers to the actual production of an utterance; (2) an illocutionary act refers to the speaker's communicative intentions in producing the utterance; and (3) a perlocutionary act refers to the effect that the utterance has on listeners (Searle, 1969). Speech

acts may be direct or indirect: direct acts occur when the actual production of the utterance matches the speaker's intentions (i.e., locutionary and illocutionary acts match), such as for the imperative "close the window". Indirect acts involve a mismatch between the form of the utterance and its function, such as for the declarative "it's cold in here" as an indirect request to close the window (Searle, 1969). The purpose of speech act analysis is to reveal the type of acts performed by speakers in these and other communicative situations. The process of analysis involves identifying and labeling the components of a particular speech act, direct or indirect. Additionally, this type of analysis examines how acts prompt subsequent acts, and how next acts are uttered as a response. Analysts may go further by speculating why conversationalists choose to produce specific acts, and the effect of their selection on the flow of the interaction.

An extremely limited number of aphasia studies have applied speech act analysis to date (e.g., Foldi, 1987; Ulatowska, Allard, Reyes, Ford, & Chapman, 1992). It is unclear why this approach has not been adopted more frequently given its value in evaluating functional communication abilities – i.e., what communicative functions an individual is able to express and how. It may be of special value for participants with extremely limited language production abilities, but who can nonetheless express a variety of communicative intentions in an appropriate manner. However, determining a speaker's intentions may not be as easily determined as measuring more concrete discourse measures such as cohesive ties or adjacency pairs, which likely explains why researchers have directed their efforts towards more structural approaches to the analysis of

discourse.

# (d) Pragmatic Approach

Similarly rooted in philosophy, the pragmatic approach is based on the ideas of Grice (1975). With particular interest in the relationship between logical meaning and natural language, 'pragmatics' examines words, sentences, and gestures in relation to those who generate them and the context in which they occur (Schiffrin, 1994). A most prominent concept within this approach is a speaker's communicative intentions. A speaker produces an utterance intending that it be received in a particular way. In turn, recipients recognize this intention, provided that certain requirements are adhered to. These preconditions are known as the 'cooperative principle', within which four maxims must be satisfied: quantity, quality, relation, and manner. A speaker's contribution should provide the appropriate amount of information (quantity); have adequate evidence and be truthful (quality); be relevant to the interaction (relevance); be clear, unambiguous, and organized (manner) (Grice, 1975). The pragmatic approach recognizes the importance of the context within which an interaction occurs to evaluate whether or not maxims of the 'cooperative principle' have been met. In brief, pragmatic analysis holds the potential of revealing speaker intentions and how listeners interpret those intentions. It does so by analyzing the semantic meanings of signs, while simultaneously evaluating whether cooperative maxims are being satisfied.

Grice presented this approach in general terms without detailing how it should be applied. For example, he did not recommend or advocate specific ways to measure quantity, quality, manner or relevance. Grice did not even delve into explicit features or components which could be indicative that a particular maxim is being met. That is, the approach does not specify what units should be considered, nor does it illustrate what investigators should be looking for as they attempt to label a discourse sample as meeting the maxims. Nonetheless, the value of the 'cooperative principle' has been recognized in many fields including communication sciences and disorders. As a result of not specifying details, and as a consequence of many realizing the value of Grice's concept, this approach is increasingly and creatively being applied in diverse disciplines (e.g., linguistic philosophy, gender studies, and teacher research) (Lindbolm, 2001).

Although Grice's framework was mainly conceptualized for conversational exchanges, it has the potential for application to other discourse genres (e.g., narratives, procedures). In fact, the present study endorses the premise that any type of communication, including monologues, can be analyzed for the maxims of quantity, quality, manner, and relevance (see Lindbom, 2001 for a review). Further, as Grice's framework is rather general, the pragmatic approach has the potential for incorporating features examined by other approaches to address a relatively wide spectrum of discourse features.

For example, the pragmatic approach stipulates that a contribution should be clear, unambiguous, and organized according to the *manner* maxim. Clarity and ambiguity are features addressed originally via cohesion analysis, while organization is a feature addressed by coherence analysis. Accordingly, the maxim of *manner* takes care of those features addressed by text linguistics. Similarly, incorporated within the *relevance* maxim of the pragmatic approach is topic maintenance, a feature typically addressed by conversational analysis.

Lexical selection, also within the maxim of *relevance* (i.e., words produced by speakers should be relevant to the interaction), can be associated with a specific type of cohesion within text linguistics - i.e., lexical cohesion. Further, since the pragmatic approach concerns itself with the communicative intentions of speakers, by so doing it is concerned with the speech acts of the utterances. Yet one can argue that the pragmatic approach has an advantage over speech acts; whereas the latter approach focuses on individual utterances, the pragmatic approach extends to the overall organization of these utterances in relation to each other (manner) as well as the relevance of one utterance to another (relevance). Moreover, the pragmatic approach addresses discourse features not addressed by any of the other approaches, such as amount of information (quantity); and accuracy of production (quality). Thus, the pragmatic approach, through its various principles, has the potential of addressing features from speech acts, text linguistics, and conversational analysis in addition to features not addressed by any of these other approaches.

Grice's approach may be especially suitable for analyzing discourse by adults with aphasia as it pays particular attention to communicative functions without neglecting structural linguistic forms (e.g., lexical selection) used to achieve these functions. As deficits in structural forms (e.g., phonemic and/or semantic errors; agrammatism – i.e., telegraphic speech) are typical in aphasia, while functional communication may be preserved, this approach could be valuable in highlighting the communicative strengths of an individual with aphasia. As noted earlier, the merits of adopting a pragmatic approach to analyzing discourse by individuals with aphasia are that it may be applied to any

discourse genre (e.g., narratives, conversations, etc.); it has the potential for incorporating features measured by other approaches, thus addressing a wider spectrum of both "structural" and "functional" features; and the approach could be particularly appropriate for highlighting the types of deficits and strengths that characterize certain patients with aphasia. In spite of these merits, the number of studies investigating functional features within Grice's (1975) maxims is quite limited, and none of those available examines elements from all four maxims (Berko-Gleason, Goodglass, Obler, Green, Hyde, & Weintraub, 1980; Bloom et al., 1995; Christiansen, 1995a, 1995b).

To summarize, the purpose of this section was to define discourse and discuss associated concepts of genres, elicitation methods, and approaches to analysis with appropriate examples. By presenting key merits and drawbacks for two familiar genres, four frequently-used elicitation techniques, and four common discourse analysis approaches, the discussion aimed to emphasize why this study focused on narrative language production which was elicited using video-clips and analyzed following the principles of the pragmatic approach. Next, a review of what is known about discourse features in aphasia is in order.

# **Chapter Two**

### **DISCOURSE FEATURES IN APHASIA**

This section will begin by introducing key concepts associated with aphasia with respect to its classification, i.e., categories, types, and severity levels, as well as describing common language, communication, and cognitive deficits associated with different types of aphasia. This will lead into features of discourse produced by adults with aphasia, and conclude with factors that have been found to influence discourse comprehension and production skills in this relatively heterogeneous population.

Aphasia is a language disorder subsequent to brain damage most commonly caused by a cerebral vascular accident in the dominant language hemisphere (Rosenbek, LaPointe, & Wertz, 1989). This disorder negatively affects a number of language and communication skills that include naming abilities, spontaneous speech production, auditory comprehension skills, repetition abilities, reading, and/or writing. There are different types and severity levels of aphasia determined by the presence or absence of deficits in any or all of these abilities, as well as the degree to which they are affected. According to the "traditional" or "classical" syndrome approach, aphasia syndromes are generally categorized as either being fluent or non-fluent, with severity levels ranging from very mild to severe. Individuals are considered fluent if they are able to produce a linguistic message of five words or more (Rosenbek et al., 1989) with smooth intonation patterns; in contrast, non-fluent aphasias are characterized by halting slow rate of speech, reduced sentence length, and impaired melodic contour. The "classical" aphasia syndromes of Wernicke's aphasia, anomia, conduction aphasia, and transcortical sensory aphasia are categorized as fluent, while non-fluent aphasias include Broca's aphasia, transcortical motor aphasia, and global aphasia (Hegde, 1994). Generally, auditory comprehension skills are moderately to severely impaired in fluent aphasias, but relatively intact to mildly impaired in non-fluent aphasia, with the exception of global aphasia in which all skills are severely impaired. More specific features characterizing the more common types of aphasia follow.

Wernicke's aphasia is characterized by speech output that is rapid and effortless, free of misarticulations, and smooth in prosody. In fact, speech may be excessively fluent such that patients with this type of aphasia may talk continuously – a condition known as logorrhea - until they are forced to stop. Pauses may be observed intermittently as individuals experience word finding challenges (Brookshire, 1997; Hegde, 1994). Although produced utterances are long and grammatically intact, speech often sounds empty and jargon-like as it is loaded with neologisms (i.e., meaningless words that sound like real words), vague vocabulary (e.g., 'thing' and 'stuff'), and literal and semantic/verbal paraphasias. Literal paraphasias occur when sounds within words are substituted or swapped (e.g., 'bable' for 'table'); and verbal paraphasias refer to words being substituted with semantically-related words (e.g., 'apple' for 'orange') (Wright, Silverman, & Newhoff, 2003). These different types of paraphasias also characterize anomia, where word retrieval problems are the only characterizing deficit. In anomia, auditory comprehension, repetition, and morphosyntactic skills are intact (Brookshire, 1997; Hegde, 1994).

The speech production of individuals with Broca's aphasia, the most common of non-fluent types, is characterized by being slow and effortful, prevalent with misarticulations, frequent in pauses, lacking in intonation, and uneven in flow. Additionally, their utterances are short in length, and their word production is often limited to content words and deleted function words, resulting in aggrammatism (Hegde, 1994; Wright et al., 2003). Perseverations (i.e., repetition of words when new stimuli are presented) and circumlocutions (i.e., talking around target word but without actually saying it) are also common. Global aphasia is usually associated with very large lesions in the left hemisphere and all of the language abilities (auditory comprehension, spontaneous speech, etc.) are severely impaired (Brooskhire, 1997; Hegde, 1994). Speech production is usually limited to a few over-drilled words or short phrases (e.g., 'oh yeah', 'you know', etc.), automatic speech (e.g., recitations, counting, etc.), and/or repetitions of nonsensical syllabic formations (e.g., 'diva miya' 'lela lelaa').

Although the cognitive functioning of individuals with aphasia is assumed to be relatively intact, a number of associated cognitive changes may co-occur with their linguistic disturbance. There may be reduction in attention, memory, organization, and problem solving abilities (Brookshire, 1997). These cognitive abilities undoubtedly influence communication, and could have a particularly negative impact on discourse production abilities. For example, good attention skills are essential to participate meaningfully in an interaction by listening to what is said and responding appropriately. Intact memory is also necessary for one to be able to relay general and specific details of an event or procedure. Additionally, discourse production requires the ability to organize information in a logical and coherent manner. Finally, problem solving is vital for one to be able to make corrections when required. This involves realization that a communication breakdown occurred and finding suitable ways to repair it. Problem solving also allows one to anticipate problematic areas and either prevent them and/or be ready to address them.

There is growing interest in discourse production skills in aphasia (e.g., Damico et al., 1999; Doyle et al., 1998; Ulatowska, et al., 1981, 1983; Ulatowska & Olness, 1997; Yorkston & Beukelman, 1980) which has generated a reasonable amount of information about the structural and functional features of discourse produced by individuals with particular aphasic profiles. The purpose of this section is to present these features as revealed by investigations of discourse in aphasia, beginning with lexical/semantic discourse features and morpho-syntactic features. This will be followed by macro-structural features including cohesion, coherence, and story grammar that have been examined under a variety of experimental conditions.

#### Lexical/Semantic Discourse Features

A better understanding of the lexical features of aphasic discourse is possible through the collective efforts of those examining these features within connected speech studies. Existing research has helped in understanding the types of lexical errors present in the discourse context (e.g., paraphasias, neologisms, empty words, circumlocutions, etc.), grammatical and semantic attributes of the discourse lexicon, and characteristics of lexical usage including

lexical diversity, efficiency, and word frequency (e.g., high vs. low frequency words). Moreover, the discrepancy between word retrieval abilities in connected speech versus other tasks (e.g., confrontation naming) is highlighted as a means of linking lower-level abilities with discourse-level abilities, thus emphasizing the importance of examining how lexical features contribute to the discourse level.

Most prominent lexical errors that characterize discourse in aphasia are word-finding deficits (Christiansen, 1995a) and paraphasic errors, both literal and verbal (Benson, 1967; Chapman, Highley, & Thompson, 1998). As noted earlier, neologisms (Chapman et al., 1998), 'empty' words (e.g., 'thing' 'this'), and non-specific lexical items (Berko-Gleason et al., 1980) are common in discourse produced by individuals with fluent aphasia, whereas circumlocutions and lack of function words are common in those with non-fluent aphasia (Benson, 1967; Chapman et al., 1998). There is conflicting evidence with regard to the grammatical class of words that adults with aphasia produce most frequently in discourse. On the one hand, there have been reports that nouns are more frequently retrieved than verbs (Williams & Canter, 1982, 1987), while the reverse has also been documented (Pashek & Tompkins, 2002). It has been suggested that this variability in findings is associated with the type of aphasia examined, where discourse in fluent aphasia contains more verbs than nouns and the reverse is observed in non-fluent aphasia (Benson, 1967; Berko-Gleason et al., 1980; Chapman et al., 1998).

In a study aimed at characterizing lexical, syntactic, thematic, and macrostructural features of discourse in aphasia, Berko-Gleason et al. (1980)

used picture sequences to elicit story-retelling discourse from ten adults with moderately-severe aphasia – five fluent and five non-fluent – and five normal controls. Adopting a structural approach to analysis, the samples were analyzed for amount of speech, essential themes, lexical features (a measure of quality of information), syntactic features, and cohesion. Their results with regard to lexicon revealed that adults with non-fluent aphasia produced around 20% of target lexemes (i.e., content words produced by at least 90% of a group of 20 normal participants); whereas adults with fluent aphasia produced approximately 8% of target lexemes. The results were interpreted by the authors as indicating that adults with non-fluent aphasia were more efficient at producing relevant lexical items in context. Another major finding of the study was that discourse produced by adults with fluent aphasia contained more verbs than nouns, while that produced by adults with non-fluent aphasia contained more nouns than verbs. Although the findings of this investigation are valuable in suggesting that lexical efficiency and grammatical class of words may be influenced by the type of aphasia, the results remain inconclusive.

Comparing findings from two studies by Williams and Canter (1982, 1987) indicated that discourse by individuals with either fluent or non-fluent aphasia did not differ in that both categories of participants named more nouns than verbs. Williams and Canter (1987) investigated the difference in naming ability between single-word confrontation naming of verbs and action-naming in the context of connected speech. Using a picture description elicitation technique, the investigators collected discourse samples from 44 adults with different types of aphasia (11 in each category of Broca's, Wernicke's, anomia, and conduction). The samples were analyzed by tallying target verbs. Results were compared to findings from an earlier study (Williams & Canter, 1982) in which nouns were the target of analysis in samples elicited from 40 adults with aphasia (10 in each of the four categories above). Regardless of aphasia type, discourse samples were characterized by more accurate productions of high frequency nouns than high frequency verbs. Type of aphasia, however, was a factor influencing the extent to which low frequency words were produced, where adults with conduction aphasia were found to produce low frequency words more than any other group, while adults with Broca's aphasia were found to be least able to produce low frequency words. This variation consequently affected the grammatical categories of words appearing in the samples. This suggests that word frequency is a factor influencing lexical usage in discourse with higher frequency words being more accessible than lower frequency words.

To further examine the influence of context – confrontation naming and video-narration – on lexical retrieval abilities of nouns and verbs, Pashek and Tompkins (2002) tested 20 adults with mild anomic aphasia and ten educationand age-matched normal controls. Participants performed a confrontation naming task of nouns and verbs in isolation, and they described events viewed in short television clips. Data were analyzed by tallying the number of nouns and verbs accurately produced during the two experimental conditions. The primary finding of the study was that word finding abilities were significantly better in video-narration than in confrontation naming for all participants. Additionally, adults with aphasia had more difficulty in lexical retrieval of nouns compared to verbs, possibly due to variations in word length and frequency as rationalized by

the authors. Despite providing further support for contextual effects on lexical retrieval abilities in aphasia, the results of this study further increase the controversy with regard to the influence of context on grammatical class of the words produced.

Pashek and Tompkins' (2002) findings were further supported by those of Mayer and Murray (2003) who also examined contextual effects on word retrieval abilities in aphasia. Mayer & Murray (2003) compared word retrieval during confrontation naming and in two connected speech tasks – description of picture sequences and conversations. Discourse samples were elicited from fourteen adults with mild or moderate aphasia – Broca's, conduction, Wernicke's, transcortical motor. The data were analyzed using three lexical measures: (1) a measure of successful attempts at word retrieval per grammatical class, nouns and verbs; (2) a measure of word retrieval efficiency quantifying the proportion of corrected versus uncorrected errors (Larfeuil & Le Dorze, 1997); and a measure of semantic complexity quantifying the proportion of substantive to "light" verbs. "Light" verbs refer to those that are simple semantically, such as go and make. Several findings of interest were reported. With regard to grammatical class, the findings suggested a trend for verbs to be more accurately retrieved than nouns regardless of aphasia severity. However, further analysis showed that self-correction of verbs occurred more often in mild aphasia, while self-correction of nouns occurred more often in moderate aphasia. The study failed to find a significant difference in the production of substantive verbs versus 'light' verbs. This finding implies that a single mechanism may be responsible for the processing of all verbs at the lexical retrieval phase

regardless of level of complexity. As one may expect, the severity of aphasia significantly influenced the scores of all measures in that participants with mild aphasia consistently scored higher than those with moderate aphasia. With regard to contextual effects, the study's main finding was that word retrieval, including self-correction of errors at the discourse level, significantly surpassed performance at the single word naming level, confirming the results of Pashek and Tompkins (2002).

As previously discussed, discourse elicitation techniques may be partly responsible for the discrepancy in findings with regard to which types of words (nouns or verbs) are more prevalent in the aphasia speech. Berko-Gleason et al. (1980) used picture sequencing to elicit story-retelling and found more verbs in the discourse of adults with fluent aphasia and more nouns in that of adults with non-fluent aphasia. Williams and Canter (1982, 1987) used single picture descriptions and found more nouns in both categories of aphasia. Pashek and Tompkins (2002) used video narration and found better verb than noun retrieval. Mayer and Murray (2003) used description of picture sequences and conversations and found a trend towards better verb retrieval than nouns. Overall, more studies suggest better production of verbs than nouns within the discourse context. It has been suggested previously that picture sequencing tasks elicit more verbs than nouns, while the reverse is true of picture descriptions. It is of interest to note that the studies that support better verb production either used video narration (Pashek & Tompkins, 2002) or picture sequencing (Berko-Gleason et al., 1980; Mayer & Murray, 2003) rather than single pictures (Williams & Canter, 1982, 1987). It is possible that the sequencing effect,

whether in still or dynamic pictures, facilitates the generation of verbs, while single still pictures facilitate the generation of nouns. So it may very well be a methodological effect, specifically an elicitation technique effect. This suggests that for the current study, which is using video-clips, a possible increased production of verbs may be expected.

A couple of investigations have looked more closely at the semantic patterns of verbs produced by adults with aphasia in a discourse context (Armstrong, 2001; Mayer & Murray, 2003). Semantic patterns refer to the type of processes that verbs correspond to, such as material verbs, which represent actions and correspond to the process of 'doing' (e.g., 'run,' 'play'); relational verbs, which indicate relations between elements and correspond to the process of 'being' (e.g., 'be,' 'have'); mental verbs, which indicate thought processes and feelings and correspond to the process of 'thinking' (e.g., 'believe,' 'decide'); and verbal verbs, which indicate talking and correspond to the process of 'saying' (e.g., 'say,' 'tell'). While Mayer and Murray (2003) did not find a significant effect of discourse context on the production of substantive verbs in comparison to 'light' verbs (e.g., go, do), Armstrong (2001, 2005) found significant effects of context on the production of other types of verbs. Armstrong (2001) elicited four narrative discourse samples from eight participants - four with moderate to mildly-severe fluent aphasia and four matched controls. Participants talked about four topics - their stroke, a war experience, their occupation, and any happy occasion. The examiner adopted a text linguistic approach analyzing verb usage following a framework developed by Halliday (1985), wherein verbs are analyzed for their role in discourse

meaning. Results showed that discourse by adults with aphasia included mainly material verbs and an extremely limited number of mental verbs. Relational verbs were used by two participants with aphasia in a comparable manner to material verbs, while two aphasic participants used them minimally. Discourse by healthy controls was mainly comprised of material and relational verbs. The author interpreted this finding as a reflection of the patients' focus on describing events lacking in opinions and evaluations.

Armstrong (2005) went on to investigate verb production in relation to linguistic functions within a context involving the expression of opinions and feelings by adults with aphasia. Participating in the study were five individuals with fluent aphasia ranging in severity from mild to moderately-severe and five healthy controls. Narratives were elicited by asking participants to talk about three personal topics - an illness (negative context), a joyful occasion (positive context), and a previous occupation (neutral context). A text linguistic approach was used to analyze verb types following a framework developed by Halliday (1994), with particular attention to mental and relational verbs. The following four measures were computed: percentage of mental verbs of total verbs produced; percentage of relational verbs of total verbs produced; percentage of mental verbs that correspond to the participant's feelings of total mental verbs produced; and percentage of relational verbs that correspond to the participant's opinions (i.e., those with an evaluative function) of total relational verbs produced.

The findings indicated that adults with aphasia exhibited a reduced overall ability to express their feelings and opinions as manifested in their

difficulty in using mental and relational verbs. An additional finding of interest is that there was less diverse vocabulary in discourse produced by adults with aphasia in comparison to that of healthy controls as revealed by a smaller percentage of mental verbs in the discourse by adults with aphasia. Moreover, discourse produced by adults with aphasia contained more general, highfrequency mental verbs than that produced by healthy controls. Although it is clear that the discourse topics elicited by Armstrong (2005) fell into three main affective categories – negative, positive, and neutral valence – the author did not go into an in-depth analysis and discussion of possible emotionality effects on the samples elicited. This level of analysis will be conducted in the current study to test the differential effects of emotional valence on the lexicon.

Wright et al. (2003) investigated lexical diversity in conversations by individuals with aphasia. The primary goals of their study were to assess how three measures of vocabulary in discourse production in aphasia relate to one another, and to evaluate the effectiveness of these three measures in discriminating between fluent and non-fluent aphasia. The three lexical diversity measures under examination were type-token ratio, number of different words, and a mathematical algorithm applied to type-token ratio. In addition to these three, the investigators analyzed word retrieval deficits to distinguish between fluent and non-fluent aphasia. Nine adults with fluent aphasia and nine with nonfluent aphasia participated in the study. The investigators elicited spontaneous conversations and picture description discourse – 'picnic scene' from the *Western Aphasia Battery*. The measures of lexical diversity were used to comparatively analyze the samples. Study findings relevant to the present study

showed that adults with fluent aphasia had significantly higher lexical diversity than non-fluent aphasia for both spontaneous conversations and picture description discourse on two measures – number of different words and typetoken algorithm – when the entire samples were considered (i.e., unequal sample size). Further, when sample sizes were reduced to equal sizes, all three measures revealed higher lexical diversity for adults with fluent aphasia compared to those with non-fluent aphasia. Additionally, individuals with fluent aphasia produced significantly longer discourse samples as compared to adults with non-fluent aphasia. Thus, regardless of the type of lexical diversity measure employed, adults with fluent aphasia consistently exhibit more lexically diverse speech than do those with non-fluent aphasia.

To conclude, lexical retrieval in discourse tasks has been documented to be better than in naming tasks (e.g., confrontation naming) for adults with aphasia (Larfeuil & Le Dorze, 1997; Mayer & Murray, 2003; Pashek & Tompkins, 2002). One may argue that lexical elements are lower-level attributes that do not qualify as discourse features. However, the preceding review points out that performance at the lexical level varies according to the discourse context, emphasizing the interaction between lower level language units and the higher discourse level. There is controversy as to the nature of this interaction, whether discourse is a sum of all smaller units or a broader entity that interacts with these units, and this issue goes beyond the purview of this study. Regardless, it is evident from the literature that any deficit in these smaller units impacts the whole. It is therefore highly relevant to delineate which of these smaller elements have significant impact – and which do not – on the ultimate communicative efficiency of discourse in its entirety.

To summarize the effect of aphasia type on lexical production, fluent aphasia leads to the predominance of errors such as neologisms and non-specific vocabulary. Non-fluent aphasia leads to a higher abundance of content words versus function words. As for grammatical word class, results varied with some evidence suggesting that discourse by adults with mild aphasia of different types (Mayer & Murray, 2003; Pashek & Tompkins, 2002) or moderately-severe fluent aphasia (Berko-Gleason et al., 1980) is likely to contain more verbs than nouns; whereas discourse by adults with moderately-severe non-fluent aphasia contains more nouns than verbs (Berko-Gleason et al., 1980). Moreover, selfcorrection of nouns may occur more in discourse by adults with mild aphasia regardless of type, while self-correction of verbs may occur more in moderate aphasia, regardless of type as well. In short, more studies suggest a trend for the discourse of individuals with fluent aphasia to contain more verbs and that of individuals with non-fluent aphasia to contain more nouns. Findings also suggest that adults with moderately-severe non-fluent aphasia are more efficient in their lexical use than adults with fluent aphasia (Berko-Gleason et al., 1980), yet discourse by individuals with fluent aphasia is more lexically diverse than that by adults with non-fluent aphasia (Wright et al., 2003). With regard to word frequency, findings indicate that all aphasia types are characterized by a prevalence of higher frequency words in comparison to lower frequency words, regardless of aphasia type (Armstrong, 2005; Williams & Canter, 1982, 1987).

## Morpho-Syntactic Discourse Features

Morphological and syntactic structures have also been examined at the discourse level as lower-level components. Morpho-syntactic discourse studies in aphasia have focused primarily on morphological and syntactic errors, such as omitted morphological forms (e.g., free & bound morphemes, such as inflections) and syntactic structures (e.g. clauses, embeddings). Morphosyntactic studies also investigated sentential length (e.g., MLU), complexity (e.g., amount of embeddings), and well-formedness. Research findings indicate that these morphological and syntactic features manifest differently in adults with aphasia as a function of aphasia type (Bird & Franklin, 1996; Penn, 1988; Rochon, Saffran, Berndt, & Schwartz, 2000; Saffran, Berndt, & Schwartz, 1989). There have been documented differences between fluent and non-fluent aphasia as well as between subtypes of non-fluent aphasia – agrammatic and non-agrammatic —as will be presented in this section.

The most common characterization of discourse in non-fluent aphasia with regard to morpho-syntactic features is simplified syntactic structures that are reduced in length and complexity (Berko-Gleason et al., 1980; Edwards, 1995; Penn, 1988; Rochon et al., 2000; Saffran et al. 1989), surfacing as a list of simple utterances. This is likely due to lack of relative and embedded clauses (Berko-Gleason et al., 1980; Bottenberg et al., 1985; Penn. 1988; Ulatowska, Allard, & Bond Chapman, 1990; Ulatowska et al., 1981, 1983, 1992), and to reduced production of free and bound morphemes (Rochon et al., 2000; Saffran et al., 1989). Additionally, adults with non-fluent aphasia have been found to omit essential syntactic and morphological forms, such as sentence subject, main verbs, inflections, and function words (Kolk & Heeschen, 1992). These descriptions do not hold equally for all individuals with non-fluent aphasia (Rochon et al., 2000; Saffran et al., 1989).

There is a difference with regards to certain grammatical features between subtypes of non-fluent aphasia - agrammatic and non-agrammatic. Saffran et al. (1989) developed a procedure for the analysis of morphological and syntactic components of discourse produced by adults with aphasia which is called Quantitative Production Analysis. Intended for application with stories elicited by having participants narrate familiar fairy-tales, this analysis examines ' a number of measures including proportion of well-formed sentences, embedding index, and proportion of verb inflections. The investigators analyzed narratives produced by two groups of adults with non-fluent aphasia – an agrammatic group (N = 5) and a non-agrammatic group (N = 5) – and a group of normal controls (N = 5). Results revealed that discourse produced by speakers with agrammatism was lacking in free and bound morphemes, and deficient in closed class words and inflections, distinguishing them from non-agrammatic and normal speakers. Propositional utterances produced by either group of adults with non-fluent aphasia were reduced in structural complexity. The relevant findings of Saffran et al.'s (1989) study to the current one is that they point towards the subtle differences between subtypes of aphasia categories, as well as the individuality of symptoms.

With an aim of expanding Saffran et al.'s (1989) findings to a larger group, Rochon et al. (2000) analyzed connected speech from 29 adults with nonfluent Broca's aphasia using the same elicitation technique and analysis procedure. Participants included 20 adults with agrammatism, nine with no agrammatism, and 12 healthy controls. Their results provided further evidence that individuals with non-fluent aphasia with agrammatism produce fewer free and bound morphemes than those with non-agrammatic non-fluent aphasia, resulting in the production of fewer grammatically well-formed utterances by agrammatic speakers than non-agrammatic speakers.

Morpho-syntactic abilities appear somewhat less impaired for fluent aphasia. With an aim of exploring the relationship between syntactic and pragmatic communicative levels, Penn (1988) analyzed 20-minute conversational samples obtained from 14 adults with various types of aphasia. Each participant joined in a single conversation with a clinician where three topics were discussed: topic of mutual interest, experience with aphasia, and a procedure. The investigator analyzed the samples for syntactic and pragmatic features. The syntactic analysis targeted four skill levels ranging from single words to sentences measuring 37 variables (e.g., total number of sentences, mean number of sentences per turn, and mean length of sentence). Findings revealed that adults with fluent aphasia were more spontaneous, produced more appropriate syntactic forms, had higher number of sentences per conversational turn, and longer mean length of utterances than adults with non-fluent aphasia.

Bird and Franklin (1996) utilized Saffran et al.'s (1989) *Quantitative Production Analysis* to compare individuals with fluent and non-fluent aphasia on morpho-syntactic variables. Samples were elicited by requiring participants to narrate familiar fairy-tales (e.g., Cinderella) as in the original procedure by Saffran et al. (1989). Five adults with aphasia – two fluent, two non-agrammatic

non-fluent, and one agrammatic non-fluent – and five normal controls participated in the study. Results confirmed impaired syntactic complexity and well-formedness for the participant with agrammatic non-fluent aphasia. Adults with fluent aphasia, similar to non-agrammatic non-fluent aphasics, were comparable to normal controls on all syntactic measures with the exception of producing fewer well-formed utterances.

Although the small sample size extremely limits generalization of findings, Bird and Franklin's (1996) results corroborated evidence from a previous study by Edwards (1995) who also used the *Quantitative Production Analysis* procedure to analyze narratives (familiar fairy-tales) produced by two adults with fluent aphasia, and a group of normal controls. The purpose of the study was to compare results from Saffran et al.'s (1989) procedure with another for analyzing morpho-syntactic components, a technique that was primarily developed for child language analysis (Edwards & Knott, 1993). Results revealed that discourse produced by adults with fluent aphasia contained utterances that are generally grammatically well-constructed, but that syntactic complexity was relatively reduced compared to that of normal controls.

To summarize, discourse by individuals with non-fluent aphasia is characterized by morphological deficits at the word level, serious limitations at the phrase and clause levels, with a great deal of incomplete sentences and reduced length and complexity of sentences. Discourse produced by adults with fluent aphasia is less impaired than that by adults with non-fluent aphasia in morphological and syntactic features. However, when juxtaposed with normal discourse, that by individuals with fluent aphasia falls short in number of embeddings, relative clauses, and appropriate use of modifiers.

#### Macro-structural Discourse Features

The aphasia discourse literature suggests that macro-structural elements are impacted differently as a function of aphasia type (Berko-Gleason et al., 1980; Bloom et al., 1995; Chapman et al., 1998; Glosser & Deser, 1991; Piehler & Holland, 1984; Ulatowska & Bond, 1983; Ulatowska et al., 1981, 1983). There is documented evidence that aphasia type affects discourse cohesion (Berko-Gleason et al., 1980; Piehler & Holland, 1984), coherence (Bloom, Borod, Obler, & Gerstman, 1993; Chapman et al., 1998; Christiansen, 1995a, 1995b), and story grammar (Bottenberg et al., 1985; Ulatowska et al., 1981, 1983, 1990). Use of cohesion, although arguably a micro-structural discourse feature, is reported within this section considering the close association between cohesion and coherence.

In terms of cohesion analysis, aphasia discourse studies examined number and type of cohesive devices produced relative to healthy controls, and the effectiveness of using these devices. For example, Berko-Gleason et al. (1980) examined production of cohesive devices, particularly reference, in a group of ten adults with moderately-severe aphasia – five fluent and five nonfluent – and ten normal controls. The investigators elicited discourse samples using picture story-retelling (i.e., participants were told a story and were required to retell it while looking at stimulus pictures). Discourse by individuals with fluent aphasia was found to contain an adequate quantity of cohesive

devices, especially pronouns. However, this group was found to produce demonstrative devices (e.g., this, there) and the conjunction 'and' excessively, but use other conjunctions (e.g., 'then', 'because', 'but', etc.) sparingly. On the other hand, discourse by adults with non-fluent aphasia was found to contain a significantly lower number of cohesive devices, primarily pronouns. This group with non-fluent aphasia did not produce a sufficient number of demonstratives and conjunctions to allow reliable measurement of these devices. Despite the difference between fluent and non-fluent aphasia in the number and types of devices used, discourse by both groups was deficient in the completeness of cohesive ties. This meant that cohesive devices produced by adults with aphasia had no referents with which to associate, making it challenging for recipients to interpret what pronouns and definite articles signify. Production of incomplete cohesive ties, due to word finding and grammatical deficits, may be interpreted as violation of pragmatic discourse rules where speakers presuppose that listeners know more than they actually do, and thus do not provide them with adequate and clear referents.

Later studies found similar results for both aphasia classifications (Bloom et al., 1995; Chapman et al., 1998; Glosser & Deser, 1991; Ulatowska & Bond, 1983; Ulatowska et al., 1983). For example, this trend of ambiguous referents regardless of number of cohesive devices was also found by Piehler and Holland (1984) for acute stage aphasia for both fluency categories. The investigators analyzed cohesive ties in 15-minute conversational samples elicited from two individuals with aphasia, one fluent and one non-fluent, as they conversed with trained assistants. The purpose of the study was to monitor

progress of use of cohesive ties at the acute stage of aphasia, and to determine whether adults with fluent aphasia differed from adults with non-fluent aphasia in their use of cohesive ties at this acute stage, which was determined by the authors as hospitalization for one week immediately following the stroke causing the aphasia. Discourse from the fluent participant at this acute stage contained an excessive number of cohesive devices, while discourse from the non-fluent participant contained a limited number of cohesive devices; yet for both participants, these cohesive devices had no referents. However, it was noted that for the fluent participant, use of cohesive devices decreased over the one week, while the reverse was observed for the non-fluent participant. The authors also found that lexical cohesion was increasingly being incorporated by both participants, simultaneously reducing the number of ambiguous cohesive ties.

The findings of this study – despite its limitation of having only two participants – are of value because they suggest that regardless of number of cohesive devices, what matters in determining clarity of information content is having clear referents for these devices. It is also interesting to note that even at the acute stage, the effects of type of aphasia on the use and clarity of cohesive devices are already apparent. Although the direction of change was opposite for the fluent and non-fluent participant, for both individuals more clear referents emerged as the patients progressed. Monitoring change at this acute stage of recovery is undoubtedly useful in understanding neural re-organization in response to the sustained damage, yet it may not be of direct clinical relevance as many patients may initiate speech-language therapy at later stages.

With regard to coherence, researchers investigated how listeners perceived and rated coherence of discourse produced by adults with aphasia, and what factors influenced these ratings. Coherence studies were also concerned with the information content, such as the centrality of themes and propositions present in discourse by adults with aphasia. Some studies that specifically elicited narratives examined the presence of story grammar elements. Aphasia type and severity were found to influence these discourse components at different levels.

There are numerous reports that discourse by adults with aphasia – fluent and non-fluent – is relatively coherent in that event sequences are maintained (Bloom et al., 1993; Christiansen, 1995a, 1995b). However, maintaining event sequencing appears not to be sufficient for listeners to rate discourse as coherent. In a study investigating narrative and procedural discourse in aphasia, Ulatowska et al. (1981) elicited three types of narratives (i.e., personal, picture sequencing, and fable retelling) from ten adults with mild or moderate fluent and non-fluent aphasia, and ten healthy controls. The purpose of the study was to examine the presence of superstructure components (e.g., setting, resolution, etc.) and to obtain listener ratings about discourse coherence. Five judges performed content ratings by answering several questions (e.g., "Do you know what is happening in the story?"). Discourse produced by adults with fluent and non-fluent aphasia received lower ratings by listeners for both clarity and content than that by normal controls (Ulatowska et al., 1981, 1983). Listeners also rated discourse by fluent participants higher on clarity than that produced by non-fluent participants (Ulatowska et al., 1983). In short, individuals with aphasia were rated as less coherent than controls for discourse content.

A follow-up study by Ulatowska et al. (1983) testing 15 adults with moderate aphasia using similar procedures confirmed these findings. The latter study demonstrated that this group with moderate aphasia produced discourse which contained a smaller number of story episodes and confused event sequencing. As expected, their discourse was rated as less informative than discourse produced by a group of 15 healthy controls. Aphasia severity also influenced story grammar. Discourse by adults with mild or moderate aphasia severity typically included fundamental components such as setting, complicating action, resolution, and evaluation (Bottenberg et al., 1985; Ulatowska et al., 1990). In contrast, discourse by adults with severe aphasia was found to be significantly impaired with regard to story structure, often manifesting as a list of utterances lacking any of the fundamental elements. The investigators also found that elicitation technique influenced the amount of information content. Picture sequencing stories contained all essential propositions, while fable retellings contained only a few. Personal stories, despite having basic narrative structure, contained fewer setting and resolution clauses, but comparable action clauses to controls. In personal stories, there was an overall tendency to omit propositions expressing inner feelings and motivations. This latter finding has been more recently supported by Armstrong (2001), who found that adults with aphasia tend to describe events but do not provide opinions and evaluations.

Ratings of ambiguity, reduced clarity, and reduced content may be associated with a number of discourse characteristics documented in other studies such as a lack of salient themes and essential propositions for both fluent and non-fluent aphasia (e.g., Berko-Gleason et al., 1980; Christiansen, 1995a, 1995b). Another attribute likely to influence coherence rating is that discourse by individuals with either fluent or non-fluent aphasia was found to contain central themes more frequently than peripheral information (Ulatowska et al., 1981, 1983). Moreover, the flow of discourse by individuals with fluent aphasia has been found to be disrupted by a prevalence of revisions, hesitations, paraphasias, circumlocutions, and ambiguous pronouns (Chapman et al., 1998). Additionally, narrative discourse by adults with fluent aphasia was found to contain many irrelevant propositions, repeated propositions, and information gaps (Christiansen, 1995a; 1995b). All of these characteristics violate discourse coherence and are likely to affect how listeners perceive and rate coherence.

Christiansen (1995a) conducted a study with the goal of developing a tool for analyzing types of propositions and coherence violations in discourse by adults with aphasia. The investigator elicited narrative discourse from 15 participants with one of three types of mild fluent aphasia – 5 anomic, 5 Wernicke's, and 5 conduction – and 20 matched controls. The samples were elicited using four cartoon strips, each consisting of 4-5 pictures. The analysis procedure involved five stages – editing the texts, parsing utterances into propositions, coding proposition types, determining coherence violations, and finally rating propositions for logic and relevance. Study findings revealed that patterns of coherence violations differed as a function of aphasia type.

Specifically, discourse by adults with anomic aphasia contained significantly more information gaps than any other group; discourse by adults with conduction aphasia contained significantly more repeated propositions than any other group; and discourse by individuals with Wernicke's aphasia contained significantly more irrelevant propositions than any other group. The author interpreted these findings to suggest that these varying patterns of violation are strategies by which each group compensates for other underlying deficits. This was rationalized for participants with anomia as their attempt to continue speaking rather than wasting time and effort trying to retrieve words, which results in information gaps. For conduction aphasia, repeated propositions were justified as attempts at self-correcting lexical and paragrammatical errors. The author explained the abundance of irrelevant propositions in Wernicke's aphasia by suggesting that participants focused on describing the stimulus pictures, thus providing details irrelevant to the story-line. These interpretations seem sensible; however, it is important to test these claims in future experiments.

To summarize, discourse by adults with moderately-severe fluent aphasia contains an adequate number of cohesive devices that are varied in type (e.g., pronouns, demonstratives, and conjunctions), while discourse produced by individuals with moderately-severe non-fluent aphasia includes an inadequate number of cohesive devices that are primarily limited to pronouns. Yet for both categories of aphasia, discourse is characterized by having incomplete cohesive ties with ambiguous referents, a trend that is apparent even at the acute stage. Sequences of events are generally maintained; however, coherence in mild or moderate fluent and non-fluent aphasia is lower in content, clarity, and

informativeness than normals, as rated by listeners. Additionally, discourse produced by this population may contain essential themes and propositions. Discourse by adults with fluent aphasia, however, is likely to contain problematic propositions that violate discourse coherence. The structure of stories produced by adults with mild or moderate aphasia contains more story elements and is more intact in comparison with severe aphasia.

Despite the wealth of increasing knowledge about discourse features in aphasia at various levels, much is yet to be understood. For example, which factors are likely to improve discourse production and comprehension deficits in aphasia? Cognitive, social, and methodological variables influencing aphasic discourse require further exploration. Of these potentially important variables, a limited number of studies have attempted to examine the influence of emotionality on discourse production. This is what this study attempts to accomplish, as will be discussed in the following section.

# Variables Influencing Discourse in Aphasia

This section will touch briefly on a number of factors that were found to influence and possibly facilitate discourse abilities in aphasia. Although the present study is limited to discourse production, it is nonetheless important to understand some of the facilitative effects on discourse comprehension as well since similar factors may influence both production and comprehension. Hence, factors influencing discourse comprehension in aphasia will be presented first, followed by factors influencing discourse production. Both linguistic (Armus, Brookshire, & Nicholas, 1989; Boyle & Canter, 1986; Cannito, Jarecki, & Pierce, 1986; Hough et al., 1989; Nicholas & Brookshire, 1983; Pashek & Brookshire, 1982) and extra-linguistic contextual (e.g., Wilcox, Davis, & Leonard, 1978) variables have been shown to facilitate discourse comprehension in adults with aphasia. Within linguistic context, phonological (e.g., rate of speech and linguistic stress), and semantic features (e.g., predictability and redundancy) have been documented to positively influence the ability to comprehend discourse-level material. Additionally, extralinguistic features such as the context within which an utterance is produced also facilitate comprehension (Wilcox et al., 1978).

At the phonological level, some studies have found that reducing speech rate and overstressing essential elements assists adults with aphasia in responding more accurately to yes/no comprehension questions, regardless of level of auditory comprehension abilities (Pashek & Brookshire, 1982). Pashek and Brookshire (1982) examined the influence of speech rate and linguistic stress on auditory comprehension of paragraphs in 20 adults with aphasia – grouped into high and low auditory comprehension abilities – and eight nonbrain-damaged adults. Using yes/no questions to assess discourse comprehension, the authors presented target paragraphs by manipulating speech rate (normal vs. reduced) and linguistic stress (normal vs. overstressing key elements). Auditory comprehension significantly improved in slower rate conditions over standard speech rate and in overstressed element conditions over normal stress for both aphasia groups, while normal adults demonstrated no difference in performance regardless of condition. As such, manipulating linguistic variables even at the most basic linguistic level - i.e., phonological parameters - can have significant effects on a broader linguistic level, the ability to comprehend discourse.

At the semantic level, increasing information redundancy (e.g., Boyle & Canter, 1986; Nicholas & Brookshire, 1983) and predictability of forthcoming information (e.g., Armus et al., 1989; Cannito et al., 1986; Hough et al., 1989) have been found to facilitate discourse comprehension in aphasia. Researching the benefits of contextual semantic redundancy, Boyle and Canter (1986) investigated whether or not comprehension of syntactically complex sentences would improve if presented at the end of a semantically redundant text as opposed to presenting them in isolation. The study included 36 adults with aphasia categorized into four groups: fluent with good comprehension; fluent with poor comprehension; non-fluent with good comprehension; and non-fluent with poor comprehension. Participants listened to target sentences either in isolation or at the end of a relevant text and were required to select a picture from a set of four alternatives that corresponded to the target sentence. Results revealed that presenting syntactically complex sentences at the end of semantically redundant text significantly improved comprehension compared to the isolation condition, regardless of aphasia category. These findings confirm results of a previous study by Nicholas and Brookshire (1983). Thus, manipulating semantic-level variables, similar to phonological variables, can also significantly influence discourse-level abilities.

The influence of contextual redundancy on the abilities of adults with aphasia to comprehend language in context has also been examined. Wilcox et

al. (1978) investigated the abilities of eighteen adults with aphasia – split into two groups: high vs. low auditory comprehension levels - in their ability to comprehend different types of indirect requests. They defined indirect requests as utterances the form of which did not match the conveyed intention. An example is using a question form "Isn't it cold in here?" with the intention of requesting that someone close the window. The authors used video-taped interactions between two adults, in which one makes an indirect request of another in different contexts. Participants were required to judge whether listeners responded appropriately to indirect requests given by the speaker by providing a yes/no response. Regardless of level of auditory comprehension, adults with aphasia performed better in comprehending utterances within context than their standardized test scores would have predicted. Although the authors did not test the comprehension of the same utterances in isolation to compare performance on the two tasks, the results nonetheless demonstrate the positive influence of extra-linguistic characteristics on comprehension of contextuallyembedded utterances in comparison to standardized test results. Thus, contextual cues were found to be significant factors positively influencing the comprehension of indirect speech acts, a discourse variable.

To summarize, studies have found that redundancy of information positively affects performance on discourse comprehension tasks. The more redundant the text the better adults with aphasia can understand it regardless of their level of comprehension abilities. Additionally, when adults with aphasia listen to information predictive of what follows, they are better able to comprehend forthcoming information. It is not exactly clear why and how these
two semantic factors have the effect they do. It is possible that redundancy and predictability cause receivers to progressively exclude extraneous explanations of the text, thus allowing them to focus on and restrict options for understanding the text. Other factors influencing discourse comprehension abilities are reducing speech rate and emphasizing key words by means of manipulating linguistic stress, both phonological variables, as well as increasing extralinguistic contextual redundancy. Clinical applications to these empirical findings include strategies to enhance communication by slowing down, stressing key words and phrases, and rephrasing information to increase textual redundancy when speaking to individuals with aphasia.

The quantity and quality of discourse *produced* by individuals with aphasia has also been found to be positively influenced by a number of variables, such as the type of discourse genre and elicitation technique used (e.g., Bottenberg et al., 1987; Glosser et al., 1988), contextual variables such as communication channels and contextual familiarity (e.g., Glosser et al., 1988), and the topic and listener familiarity (Li et al., 1995; Williams et al., 1994). For example, the role of discourse genres and the method by which discourse samples are elicited were highlighted by Glosser et al. (1988); they elicited personal narratives using informal interviews, and picture description discourse under varying communicative conditions from ten adults with aphasia, five mild and five moderate in severity. Within the personal narrative genre, participants spoke about one of four different topics – family, occupation, education, or major illness – in each of the communicative conditions. Their findings revealed that, regardless of condition, personal narratives were characterized by more

complex language, measured in part by length of utterance and vocabulary size, and fewer verbal disruptions, measured partly by number of mazes, repetitions, paraphasias, and fillers, than picture descriptions. Their findings demonstrate both a genre effect – narratives vs. descriptions – and an elicitation method effect – spontaneous vs. picture-elicited – on discourse production. Another example of an elicitation method effect is a comparison of discourse elicited using a picture sequence with that using single pictures. Picture sequences elicited discourse significantly higher in word count than single pictures (Bottenberg et al., 1987), demonstrating the facilitative effect of elicitation technique on discourse quantity.

Discourse topic, which is both a semantic and pragmatic variable, has also been found to influence language complexity and verbal disruptions (Glosser et al., 1988). In the Glosser et al. (1988) study described above, which examined four different topics, participants had lower verbal complexity scores when speaking about families than when speaking about an illness or work. Conversely, the topics of education and occupation resulted in a significant increase in verbal disruptions compared to family or illness. These results demonstrate that discourse content or topic influence semantic and syntactic discourse features.

Not only discourse topic, but also familiarity of topic was found to influence discourse production characteristics. Influence of topic familiarity and listener familiarity on discourse variables was examined by Williams et al. (1994) and followed up by Li et al. (1995). In both studies, investigators examined familiarity effects on syntactic and semantic features in procedures and narratives by adults with aphasia. Participating in the research were 22 adults presenting with one of three types of aphasia – Broca's, conduction, or anomic – and 10 normal controls. Participants talked about familiar and unfamiliar topics with both a familiar (spouse) and an unfamiliar listener (investigator). Williams et al. (1994) analyzed data for quantity and syntactic complexity. Quantity was measured by number of T-units – defined by Hunt (1970) as an independent clause plus any associated dependent clauses. Syntactic complexity was measured by number of words and clauses per T-unit. For both discourse genres investigated, topic familiarity positively influenced discourse quantity resulting in a significant increase in number of T-units over unfamiliar topics. Topic familiarity also facilitated grammatical complexity of narratives, with a higher number of words per T-unit for familiar than unfamiliar narratives. Interestingly, the reverse was observed for procedural discourse, where unfamiliar procedures were significantly more complex than familiar ones as demonstrated by a higher number of words and clauses per T-unit. Listener familiarity was not found to significantly influence quantity and grammatical complexity.

Li et al. (1995) analyzed data for discourse content, which was measured by the number of essential and optional steps in procedural discourse, and essential story elements in narratives. Topic familiarity facilitated inclusion of optional steps in procedures and action and resolution clauses in narratives. Additionally, participants were more likely to provide story setting with a familiar listener than an unfamiliar listener. The authors concluded that listener familiarity positively influenced production of story elements in narrative tasks. Thus, to summarize the findings of Williams et al. (1994) and Li et al. (1995), both discourse topic and the familiarity of the topic influenced grammatical complexity. Listener familiarity, on the other hand, was not found to significantly influence quantity and grammatical complexity although it facilitated discourse content. Findings for listener familiarity effects may not be as compelling as topic familiarity but have nonetheless been found to influence discourse content. The evidence here is yet another clue to the susceptibility of discourse production skills (e.g., discourse quantity and content) to the influences of a multitude of contextual variables (e.g., topic, listener, etc.).

Adults with aphasia also seem to benefit from familiarity of other attributes of the context within which they are communicating. Familiar conditions of communicating, such as using a telephone, have been documented to influence semantic and syntactic complexity of discourse production in aphasia. Glosser et al. (1988), in their study described above, investigated the effect of extra-linguistic contextual characteristics and communication conditions on discourse production. Samples were elicited within four contexts varying in conditional constraints - restricted vs. unrestricted, and familiar vs. unfamiliar. In the restricted condition, participants were limited in the number of communication channels they could make use of, auditory only (restricted) vs. auditory and visual (unrestricted). The four contexts were face-to-face conversations (familiar, unrestricted), telephone conversation with no visual contact (familiar, restricted), conversing via television screens connected through a bidirectional video system (unfamiliar, unrestricted), and conversing with an opaque barrier separating the participant and examiner (unfamiliar,

restricted). Restricting communication channels to auditory only resulted in production of more complex verbalizations, semantically and syntactically. Interestingly, adults with mild aphasia produced more complex language in the telephone condition, while those with moderate severity produced more complex speech in the barrier condition. The authors interpreted these results as indicating that restricting communication to verbal-vocal channels facilitates grammatical complexity of utterances to cope with the needs of the communicative task. It may be possible that adults with aphasia vary grammatical complexity of their productions as an adjustment strategy to manage and deal with the altering burdens of the communicative task. These results can also be interpreted to mean that familiarity of the telephone context facilitated grammatical complexity. Regardless, these results demonstrate that nonlinguistic social features of the communicative context, such as restrictiveness and familiarity, have an effect on the syntactic and semantic complexity of the language produced.

To summarize, these findings point to a number of factors that may impact on the quantity and quality of discourse production in aphasia. These factors include discourse genre, elicitation technique, discourse topic, familiar topics, listeners, and communication conditions. Overall, this review illustrates that both linguistic (e.g., topic and genre) and extra-linguistic factors (e.g., method of elicitation and contextual variables) may have a notable impact on discourse production indicating that discourse skills can be modulated by a number of variables. One additional factor that has been given little attention so far is emotionality, as will be discussed in the following chapter.

### The notion of Resource allocation in Aphasia

From this review, it is clear that linguistic performance can be manipulated and varied in adults with aphasia due to different linguistic and contextual variables, although much additional research needs to be done. The fact that aphasic performance is variable leads to a fundamental theoretical question that has been a source of controversy amongst researchers in aphasia. This question concerns the nature of aphasia itself and the characterization of aphasia as a disorder. That is, whether aphasia is a disorder of language loss (i.e., deficit in linguistic competence) or a deficit in language access or language processing (i.e., difficulties with performance) is still an area of debate.

Attempts to answer this question have given rise to two primary schools of thought – linguistic-based theoretical models and processing-based models which currently dominate aphasia research. Linguistic-based approaches are concerned with describing linguistic deficits whereas processing-based approaches examine notions of processing limitations. Empirical evidence obtained from comprehension and production studies has been put forth supporting each of these two major approaches. Examples of linguisticdescriptive approaches include Trace-Deletion hypothesis (e.g., Grodzinsky, 1990) and Case-Deficit hypothesis (Druks & Marshall, 1995), whereas examples of processing approaches include Mapping Deficit hypothesis (Linebarger, Schwartz, & Saffran, 1983), Limited-Capacity hypothesis (Linebarger, et al., 1983; Kolk, 1998), and Resource Allocation hypothesis (McNeil, Odell, & Tseng, 1991). In keeping with the present idea that certain aphasic deficits may be amenable to improvement due to factors such as emotionality, the notion of resource allocation and Kolk's (1998) description of 'adaptation' in aphasia are of particular interest here.

One reason that processing approaches were postulated is to account for discrepancies in aphasic performance across tasks and points in time. For example, the limited-capacity hypothesis maintains that certain tasks (e.g., comprehension) "overload the processing capacity" of adults with aphasia, while other less demanding tasks (e.g., grammaticality judgment) may be within individual processing capacity limits. Kolk and colleagues consider processing limitations to be due to reduced availability of linguistic information or limited access to them; this in turn leads to slow activation and/or fast decay of certain information required to formulate meaningful sentences. The limited-capacity hypothesis gained preference because it was able to account for variations in aphasia severity levels (Kolk & Weijts, 1996). The fact that speech by individuals with aphasia varies across contexts and across tasks is taken as primary evidence for a variety of 'performance limitations' (e.g., Kolk & Heeschen, 1992; Linebarger et al., 2007; see Bastiaanse, 1994 for a review).

While originally conceptualized for syntactic deficits, the notion of limited capacity and its effects on language in aphasia has been extended to the discourse level. Kolk (1998) proposed an "economy hypothesis" to account for variations in spontaneous speech. The basic tenet of this hypothesis is that individuals with aphasia 'adapt' the complexity of their utterances to their limited capacity by maintaining a stock of normal forms which require reduced capacity. Presumably, these forms can be used without overloading the

processing system in contexts of limited resources to allocate to the task. An

alternative processing account – Resource Allocation hypothesis – is based on the basic assumption that language deficits in aphasia are a by-product of a general limitation in attentional resources (e.g., McNeil & Kimelman, 1986; McNeil, Odell, & Tseng, 1991; Murray, 1999; Murray, Holland, & Beeson, 1997a, 1997b; Slansky & McNeil, 1997; Tseng, McNeil, & Milenkovic, 1993). That is, due to their brain damage attentional capacity is more limited in individuals with aphasia affecting their linguistic performance. Support for this claim is obtained from studies that utilize dual task experiments where participants perform two tasks simultaneously, such as a story-retell procedure and visual-motor tracking (McNeil, Doyle, Hula, Rubinsky, Fossett, & Matthews, 2004).

Although this report was not specifically designed to test resource allocation accounts of aphasia, evidence that aphasic deficits may be explained by a deficit in allocating resources, rather than a linguistic deficit per se, is highly germane to the present study. If this characterization is correct and many of the difficulties experienced by aphasic patients are the result of directing a sufficient amount of attention (or other cognitive) resources to processes needed to produce language efficiently, the idea of facilitating pragmatic features of discourse in certain aphasic patients becomes possible. For example, if the emotional content of a stimulus were to alter the effects of attention or other cognitive resources on language in a positive manner, one might predict an improvement in various dimensions of their discourse production as has been found when a number of other factors were manipulated as discussed above. These ideas will be considered further in what follows.

# **Chapter Three**

# **EMOTIONS AND LANGUAGE**

Emotionality is one factor that has been found to affect communicative abilities in aphasia. Perception and expression of emotions play an important role in communicative interactions and, more broadly, in the processing of social information (Crick & Dodge, 1994). An emotion is an internal feeling, which manifests itself in and is expressed via recognizable verbal and/or non-verbal behaviors known as 'affect' (Auerbach & Karow, 2003; Karow & Connors, 2003). Receptive processing of emotions requires perception of non-verbal cues, which involves visual recognition of facial expressions and gestures, and auditory recognition of affective speech prosody. Receptive processing also involves comprehension of verbal cues, such as emotional words and phrases. By the same token, emotional expression may be non-verbal through visual means – facial, gestural, bodily – and/or vocal means using speech prosody; or it may be verbal by using emotional words (Auerbach & Karow, 2003).

Emotions are primarily defined by three parameters: valence, arousal, and directionality. An emotion is characterized as having positive (e.g., happy, pleasant surprise) or negative valence (e.g., sad, fear), as being of high (e.g., happy, angry, fear) or low arousal (e.g., sad, disgust), and as resulting in behaviors of approach towards (e.g., happy, pleasant surprise) or avoidance of (e.g., angry, disgust, fear) the emotion-eliciting stimulus (Karow & Connors, 2003). For the purposes of this study, emotionality and emotional content refer to the presence or absence of any number of emotions (e.g., sadness, fear, happiness) manifested in facial expressions or which may be interpreted from situational cues (Timler, 2003), such as a scene of a man beating a woman. But how do emotions interact with cognitive and language processes to potentially alter discourse abilities in aphasia and what does this tell us about the underlying brain mechanisms involved?

#### **Relationship between Emotions and Language**

The relationship between emotions, language, and cognition is complex and vigorously debated as to whether affective communication systems are regulated and maintained within a central processor, or if independent linguistic and cognitive modalities interact during emotional communication (Karow, 2003). Current theories support the integration of emotions and cognitive processing (Crick & Dodge, 1994). Specific theoretical models have attempted to describe the relationship between emotions/emotionality and language production in reference to how these functions are differentially localized in the brain or in terms of how emotional-cognitive-linguistic processes interact.

In the literature on hemispheric specialization and laterality there is evidence that, in contrast to linguistic processes which are linked to the left hemisphere, emotional processing takes place largely in the right hemisphere of the brain (Borod, Andelman, Obler, Tweedy, & Welkowiz, 1992; Borod, Bloom, & Santschi-Haywood, 1998; Bowers, Coslett, Bauer, Speedie, & Heilman, 1987; Ross, 1985; Ross & Mesulam, 1979; DeKosky, Heilman Bowers, & Valenstein, 1980). The findings of these studies typically demonstrate that healthy control participants perform significantly better than right brain damaged (RBD) patients on tasks of processing emotional stimuli, suggesting that the RH is dominant for processing affect. Other theories of how the brain is organized for language versus emotion processing maintain that both the RH and LH work in unison to process emotional information (Blonder, Bowers, & Heilman, 1991) or that hemispheric processing is sensitive to the *valence* (positive vs. negative) of emotional stimuli which determines in which hemisphere it will be processed. The valence hypothesis has two versions: the first maintains that the RH processes negative emotions, while the LH processes positive emotions (Borod, et al., 1992; Borod, Koff, Perlman, & Nicholas, 1986; Canli, Desmond, Zhao, Glover, & Gabrieli, 1998; Gainotti, 1972); the second version also argues that the RH processes negative emotions, while positive emotions are processed by both hemispheres (Ehrlichman, 1987). One of the implications of these theories is that adults with left brain damage and aphasia, when presented emotional stimuli, should retain sensitivity to the emotional content of the stimuli (RH hypothesis), or perhaps be more sensitive to *negative* features of the stimuli since these are processed in the intact right hemisphere. Unfortunately, studies examining the influence of emotionality on discourse production in participants with aphasia (Bloom et al., 1992, 1993, 1996; Borod et al., 2000) did not look at the differentiating effects of positive versus negative emotions. Moreover, studies that examined performance on emotional tasks in adults with either RHD or LHD yielded conflicting results with regard to accuracy of processing of positive or negative emotional stimuli (Lehman Blake, 2003). Therefore, the potential impact of positive versus negative emotions on aphasia cannot be determined with certainty.

An alternative approach to understanding emotional processing is to investigate how emotionality interacts with other cognitive and linguistic processes rather than focusing on localization of function. Analogous to a language network with centers in Broca's and Wernicke's areas, some researchers believe that there is an explicit memory/emotion network with dedicated circuitry in the brain (with centers in the hippocampal-entorhinal complex and amygdala, Mesulam, 1998). This network maintains and regulates the processing of emotions and how they could impact on other systems such as language. For example, Mesulam (1998) argues that emotions influence neural activity via two routes: attention and memory. Events that are highly emotional - either positive or negative - tend to increase attention, thereby enhancing neural activity making it highly selective, intense, and longer in duration. Consequently, the resources for processing these events are purportedly strengthened (Mesulam, 1998). It can be hypothesized that emotional stimuli, due to strengthened processing resources, could then lead to enhanced language production in certain circumstances.

Experimental evidence appears to support Mesulam's (1998) notion that emotion influences neural activity by enhancing the allocation of critical processing resources. Specifically, there is evidence that emotionality enhances attention (e.g., Harris & Pashler, 2004; Keil, Moratti, Sabatinelli, Bradley, & Lang, 2005; Öhman, Flykt, & Esteves, 2001; Vuilleumer, 2000) and memory (e.g., Kengsinger, Krendil, & Corkin, 2006; Nagae & Moscovitch, 2002; Talmi & Moscovitch, 2004). This evidence comes from behavioral (e.g., Harris & Pashler, 2004; Nagae & Moscovitch, 2002; Öhman et al. 2001), ERP (e.g., Keil et al., 2005; Keil, Müller, Gruber, Stolarova, Wienbruch, & Elbert, 2001), and fMRI studies (Bradley et al., 2003; Lang, Bradley, Fitzsimmons, Cuthbert, Scott, Moulder & Nangia, 1998). Some of these studies will be reviewed next in an effort to highlight the role of underlying cognitive processes in enhancing discourse production skills, a central motivation for the current study. Specifically, studies examining the role of attention and memory are briefly presented.

# **Emotional Stimuli Enhance Attention**

Experimental evidence suggests that emotional stimuli automatically capture attention, substantiating heightened allocation of attentional resources for stimuli with emotional content. Öhman et al. (2001) recorded reaction times from healthy participants who were required to find fearful emotional stimuli in a grid-pattern of neutral stimuli and find neutral stimuli in a grid-pattern of fearful emotional stimuli. The investigators used pictures of snakes and spiders as fearful stimuli, and pictures of mushrooms and flowers as neutral stimuli. Reaction times for detecting emotional stimuli were significantly shorter when presented within a set of neutral distracters than detecting neutral pictures in a set of emotional distracters, which demonstrated that attention is involuntarily directed towards emotional stimuli (Öhman et al., 2001). Additionally, participants who had phobias of snakes or spiders had even shorter reaction times than participants expressing no such fears. The authors contend that emotional stimuli of a threatening nature receive higher priority in allocated

attention processing resources.

It can thus be said that emotional stimuli distract one's attention from the target stimuli of focus. This feature is known as 'distractibility', which refers to the power of emotional stimuli to instantaneously seize a person's attention, forcing a shift of concentration from the target stimulus to another stimulus. In a study investigating the effect of emotional stimuli on reaction times in a perceptual-cognitive task, Harris and Pashler (2004) used emotional and neutral words as distracters. Sixty-one college students participating in the study were required to rapidly judge whether two digits presented on the screen matched, with the distracter word positioned between the two digits. Results indicated strikingly slower reaction times on the primary digit task when presented simultaneously with emotionally negative words rather than neutral words. These behavioral data demonstrate that participants were distracted more by emotional stimuli, indicating that stimuli of this nature are more capable of grabbing attention, and more generally, that emotional dimensions of a stimulus can modulate attention resources.

In addition to increasing reaction times, negative emotional stimuli were found to increase error rates. Keil et al. (2005) conducted a study the purpose of which was to explore the relationship between two types of attention – automatic attention and spatial attention (i.e., participants instructed to attend to a specific hemifield) to stimuli with negatively emotional or neutral content. Keil et al. (2005) obtained both behavioral (i.e., reaction times and error rates) and electroencephalographic data from twenty young healthy adults with an average age of 23 years. Findings revealed longer response times and higher error rates for negative stimuli, even when these stimuli were presented in the non-attended hemifield, suggesting that negative emotional stimuli attract attention, thus interfering with task requirements.

There is also evidence for the effect of emotional faces on attention, although the nature of this evidence is still inconclusive. Vuilleumier (2001) reported that expressive faces competed more strongly for attention than nonexpressive faces. Schweinberger, Jentzsch, Jack, and Taylor (2002), on the other hand, did not find a significant effect for facial expression in attracting attention. They examined the influence of emotional facial expression in picture stimuli (16 neutral, 16 happy, and 16 angry faces) on attention measured by reaction times without the presence of attentional competitors in 20 undergraduate students. The findings did not reveal significant differences in reaction times between emotional or neutral facial expressions.

There is also ERP evidence of enhanced sensory processing for affective stimuli (Keil et al., 2001; Schupp, Junghofer, Weike, & Hamm, 2003). Stimuli characterized as being emotionally arousing reliably influence certain components of ERP data (Keil et al., 2001). For example, in the Keil et al. (2005) study cited above, the investigators observed enhanced signal amplitudes for affective stimuli presented to both attended and non-attended hemifields. Similar modulations were not observed for neutral stimuli. These finding suggest that both motivated and spatial attentional resources are automatically allocated to stimuli with emotional content. Moreover, signal data for negative emotional stimuli were consistently faster, although to a smaller degree, than those for neutral stimuli, indicating that affective stimuli influenced the speed of the signal phase and the height of its amplitude (Keil, Gruber, Müller, Moratti, Stolarova, Bradley, & Lang, 2003).

It can thus be concluded from the research reviewed above that emotional content enhances sensory processing. Emotional stimuli tend to enhance attention as demonstrated by their ability to automatically capture attention, causing distraction from ongoing tasks. Overall, the evidence points to the automatic nature of emotional stimuli to capture attention as revealed by shorter reaction times to emotional stimuli and increased error rates when emotional stimuli are used as distracters. This evidence is varied in terms of the types of emotional stimuli used such as facial expressions, pictures of frightful animals, and emotional scenes.

## **Emotional Stimuli Enhance Memory**

Similar to attention studies, there is behavioral research on the influence of emotion on memory recall, providing evidence that emotionality enhances memory regardless of the type of emotional stimuli used (e.g., Kengsinger et al., 2006; Nagae & Moscovitch, 2002; Talmi & Moscovitch, 2004). As demonstrated below, there is sufficient evidence that memory for emotional items, events, words, and pictures surpasses memory for non-emotional items, and that stimuli with emotional content enhance recollection of event details more than stimuli with neutral content.

In a study by Nagae and Moscovitch (2002), the authors used a freerecall paradigm to investigate differences between left and right cerebral hemispheres in memory for emotional words in 18 young healthy adults. Nouns with different emotional content (four positive, four negative, and four neutral) were presented in succession to each visual half-field. At the end of each trial, participants performed a free recall task by naming all the words they could remember. Results revealed that participants recalled emotional words, positive and negative, significantly better than neutral words presented in either visual field. Although positive words were recalled slightly better than negative words, the difference was not significant. The authors interpreted this finding to suggest that accentuating the role of memory draws attention to later stages of processing of emotional stimuli. These later processing phases come after visual field perception, and thus reduce the effects of laterality. Consequently, no difference is found between recalling emotional words presented to either visual field.

Talmi and Moscovitch (2004) conducted a study to investigate whether or not there are factors that mediate the effect of emotionality on memory. Sixty healthy undergraduate students were required to study a list of words, participate in a distracter task, and then perform a free recall task of the words studied. Participants performed better for emotional words than randomly selected neutral words. The authors interpreted these results as suggesting that semantic relatedness between emotional words has an important role in enhancing memory for these items. They also interpreted their results as indicating that two types of processes work in unison to enhance memory for emotional stimuli. One set of processes refers to organizational properties, while the other is linked to arousal. As Talmi and Moscovitch (2004) suggest, increasing arousal is a more direct process whereby senses are heightened and memory is enhanced.

Additionally, emotionality may assist in organizing the information as it is encoded and retrieved, thus facilitating recall.

The facilitative effect of emotionality on memory recall has also been corroborated in studies examining the effects of aging on memory. For example, Kengsinger et al. (2006) compared younger and older healthy adults in their ability to recall two real-life events, close in time frame, but vary in emotionality rating, as rated by study participants themselves. Both age groups demonstrated significantly better ability to recall event details and reception details (i.e., personal details related to context within which event was witnessed or learned about, such as what they were wearing or who they were with) for the highly emotional event as compared with the non-emotional event. For the emotional event in particular, the age discrepancy was smaller for number of details recalled. Thus, recall of event details was enhanced by the emotionality of the event facilitating recall in older adults.

Overall, it can be concluded from research in this section that emotional content enhances particular aspects of information processing which are critical to many tasks. Emotional stimuli appear to enhance attention as demonstrated by their power to automatically capture attention, distracting a participant from an ongoing task. Moreover, memory and recall for emotionally charged stimuli is more accurate than for neutral stimuli. One can reasonably predict that, by enhancing attention and memory through the presentation of emotionally-laden stimuli to elicit discourse, adults with aphasia may show improvements in their discourse production, as will be tested here.

#### Influence of Emotionality on Communicative Abilities in Aphasia

There is existing evidence that emotional content facilitates communication skills in adults with aphasia, including reading and writing abilities (Landis, Graves, & Goodglass, 1982), repetition (Ramsberger, 1979), and comprehension (Hielscher, 2004; Reuterskioeld, 1991). For example, Landis et al. (1982), in a study that included 32 adults with aphasia, found that the majority of participants were more accurate in reading (18/32 participants) and writing (22/32 participants) emotional words such as 'kill' and 'love' than nonemotional words such as 'half' and 'core'. Also, Ramsberger (1979) examined the influence of emotional content on word repetition in a group of 20 male adults with aphasia who presented with repetition deficits at the single word level. The study utilized video to present the stimuli, which included three categories of abstract words (positive, negative, and neutral) and one category of concrete words (neutral). Results revealed that emotionality facilitated repetition of abstract words, when compared to neutral abstract words. However, no significant effect was noted for emotional abstract words over neutral concrete words, neither was there a difference between positive and negative words (no valence effect). The author interpreted these findings as suggesting that emotionality enhances abstract word repetition abilities in aphasia regardless of emotional valence. Likewise, Reuterskioeld (1991) investigated the influence of emotional content on the auditory discrimination abilities of single-words in adults with aphasia ranging in age between 44 and 77 years. Twenty-eight words were used as stimuli with an equal number of items from four categories -

emotional action words, emotional object names, non-emotional action words,

and non-emotional object names. Participants were able to discriminate emotional words significantly better than non-emotional words, suggesting a positive facilitative effect of emotional content on comprehension, at least at the single word level.

At the discourse comprehension level, Hielscher (2004) conducted a study composed of two experiments, which aimed at exploring how adults with brain damage and healthy controls infer emotional information from reading texts. A total of 74 individuals participated in the study -21 with left hemisphere (LH) damage, 26 with right hemisphere (RH) damage, and 27 healthy controls. Six individuals with LH damage presented with mild aphasia (anomia or Broca's). Participants read 24 texts varying in valence (12 positive & 12 negative), and were required to either infer the emotional state of the main character or to participate in a lexical decision task. Data were analyzed for reading time and lexical decision times. Results indicated that LH damaged adults did not perform as well as healthy controls in perceiving verbal and nonverbal emotional stimuli. Moreover, emotional valence did not affect the ability of adults with LH damage to infer emotional information; neither did it affect reading times. However, their comprehension of emotional words was better than that of corresponding non-emotional words. It is worth noting that the study did not compare emotional items with neutral items, except for comprehension of words, and thus we can not determine if emotionality enhances performance in comparison to lack of emotionality in the other tasks.

Influence of Emotionality on Discourse Production in Aphasia

Can the documented positive influence of emotionality on specific aphasia communication skills be extended to discourse production? A limited number of studies provide support for this notion (Bloom, Borod, Obler, & Koff, 1990; Bloom et al., 1992, 1993; Bloom, Borod, Santschi-Haywood, Pick, & Obler, 1996; Borod, Rorie, Pick, Bloom, Andelman, Campbell, Obler, Tweedy, Welkowitz, & Sliwinski, 2000; Bottenberg et al., 1987). Bloom et al. (1990) conducted a study, the aim of which was to evaluate verbal/lexical features of discourse production in samples elicited using positive and negative emotional images. Nine participants - three with LH damage and aphasia (2 fluent and 1 non-fluent), three with RH damage, and three NCs – described their feelings towards the emotional images. Samples were analyzed using a procedure that incorporates structural and functional approaches. Judges rated transcribed samples to evaluate whether specific categories of emotions were conveyed. Additionally, lexical items produced were judged for pleasantness rating and intensity rating using 5-point Likert scales. Results revealed that adults with aphasia, although less accurate in communicating specific emotion category, were rated just as well as normal controls in their ability to convey emotional valence using verbal language. Moreover, lexical items used by adults with aphasia were not rated differently from control subjects in emotional pleasantness or intensity. The findings of this study suggest that adults with aphasia may perform just as well as normal controls in their ability to use verbal means to express emotionality. Although this study did not compare emotional with non-emotional conditions, the comparable performance on emotional

expression of aphasic to non-brain-damaged participants hints at the facilitative influence of emotional content.

In a key study that examined verbal emotional expression by adults with LH damage, adults with RH damage, and healthy controls, Bloom et al. (1992) analyzed discourse samples with emotional content and samples with nonemotional content. One objective was to examine the effect of varying types of content – emotional, visuospatial, and procedural – on the amount of information produced. Emotional discourse was elicited using a picture sequence depicting a child whose dog is hit by a car. Non-emotional discourse was elicited using a picture sequence depicting frying an egg (neutral/procedural content), and a picture sequence depicting a person moving a box by climbing on a chair (visuospatial content). For each discourse sample, two raters counted content elements that refer to any one of a number of emotional, visuospatial, or procedural elements depicted in the pictures. These content elements are predetermined as those that have been produced by normal speakers as they narrate the sequence (Yorkston & Beukelman, 1980).

The mean number of content elements produced by adults with aphasia for emotional discourse (mean = 3.3) fell between procedural (mean = 3.6) and visuospatial discourse (mean = 3.0). However, there was less variation in content element production among the group with LH damage for emotional discourse than other types of discourse content – procedural and visuospatial. The investigators found that discourse with emotional content did not differ significantly across the two patient groups in the number of correctly produced content elements. However, discourse with non-emotional content had fewer content elements when produced by adults with LH damage than that produced by adults with RH damage and normal controls. These results suggest a trend for adults with LH damage to display more reliable production of content elements in emotional than non-emotional conditions, although one must be cautious as the study showed no significant group difference across emotional and non-emotional conditions. Nonetheless, these findings imply that adults with aphasia may benefit from emotionality in certain aspects of their discourse production and this possibility merits a more rigorous, systematic exploration.

In a related study, Bloom et al. (1993) elicited discourse samples using the same procedures described above (Bloom et al., 1992) from 12 adults with LH damage (all presenting with aphasia), 9 with RH damage, and 12 normal controls. The transcribed samples were rated by three speech-language pathologists (SLPs) in terms of pragmatic appropriateness, where each sample was rated as being either appropriate or inappropriate on seven pragmatic features. The pragmatic features were conciseness, lexical selection, quantity, relevancy, specificity, topic maintenance, and revision strategy. Conciseness refers to producing utterances that are informative, but do not provide too much information (i.e., no unnecessary details). Lexical selection refers to using items that are appropriate to the text with no evidence of word-finding difficulties indicating adequate lexical access. Quantity refers to completeness of the content of utterances. Relevancy refers to selection of topics related to overall discourse topic. Specificity refers to the availability of information that is specific and unambiguous. Topic maintenance refers to the production of utterances within the same theme as preceding utterances. Finally, revision

strategy refers to successful repair of communication breakdowns. It is worth noting that Bloom et al.'s (1993) conciseness corresponds to Grice's (1975) maxim of quantity, lexical selection and topic maintenance correspond to the maxim of relevance, and specificity corresponds to the manner maxim.

Based on SLP ratings, discourse by adults with aphasia was rated as significantly impaired in pragmatic features of information quantity, lexical selection, specificity, and repair strategies in comparison to normal controls. On the other hand, individuals with aphasia were not rated differently than normal controls in the pragmatic features of conciseness, relevance, and topic maintenance. Overall, discourse by adults with aphasia was rated as pragmatically less appropriate than that by normal controls. However, the majority of adults with aphasia (9 out of 12) received higher mean pragmatic ratings in the emotional vs. the non-emotional conditions, while this was not the case for either RH damaged or normal control groups. The fact that discourse with emotional content by adults with aphasia received higher pragmatic ratings indicates that it was less impaired than that with visuospatial content or procedural discourse. This suggests that emotionality increases pragmatic appropriateness of discourse in aphasia.

In another important study, Bloom et al. (1996) examined the impact of emotionality on discourse cohesion and coherence. Cohesion was measured by counting lexical cohesive devices, while coherence was measured using perceptual ratings by listeners, reflecting their ability to interpret overall discourse meaning. Three raters were asked to judge the form and content of short narratives elicited from 12 adults with mild to moderate aphasia (fluent and non-fluent) using three types of picture stimuli (emotional, procedural, and visuospatial) described in the previous study (Bloom et al., 1992). Based on a modification of a procedure developed by Ulatowska et al. (1983), seven coherence questions (e.g., "Do you know what is happening in the story?" "Is the story complete?" "Is the language clear?") were rated on a 3-point scale (0 = not at all, 1 = slightly, and 2 = yes). The main findings indicated that adults with aphasia displayed coherence deficits compared to the two other groups. At the same time, cohesion was not influenced across the three experimental conditions. This difference signifies relatively preserved cohesion, but impaired coherence for adults with aphasia.

A secondary finding, which was not discussed at length by the authors, provides additional motivation for the current study. For six of the seven coherence questions, emotional discourse produced by adults with aphasia received higher ratings than non-emotional discourse. For example, when listeners rated the succession of information produced by speakers with aphasia across the three conditions, the mean coherence rating was 87.5 for emotional discourse, and 79.2 and 58.3 for non-emotional discourse (visuospatial and procedural, respectively). These results imply that emotional content could enhance discourse coherence for many adults with aphasia. Furthermore, discourse with emotional content produced by healthy controls received higher ratings for all seven questions, providing further evidence of the facilitative effect of emotionality on coherence. Hence, perceptual ratings of discourse coherence were positively influenced by emotional content for both normal speakers and adults with aphasia, although one could argue that the benefits of

emotionality on discourse production are especially critical in the face of aphasia language deficits.

These findings correspond to a trend revealed in an earlier study by Bottenberg et al. (1987), who investigated the effect of content on story grammar utilizing three discourse measures. The first, Total Word Count, was an overall measure of productivity corresponding to Grice's (1975) quantity maxim. The second measure was cohesive tie analysis, as described by Halliday & Hasan (1976), where five types of cohesive ties – reference, lexical, conjunction, substitution and ellipsis - were examined. The third measure was Story Grammar following procedures described by Stein and Glenn (1979) and Hedberg and Stoel-Gammon (1986). Story grammar was examined by exploring various levels of discourse organization (e.g., action sequences, interactive episode, etc.). Cohesion analysis and story grammar measures correspond roughly to Grice's manner maxim. A primary finding was that the mean word count for narratives elicited using the Cookie Theft picture (non-emotional content) was significantly shorter than for those elicited using a picture scenario depicting the Kennedy assassination (emotional – fear/sad). The investigators also found a trend for story grammar levels to be lower for narratives elicited using the Cookie Theft picture than those elicited using a picture sequence depicting a fire scenario (emotional - fear), which were in turn lower than those elicited in response to a picture scenario depicting the Kennedy assassination. Results were interpreted by the authors as suggesting that the type of stimuli (single picture vs. picture sequences) and discourse topic may have been factors affecting story length and organization. However, it is also possible that the

emotional content of the latter two stimuli may have been a critical factor leading to these results. The findings of Bottenberg et al.'s (1987) study suggest a possible differential effect of emotional content on discourse length, story grammar, and other discourse production features. This possibility warrants further investigation to determine the possible influence of different emotional contexts on discourse production features.

Further motivation for the present investigation is based on a study by Borod et al. (2000). The investigators conducted a behavioral study with three groups of participants, 16 adults with LH damage, 16 with RH damage, and 16 normal controls. Thirteen of the participants with LH damage presented with aphasia (2 fluent, 5 nonfluent, 6 mixed) ranging in age from 39 to 78. The study had three objectives, one of which was to evaluate whether or not emotional content had a facilitative effect on pragmatic variables in any of the three experimental groups. The authors elicited seven emotional and seven nonemotional monologues by presenting typed words and asking participants to talk about personal experiences related to the presented words. Judges rated the appropriateness of these transcribed monologues on six pragmatic features using a 5-point rating scale. The pragmatic features were conciseness, lexical selection, quantity, relevancy, specificity, and topic maintenance as defined above (Bloom et al., 1993). Thus, Borod et al., (2000) examined features within quantity, relevance, and manner. As measuring quality would entail having a reference point, given that elicited discourse were personal experiences and judges were unfamiliar with participants, no such reference point existed, as such, examination of quality could not be determined.

Adults with left-brain damage were rated as significantly less appropriate than controls for all pragmatic features measured. However, adults with leftbrain damage were rated as significantly better across all pragmatic features on emotional than non-emotional discourse. The authors interpreted this finding as an indication that emotionality enhances certain pragmatic features in some adults with left-brain damage. As the majority of these individuals presented with aphasia, it may be safe to say that adults with aphasia are likely to benefit from emotionality in facilitating certain discourse pragmatic features. Interestingly, in examining the effect of valence, adults in the LBD group were rated as pragmatically more appropriate in positive emotional discourse than in negative emotional discourse (Borod et al., 2000). This evidence further motivates the current investigation with an even closer look at the differential effects of emotional valence. In conclusion, there is some evidence of the facilitative effect of emotionality on a variety of discourse pragmatic features in aphasia including coherence, story grammar, and amount of information content. These data prompt further exploration of how emotional content enhances production of pragmatic discourse features in a more controlled manner.

### **Purpose of Study**

The aim of the current study is to examine the influence of emotionality on discourse production in Arabic-speaking adults with aphasia. Specifically, the purpose is to explore whether or not emotional content has a facilitative effect on the pragmatic features of discourse, thereby informing some of the processes involved in discourse production and associated deficits subsequent to aphasia. Through analyzing discourse samples obtained from a group of adults with aphasia and a group of healthy adults on a number of pragmatic features, valuable knowledge may be gained as relates to the interactions among emotionality, pragmatics, and discourse production. The findings are discussed in relation to current theoretical models of the nature of deficits underlying aphasia.

As outlined above, previous research has found evidence of a facilitative effect of emotional content on discourse production in aphasia (Bloom et al., 1990, 1992, 1993, 1996; Borod et al., 2000; Bottenberg et al., 1987). Based on a review of this literature, it is reasonable to predict that emotionality will positively influence some pragmatic features of discourse produced by individuals with aphasia; in particular, discourse elicited in response to positive and negative stimuli is predicted to be longer, contain more content units, be more efficient, contain more relevant vocabulary, more topic-relevant, and more coherent than that elicited in response to neutral stimuli. This prediction is based on the broad assumption that emotional material will attract greater attention than neutral stimuli and possibly enhance attention and memory for these items, which may then facilitate discourse-related processes through resource allocation.

The approach adopted was to elicit discourse samples using video-clips which were constructed to carefully manipulate the emotional valence of the situation portrayed on the videos (either positive, negative or neutral). Recall that video-clips tend to be of high interest to adults when compared to alternative elicitation techniques (Dollaghan et al., 1990), perhaps due to their dynamic nature, and they allow naturalistic portrayals of emotion to be shown, which is crucial to the present investigation. Most importantly, using video-clips may be likened to other functional tasks of telling others about events that have been witnessed. It was hypothesized that discourse elicited in response to positive or negative stimuli would be more pragmatically appropriate than that elicited in response to neutral stimuli especially in reference to these six measures: 1) amount of production, 2) communicative efficiency, 3) accuracy of production, 4) coherence, 5) lexical selection, and 6) topic maintenance.

The present study applied the pragmatic approach to narrative discourse, evaluating each utterance as a contribution within the context of other utterances. It did so by analyzing discourse samples for functional features within the four maxims of the pragmatic approach using specific measures as follows: to assess quantity, amount of production was measured by using a word count, and communicative efficiency was measured by dividing number of correct content units over number of total words. For quality, accuracy of production was measured by evaluating the number of content units in relation to a set of core content units. For manner, discourse coherence was measured using utterance ratings of local and global coherence following a procedure described by Coelho & Flewellyn (2003) to evaluate the unity and organization of information. For relevance, lexical selection was measured by calculating the number of keyword lexemes in relation to those found in the normative samples (Berko-Gleason et al., 1980), and topic maintenance was measured by rating each utterance in terms of its relation to the overall discourse topic. These measures will be defined further in the Main Experiment chapter.

### **Chapter Four**

### **EXPERIMENT ONE – STIMULUS VALIDATION STUDY**

To investigate how emotional content interacts with language production skills at the discourse level in aphasia, the pragmatic features of discourse produced by Arabic-speaking adults with aphasia, subsequent to left-hemisphere CVA, and a matched non-brain-damaged control group were analyzed. The investigation consisted of two experiments. First, a stimulus validation study was carried out to evaluate the presumed affective content of the stimuli used in the primary experiment. Then, using materials selected based on the results of the first experiment, the main experiment sought to examine the effect of emotional (positive & negative) and non-emotional content on several pragmatic features of discourse. Details of the stimulus validation study and the main experiment are presented in sequence with separate discussion of relevant findings.

# Methods

This preliminary study sought to ensure the appropriateness of the test stimuli – video-clips specifically collected and edited for this investigation – for the purpose of the main study. Prior to using experimental stimuli with individuals with aphasia, it was necessary to evaluate the emotional content of the stimuli and their potential to elicit an adequate amount of discourse. This pilot study aimed at evaluating and validating the emotional content of the clips on a number of dimensions (e.g., emotional valence, intensity) by having a group of healthy Arabic-speaking adults judge each video-clip using an emotionality questionnaire designed for this purpose. This was to ensure that each stimulus represents a valid exemplar of one of the three affective categories (positive, negative, & neutral). The second goal was to ensure that each stimulus item had the potential of eliciting a sufficient amount of discourse for subsequent analysis and group comparisons; this goal was achieved by having the same pilot group of participants relay the events portrayed in each videoclip, thus providing preliminary normative discourse data.

### *Participants*

Ten healthy Arabic-speaking adults (5 males, 5 females) with a Saudi dialect participated in the validation study. Participants ranged in age between 18 and 43 years (mean = 28.0) and ranged in years of education between 12 and 28 years (mean = 16.0). Participants were recruited using research advertisements placed at a Saudi student club in Montreal, Canada and at two hospitals in Jeddah, Saudi Arabia. Four participants were tested in Montreal (3 females and one male) and six in Jeddah (4 males and two females). Table 1 displays basic demographic features of these individuals. Participants had no history of psychiatric disorder, dementia, drug or alcohol abuse, prior neurological disease, or any communication disorder as determined by selfreport. Approval from the McGill Institutional Review Board (Faculty of Medicine) was granted prior to initiating human testing and data collection (Appendix A). Each participant signed an "Agreement to Participate in Research – Consent Form" in Arabic.

No.	Gender	Age (vears)	Education (vears)	Testing Location
R1	F	26	17	Montreal
R2	F	35	28	Montreal
R3	Μ	33	17	Montreal
R4	F	28	17	Montreal
R5	F	27	18	Jeddah
R6	Μ	43	13	Jeddah
R7	F	28	17	Jeddah
<b>R8</b>	Μ	19	12	Jeddah
R9	Μ	18	12	Jeddah
R10	Μ	22	12	Jeddah
Mean		27.9	16.0	
SD		7.6	4.8	

Table 1. Basic demographic features of validation study participants

### Materials

Fifteen video-clips, 5 per valence category (positive, negative, neutral) were initially constructed to elicit discourse samples in response to emotional stimuli. For each video-clip, events and situational cues were chosen for their association with a specific category of emotional valence, which would also be manifest in (congruent) facial expressions of characters in these clips.

To facilitate a logical flow of ideas in discourse production, each videoclip was conceptualized to portray a logical sequence of events that create a short story-line comprised of three segments with a beginning, middle, and end. When preparing stimuli, care was taken to ensure that the video-clips were culturally appropriate by selecting excerpts from a Saudi local television program that addresses a variety of social issues. Permission to extract clips and use them for research purposes was obtained from the media company producing the program. The variety of themes and topics portrayed on this program allowed for selection of an array of subject matters, such as boarding a plane, a wedding ceremony, a hospital admission, and preparing a family meal. The topics were familiar in the sense that any one of the participants may have experienced similar situations, thus making these video-clips functionally relevant to participants. Additionally, the program selected was suitable because despite this variety of informational content, consistency in the quality of acting and media production across all video-clips was maintained. This controlled for potential effects of variation in representing different situations and emotional manifestations.

In determining the content and length of the video-clips, measures were taken to elicit a sufficient amount of discourse while controlling for the presence of conflicting or variable emotions. In other words, video-clips had to be long enough and detailed enough to elicit an adequate amount of discourse, but not excessively long, which would increase the likelihood that incompatible emotions would emerge. Moreover, it was necessary to control for the potential effects of auditory information on discourse production, especially considering that participants with aphasia may present with different levels of auditory comprehension abilities. This led to the decision to utilize silent clips that ranged in duration between 30 to 45 seconds.

# Construction of Video-clips

The author previewed eighteen 30-minute episodes of the program provided by the media production company, scanning for material with evident emotional content (e.g., anger, fear, happiness, pleasant surprise, sadness) or completely free of emotional content (i.e., neutral). Audio was muted during previewing to eliminate the influence of language and vocal characteristics on the selection process. Scenes that were selected for potential inclusion based on the criteria specified above were extracted using a video-ripping program. Potential scenes were initially not restricted to any time length and ranged from 10 seconds to 2 minutes. Care was taken to control for the number of characters appearing in each scene, to be as minimal as possible to reduce valence variability among characters (e.g., one character could portray a positive emotion, while another portraying a negative emotion). As different episodes were previewed, scenes were selected from one episode if they seemed appropriate for possible integration with scenes from other episodes to create a logical sequence. For example, one segment portraying a group of men looking through a map and digging up a box in the desert was extracted from one episode, another segment portraying a box full of money was extracted from another episode, and finally a segment portraying two men splitting a sum of money was taken from a third episode. In the original program, the three episodes were not at all related, but with editing, a logical sequence of events was established creating a 'Treasure Box' story.

The captured scenes were then edited using commercial software. Audio files were removed from the video files to create the silent clips as stated earlier.

The majority of scenes were entered as a single video-clip, clipping off unnecessary beginnings, endings, and/or frames from within the scenes. Other scenes were fragments from different episodes and attached together, as illustrated in the 'Treasure Box' clip described above. In the editing process, it was essential to delete frames with characters or events not contributing to the story-line and frames displaying contradicting emotional content. For example, if a clip was intended to be negative, yet contained events that may be perceived as positive, the positive frames were deleted in order to ensure the reliability of emotional valence. For example, in a scene involving a stolen car, the main character in the original clip took an excessively long time (approx. 10 sec.) to react to the fact that his car had been stolen. If left unedited, this delay in the character's reaction would likely be perceived as humorous, as probably intended by the original program. Accordingly, it was important to significantly reduce the length of time (to approximately 2 sec.) between realizing the theft had occurred and reacting to it, by deleting several frames.

Each video-clip was exported as a movie file. A peer group of five researchers in communication sciences and disorders previewed the clips and provided feedback for improving quality, emotional content, and story logic. The clips underwent further editing and were finalized based on comments received. The finalized movie files were exported in two formats – single-play and double-play – to facilitate presentation of the clips for each of the two tasks required of participants, discourse production (double-play files used) and completion of judgment questionnaire (single-play files used). Single-play files contained the video-clip as specified above, and terminated with a five-second
black screen. Double-play files contained the video-clip as specified above, a five-second black screen interval, a replay of the video-clip, and terminated with a five-second black screen.

# Emotionality Questionnaire

As previously stated, an emotionality judgment questionnaire was utilized to obtain participant input about the content and emotional quality of each video-clip. This was done primarily to select the best exemplars of the three valence categories as perceived by unbiased healthy participants to include in the main experiment. A 7-item questionnaire in Arabic was developed to obtain participant feedback about several emotionality dimensions of each video-clip (Appendices B & C). The first four questions on the questionnaire were specific to emotional aspects. The opening question was constructed to classify each video-clip into an emotional valence category (positive, negative, & neutral). The second item was designed to measure the level of emotional intensity of each video-clip on a 5-point rating scale from '0' to '4'. The purpose was to control, as much as possible, for intensity as a factor that may influence speech production. The third question was intended to inform about specific emotions that participants associated with each stimulus, and to rank order the degree of association if more than one item was selected. Eight items were provided for participants to choose from (six basic emotion labels, 'neutral', and 'not clear'). This question served as confirmation for the initial question, where agreement would be expected between valence category in the first question and emotional label in the third question (e.g., selecting 'positive' and 'happiness'; 'negative',

'fear', and/or 'anger'; 'neutral' and 'neutral'). Through the fourth question, participants were given the opportunity to freely name any additional emotions they associated with the clip that had not been listed in the previous question. Similar to the third question, the responses to the fourth question were intended to confirm clarity of valence category, but by giving participants an opportunity to produce emotional categories spontaneously. For example, if a clip judged to be 'neutral' in response to the emotional valence question received responses on the fourth question that signify other emotions such as 'grieving' or 'content', this would indicate that the clip just viewed is ambiguous to the viewer. Hence, this would reduce the eligibility of this clip for inclusion in the main experiment.

The last three questions on the questionnaire provided supplementary information on the quality and familiarity of the clips. The fifth question was designed to obtain participants' opinions about the arrangement and unity of different segments of each clip, whether or not they were logically organized. This was addressed by having participants rate logical sequence using a 5-point scale. Likewise, the sixth item required participants to rate the interest level of each video-clip on a 5-point scale. It was intended to obtain an impression of the potential of each clip to capture attention. The purpose of the final 'yes/no' question was to get a sense of whether or not participants were familiar with any of these clips (or segments of them) since they were extracted from a popular TV program, which made it highly probable that they had been seen before. Participant responses to these items were used to select which video-clips to include in the main experiment as testing items, and which to include as a practice item. Responses to these questions were considered in determining eligibility criteria for inclusion in the main experiment. However, these questions varied in priority value. Questions one (valence categorization), two (intensity ratings), and five (logical sequence rating) were always considered first in determining inclusion eligibility. Once videos were selected, questions three (select specific emotions) and four (name specific emotions) served to confirm the responses to the categorization rating, ensuring congruency of responses. If these last two questions yielded incongruent emotions with results of the first question, that would be an indication for the inappropriateness of a video-clip. Finally, questions six (interest rating) and seven (previously seen) had secondary value in determining eligibility where the responses to these two questions were considered if several clips were equal on a number of dimensions as revealed by previous questions.

# Procedure

Testing was carried out individually in a quiet room in either a laboratory or clinical setting. All participants completed testing in one session ranging from 45-75 minutes. The first part of the session was used to elicit discourse samples, and the second part to complete the questionnaire. Participants were provided with short breaks after the 5<sup>th</sup> and 10<sup>th</sup> video-clip presentation and between the two tasks. Participants were seated at a table, wearing a high quality lapel microphone placed 10 centimeters away from their mouths. Facing them was a Toshiba satellite laptop computer on which all stimulus items were presented. Each participant had an individualized PowerPoint Presentation. All presentations initiated with a white-background slide on which written instructions for the discourse elicitation task were provided. On the subsequent fifteen slides, double-play movie files were inserted, one per slide, in random order for each participant. A subsequent slide provided written instructions for the questionnaire task. The subsequent fifteen slides included single-play movie files similarly ordered as in the discourse task. All slides with movie files had a dark grey border and were programmed to play upon clicking by the examiner.

For the discourse task, immediately after watching each double-play movie, participants described events depicted in the video-clip to a research assistant before proceeding to the next clip. The following instructions were given in Arabic, "You will watch a number of video-clips on the computer screen. There are fifteen video-clips. Each clip will be played twice. After you see each video for the second time, you will tell <u>(name of research assistant)</u> about the events you saw in the clip. The research assistant has not seen these clips before." For the questionnaire task, immediately after watching each single-play movie, participants completed a separate questionnaire form for each stimulus before proceeding to the next clip. The following instructions were given in Arabic, "You will see the video-clips again, but this time each clip will be played just once. After viewing each clip, you will answer a few questions about it." Discourse samples were audio-recorded using a Sony digital voice recorder (TCD-D3) for analysis at a later time.

# Transcription

Discourse samples were transcribed verbatim by the investigator using Arabic orthography. Hesitations were also transcribed, and unintelligible speech was indicated with (---). Words were grouped into utterances based on contextual information, natural pauses, intonational patterns and syntactic structure. Fifty percent of all transcripts were verified by a second listener with 96% inter-judge reliability calculated per sample.

## Discourse Analysis

1) Content Unit Analysis – The amount of information conveyed per video-clip was measured by identifying and counting total number of content units (CU) identified based on the principles put forth by Yorkston and Beukelman (1980), and adapted from the methodology of Menn, Ramsberger, and Helm-Estabrooks (1994). The purpose of analyzing CUs was to quantify amount of information per speech sample and to allow comparison of this discourse feature across video-clips. This quantification and comparison were executed through a five-stage process: identifying, tallying, and averaging CUs per video-clip; determining Core CUs for each video-clip, and comparing Core CUs across video-clips.

A concept (e.g., noun, adjective, verb phrase, prepositional phrase, etc.) was identified as a distinct CU if it was present in any normal sample in isolation. Alternatively, concepts that were always produced in conjunction with each other (e.g., 'in the box', 'first class', 'Saudi Arabian Airlines', etc.) by normal speakers in response to a particular stimulus were recognized as a single CU. For example, if 'sayyara ramadi' (grey car) was consistently present in all samples elicited using the "Stolen Car" video-clip as 'sayyara ramadi', it was considered a single unit. Alternatively, if in any sample 'sayyara' (car) occurred autonomously, 'ramadi' (gray) would be identified as a distinct CU from 'sayyara'.

Moreover, concepts were only identified as CUs if they accurately corresponded to the eliciting video-clip. An accurate CU referred to a word or phrase that enabled listeners to create correct mental images of the video-clip being described (Menn et al., 1994). For example, if a participant self-corrected, only the production that correctly reflects elements in the video-clip was identified. In a sample where a participant produced 'mishlah' [type of cloak] and then self-corrected saying 'digla' [another type of cloak], only one CU 'digla' was identified. In some instances, two CUs may be identified as referring to a single concept (e.g., 'going' and 'returning' in reference to boarding an airplane). Both CUs were identified as correct.

Information produced that was not a direct description of the target stimulus was not included in identifying CUs. Words and phrases were not identified if they provided personal comments on the video-clip or the task at hand, rather than describing events and characters. For example, phrases like "I forgot," "no, before that," and "in this scene" were not included in the CU listing. However, this type of information was documented in a separate category containing extraneous information and/or off-topic comments (e.g., "Babies! I love them at this age!" "hathi almarhala tutheer ashjani"). Despite being excluded from CUs, recording such comments may prove valuable in demonstrating that a video-clip conjures up emotional reactions in participants, and consequently assist in interpreting results.

Synonyms and words referring to the same concept were identified as a single CU (e.g., 'the woman' = 'his wife' = 'the person wearing black') to avoid redundancies. In addition, recurring concepts were identified only once unless they clearly referred to a different entity. In such cases, the recurring concept was identified as a new CU. An example was using 'woman' to refer to a main character's wife (a younger woman), and then using the same word 'woman' to refer to an older woman. Another example was 'morning' when produced as part of "morning exercises" and "in the morning," where it was considered two distinct CUs. Identifying a CU was designated by underlining the first instance it was produced. Any subsequent recurrence was double-underlined (e.g., 'his wife' and 'the woman'). The units were listed in tables, one table per sample per participant with a total of 150 samples.

CUs for individual speech samples elicited from participants were tallied. A composite list was then generated for all CUs produced by the ten normal speakers per video-clip. Finally, two ranges of CUs were recorded: a range of lowest-to-highest number of CUs for each stimulus, and a similar range for each participant. For each video-clip, the average number of CUs produced by all participants was then calculated. Averages across participants included the median, mean, and standard deviation for each stimulus.

It was expected that the number of CUs participants produced would vary widely simply due to the fact that some people naturally tend to include more or less detail than others. Therefore, it was deemed appropriate to

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determine the core concepts (Core Content Units) that a video-clip elicits. Core CUs referred to the minimum amount of information that a participant was likely to include in describing the events of a specific stimulus. These were the CUs that a majority of participants produced in their samples. For the present analysis, Core CUs were determined as those produced by at least 70% of participants. Stimulus video-clips that did not elicit a minimum of ten Core CUs were excluded from further analysis and from the main experiment. To be used in the main experiment, video-clips from each emotional category had to be matched with video-clips from other categories for number of Core CUs.

2) Total Word Count – All words, including those produced for personal commentary (e.g., views, impressions), commentary on task, and off-topic digressions were counted towards total number of words. Morphemes that typically occur as free morphemes (e.g., 'wa', conjunction meaning 'and'; /?ala/, preposition meaning 'on' or 'above') were counted as separate words. Word fragments, when recognized as part of a subsequent word, were counted. Meaningless fillers (e.g., /ah//um/) were not included in the word count. Prepositions, when bound to a word, were not counted as separate words (e.g., /bil//lail/ 'at night').

## Emotionality Questionnaire Analysis

Responses to questionnaire items one (valence category) and seven (familiarity) were calculated for percent agreement. For questionnaire items two (intensity), five (logical sequence), and six (interest), mean rating and standard deviation (SD) were computed. For items three and four (selecting, ranking, and naming specific emotions), responses were tallied. Results were used to guide selection of a subset of video-clips to be utilized in the main experiment and to interpret performance on discourse measures.

# <u>Results</u>

## Emotionality Questionnaire Analysis

*Table 2* displays the results for four items of the emotionality judgment questionnaire: percentage of agreement among participants in categorizing emotional valence; emotional intensity rating; logical sequence rating; and interest rating for each clip. To be considered for inclusion in the main study, each video-clip needed a minimum 70% agreement among participants in classifying the clip into one of the three valence categories. Table 2 displays video-clips receiving at least 70% for each valence category, and lists excluded video-clips that do not meet the 70% criterion. There was most agreement amongst participants in categorizing positive clips (three obtained 100% and one obtained 80%), although category ratings were also high for negative (one obtained 100%, one 90%, and two 80%) and neutral clips (one obtained 90%, three obtained 70%). Based on these findings, it was decided to eliminate one clip from each category so as to restrict each category to the best exemplars of a particular valence before inclusion in the main experiment. As shown in *Table 3*, this created greater balance across valence categories in terms of the reliability of individual clips perceived as positive, negative or neutral (Means = 93%, 90% and 77%, respectively).

Clip No./Theme	% Agreement	Emot	ional	Log	ical	Inter	rest				
	Category	Inter	isity	Sequ	ence						
		Mean	SD	Mean	SD	Mean	SD				
3- Old-fashioned wedding	80% Positive	2.50	1.27	2.90	1.20	2.60	0.97				
4- Girl with doves	100% Positive	3.20	1.03	3.50	0.71	3.10	0.88				
5- Birth of baby	100% Positive	3.40	0.97	3.00	0.82	2.90	1.20				
9- Father with daughter	100% Positive	3.00 1.15		3.20	0.92	2.60	1.17				
Mean positive clips	95%	3.03		3.15		2.80					
2- Finding treasure	70% Neutral	1.10	0.74	2.60	1.17	2.30	1.34				
6- Selling a car	70% Neutral	1.10	0.99	3.10	1.10	2.00	0.82				
7- Airplane trip	90% Neutral	1.30	1.34	2.10	1.10	1.60	0.97				
10- Boys at school	70% Neutral	1.80	1.32	2.80	0.92	2.50	0.97				
Mean neutral clips	75%	1.33		2.65		2.10					
11- Stolen car	80% Negative	3.10	1.10	3.50	0.71	2.90	0.99				
13- Man taken to jail	80% Negative	2.80	1.23	2.90	0.99	2.50	1.27				
14- Heart attack	90% Negative	3.20	0.92	3.20	1.32	3.20	1.03				
15- Domestic violence	100% Negative	3.70 0.48		3.30	1.25	3.60	0.52				
Mean negative clips	87%	3.20		3.23		3.05					
1-Watching TV	60% Neutral		Excluded								
8-Family having lunch	50% Pos/Neu		Excluded								
12-Family moving out	40% Positive			Exclu	ided						

Table 2. Emotionality categorization & ratings (n=10)

Table 3. Mean ratings assigned to the 3 video-clips selected per valence category.

Valence	Category Agreement (%)	Emotional Intensity	Logical Sequence	Interest
Positive (clips # 3, 4, 5)	93.3%	3.03	3.13	2.87
Neutral (clips # 6, 7, 10)	76.7%	1.40	2.67	2.03
Negative (clips # 13, 14, 15)	90.0%	3.23	3.13	3.10

*Figures 1, 2, and 3* display means and standard deviations for emotional intensity, logical sequence, and interest ratings, respectively, per video-clip per valence category. Negative and positive video-clips received higher emotional intensity ratings, while neutral video-clips received lower intensity ratings (*Figure 1*), as may be predicted. The very definition of neutrality implies that it

is devoid of emotions, and accordingly should be without emotional intensity. In fact, a low emotional intensity rating may serve to substantiate a video-clip's validity as neutral. With regard to positive and negative video-clips, the overlapping circles in *Figure 1* suggest an approximate balance between the two categories in intensity ratings. Similar overlapping of circles across the three categories for logical sequence is evident in *Figure 2*, suggesting approximate balance across categories. *Figure 3* shows that participants tended to rate negative clips as higher in interest value than positive clips. Neutral clips seemed to be of least interest to participants.





Note: Each circle represents a video-clip, with clip number on each circle. Circle position on graph represents mean ratings, and circle diameter represents standard deviation. The higher the center on the graph, the higher intensity rating received. The smaller the circle, the more agreement amongst participant in rating the clip.



Figure 2. Mean logical sequence ratings per video-clip





In summary, positive, negative, and neutral video-clips were balanced as closely as possible for mean consensus rating for emotional intensity, logical sequence and interest. This led to selecting clips 3, 4, and 5 for positive valence; clips 13, 14, and 15 for negative valence; and clips 6, 7, and 10 for neutral. With regard to other questionnaire items, selecting specific emotions and ranking them confirmed categorical selection. Neither selecting nor free naming of additional emotions resulted in incongruent emotions. Moreover, familiarity for the majority of clips ranged between 40% and 70% familiar. This suggests that the familiarity of the clips would not be a factor worth considering in determining variation in discourse production.

# Discourse Analysis

Content unit (CU) range and core CUs produced by at least 70% of participants per video-clip are summarized in *Table 4*. Upon cursory inspection, the difference in the amount of information discourse produced across the three categories does not seem substantial. Content units were quite similar across valence categories. CU analysis further supports excluding clips 2, 9, and 11 because they elicit the smallest number of collective content units per emotional category. Of the excluded items, video-clip 11 elicited most content units and hence it was selected as a practice item for the main experiment.

Clip No./Theme	Range of CUs	Core CU	Mean after
			exclusion
P3- Old-fashioned wedding	7 - 66	27	27.7
P4- Girl with doves	12 - 62	31	
P5- Birth of baby	7 – 51	25	
P9- Father with daughter	6-21	<del>15</del>	Excluded
NT2- Finding treasure	4-23	<del>13</del>	Excluded
NT6- Selling a car	6-48	27	25
NT7- Airplane trip	8-43	22	
NT10- Boys at school	4 - 36	26	
NG11-Stolen car	<del>11-47</del>	<del>21</del>	Excluded
NG13- Man taken to jail	8-39	23	28.3
NG14- Heart attack	9-64	29	
NG15- Domestic violence	14- 76	33	
NG14- Heart attack NG15- Domestic violence	9 – 64 14- 76	29 33	

Table 4. Content Unit range & Core CUs

P = positive, NT = neutral, NG = negative

# Discussion

The current experiment was designed to evaluate the suitability of test stimuli on several dimensions and to select a set of clips for use in the main experiment. Analyses of responses to an emotionality questionnaire and content unit analysis of discourse samples elicited from a group of 10 healthy adults in response to the stimuli guided selection of 3 clips per emotional valence category (positive, negative, and neutral) and one practice item as specified above. The selected clips were relatively balanced across categories for interest level and logical sequencing. Selected clips in all categories were also found appropriate to their respective valence with regard to emotional intensity ratings. Moreover, each of the selected clips elicited a sufficient amount of discourse to warrant analysis. Thus, the objectives of this experiment were met.

Before proceeding to the main experiment, one of the results of the stimulus validation experiment is worth reflecting on. It was interesting to find

that participants agreed most on categorizing positive and negative clips indicating that clips with obvious emotional content were easier to identify and classify than neutral clips. This may be interpreted to mean that stimuli with emotional content are relatively easier to construct than those with no emotional content. This finding may also be due to possible confusion amongst participants in determining neutrality unlike what is clearly positive or negative. For positive clips, one can include situational (e.g., wedding, having a baby) and facial cues (smiles, laughter) that are obviously pleasant and comparatively easy to detect. Similar cues can be used in constructing negative stimuli (e.g., person beating another, frowns, crying). Constructing neutral stimuli which present a series of events that are logically sequenced, interesting, and meaningful and yet emotionless appears to be more challenging. In contrast to emotional clips, it was important that neutral clips did not represent situational cues or display facial cues that may direct towards one emotional valence or another. Situational content is another factor that is likely to make neutral clips more challenging to construct and identify. Typically, positive and negative situations are agreed upon by most in a society and thus they are less likely to be open to personal interpretations. Neutral events, on the other hand, are more open to personal preferences and biases which are likely to influence one's judgment of neutrality.

For example, consider a situation where two people are boarding an airplane. If there are no overt facial expressions of emotion, it may be considered a typical, uneventful occasion. However, if a viewer who enjoys traveling observes that the couple is seated in First Class and that they are being

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served hospitably, one may view this clip as positive. Alternatively, if the viewer has a fear of flying or has had negative experiences associated with flying, then this person might be more prone to classifying the clip as negative even when the clip does not portray such negativity. This finding corresponds to studies that have examined visual and auditory perception of emotionality in faces and voices where it was more challenging for participants to classify neutral facial expressions (Ekman, 1975) and neutral prosodic stimuli (Pell, Kotz, Paulman, & Alasseri, 2006).

# **Chapter Five**

## MAIN EXPERIMENT

#### Methods

#### **Participants**

Nine native Arabic-speaking adults with aphasia within the mild to moderate severity range resulting from unilateral left-hemisphere stroke, and 15 healthy controls participated in the study. Participants, both with aphasia and healthy controls, were recruited through hospitals in Jeddah and Madina, Saudi Arabia. Participants with aphasia were recruited through referrals from speechlanguage pathologists, while normal controls were recruited using two methods: posting advertisements at hospitals where testing had been conducted calling for study participants and inviting relatives (e.g., spouse, sibling) of adults with aphasia participating in the study to participate. Prior to testing, approval was obtained from the Saudi Ministry of Higher Education to conduct scientific research in Saudi Arabia. All participants provided informed consent to participate in this study.

All participants with aphasia – five females and four males – were righthanded with a mean level of formal education of 9.78 years (range: from 0 to 22 years). The mean age of participants was 50.9 years (range: from 38 to 62 years). No minimum education level was required as an exclusion criterion as it had been expected that several participants would not have formal schooling, especially females above 50 years of age. At the time of testing, all participants were at least three months post-onset of their stroke. The mean post-onset time for the group was 23.11 months at the time of testing (range: from 4 to 48 months). None of the participants had a previous history of drug or alcohol abuse, neurological, psychiatric, or psychological disease as per medical records. To ensure adequate hearing acuity, each participant passed a hearing screening at 35 dB hearing level for frequencies 500Hz, 1000Hz, and 2000Hz in at least one ear. None of the participants had uncorrected visual impairment.

Fifteen healthy non-brain-damaged controls matched by group means on age and education also participated in the study. They were all native speakers of Arabic with no history of drug or alcohol abuse, neurological, psychiatric, or psychological disease per self-report. Seven females and eight males participated in the control group with a mean level of education of 10.73 years (range: 0-23 years). The mean age of participants was 47.2 years (range: 35-65 years).

Aphasia severity levels were determined by results of an unpublished Arabic aphasia test (JISH Aphasia Diagnostic Test - JADIT) (Aseeri & Abdalla, 2000), which classifies patients based on communicative skill proficiency and severity. All participants were able to name at least 10 objects in the Connected Speech subtest (Open-Ended Questions and Picture Description tasks) of the JADIT. Additionally, all participants had a minimum accuracy level of 70% on the Auditory Comprehension subtest in order to comprehend task requirements. Accordingly, individuals with severe or global aphasia were excluded to ensure that participants produced an amount of discourse sufficient for analysis. Individual communicative profiles for each participant with aphasia are displayed in *Table 5*. The aphasia profiles obtained from JADIT were subsequently used to provide the necessary background information for

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interpreting results, but were not used to group participants due to the small sample size.

Participants with aphasia were not selected for the site of lesion within the left hemisphere (posterior vs. anterior) or for classical aphasia type. As the primary goal of the current experiment is to understand the effects of emotionality on production, variations in performance are expected to be more detectable across testing conditions if participants initially present with a production deficit. Hence, participants were selected for the major type of deficit they present with – i.e., mainly a production deficit with relatively intact auditory comprehension skills. These two requirements by default restricted the type of aphasia to non-fluent or mild fluent aphasia as shown in *Table 5*, characterized by a production deficit and relatively intact to mildly impaired comprehension.

As a background measure, the processing of emotional displays (prosody, facial expressions) was assessed briefly in each participant since many video-clips contained obvious facial expressions about emotion. To assess emotional prosody, participants listened to 20 sentences with different emotional prosodic features (four emotions: anger, happiness, fear, and neutral x five items per emotion) and judged which of the four emotions was conveyed by the voice. In a parallel task, the participants judged 20 facial expressions of the same emotions (4 emotions x 5 items) taken from the Ekman and Friesen (1976) series. As several patients were illiterate, the examiner provided the choices verbally. For prosody, performance accuracy ranged between 40% and 90%; however, since the video-clip stimuli were silent, these results were not expected to impact on performance in the main experiment. For facial expressions, performance accuracy ranged between 60% and 100%. Thus, it is unlikely that difficulties in emotional face processing should interfere in how the aphasic patients process video-clips in an important manner.

Participants	Age in years	Gender	Months post onset	Education (years)	Lesion Site	Aphasia Type	Communicative characteristics (JADIT)
AI-MM	61	ſ <b>ŗ</b> .	48m	Ш	Middle cerebral artery	Moderate non-fluent (Broca's)	<ul> <li>Relatively intact AC</li> <li>Moderate Aggramatism</li> <li>Mildly impaired naming</li> </ul>
A2-HK	54	Ľ	Ş	II	Tempo-parietal	Moderate fluent	<ul> <li>Mildly impaired AC</li> <li>Intact morphosyntactic SP</li> <li>Moderately impaired naming</li> </ul>
A3-IN	4	ſĽ	48m	12	Posterior frontal lobe	Mild Anomia	<ul> <li>Intact AC</li> <li>Intact morphosyntactic SP</li> <li>Mildly impaired naming</li> </ul>
A4-ZA	52	Γ <b>ι</b>	17m	Ц ,	Parietal	Moderate Anomia	<ul> <li>Intact AC</li> <li>Intact morphosyntactic SP</li> <li>Moderately impaired namin;</li> </ul>
A5-AA	60	X	4m	12	Frontal	Moderate non-fluent (Broca's)	<ul> <li>Relatively intact AC</li> <li>Moderate Aggramatism</li> <li>Moderately impaired namin</li> </ul>
A6-AM	62	Σ	24m	10	Frontal	Moderate non-fluent (Broca's)	<ul> <li>Relatively intact AC</li> <li>Mild Aggramatism</li> <li>Severely impaired naming</li> </ul>
A7-KZ	38	۲.	6m	16	Frontal & parietal lobes, basal ganglia	Moderate non-fluent (Broca's)	<ul> <li>Relatively intact AC</li> <li>Severe Aggramatism</li> <li>Moderately impaired namin</li> </ul>
A8-MQ	42	Σ	30m	16	Temporal	Moderate non-fluent (Broca's)	<ul> <li>Intact AC</li> <li>Severe Aggramatism</li> <li>Moderately impaired namin</li> </ul>
CIH-6A	48	M	5m	22	Posterior parietal	Mild Anomia	<ul> <li>Intact AC</li> <li>Intact morphosyntactic SP</li> <li>Mildly impaired naming</li> </ul>
Mean SD	50.9 9.2 38-67v		20.8 18.0 4-48m	9.8 8.1 11./0 – 22v			

Table 5. Basic demographic and clinical characteristics of participants with aphasia

# Materials

As described in the stimulus validation experiment, nine video-clips, three per emotional valence category, were used as the test stimuli. One additional video-clip item was used for practice and task-orientation purposes.

# Procedure

Normal controls completed testing in one session where they performed the discourse production task. Each of the participants with aphasia attended two testing sessions that lasted between 30 to 45 minutes – an eligibility testing session and the discourse production session. Testing took place in a quiet room in each hospital. A brief history was taken in the first session to determine inclusion criteria. This was followed by the hearing screening, JADIT administration, and testing for comprehension of emotion.

Adults with aphasia attended the second session to perform the discourse elicitation task. Participants were seated at a table facing a laptop computer via which video-clip stimuli were presented. Each participant wore a lapel microphone attached to a Sony digital voice recorder (ICD-MX20) which recorded their speech. Each video-clip was played twice. Immediately after the second viewing of each clip, participants narrated the events to a research assistant. The following instructions were given in Arabic, "You will watch a number of video-clips on the computer screen. There are ten video-clips. Each clip will be played twice. After you see each video for the second time, you will tell <u>(name of research assistant)</u> about the events you saw in the clip. The research assistant has not seen these clips before." The practice item was presented first, and then participants were asked if they had any questions. No time limit was imposed on participants. The videos were presented in random order within and across subject groups and across emotions. Each participant was offered a brief break after two-to-three narrations.

# **Transcription**

The voice recordings of elicited samples were transferred to a CD as individual samples using Sony Digital Voice Editor Version 2.31. Data were transcribed verbatim from the CD by the investigator or a research assistant (speech-language pathologist) using Arabic orthography. Hesitations were also transcribed, and unintelligible speech was indicated with (---). Words were grouped into utterances based on contextual information, natural pauses, intonational patterns and syntactic structure. A total of 216 discourse samples were collected for analysis. Of these, 20% of the written transcripts (43 samples) were verified with their corresponding voice recordings independently by a second listener, a speech-language pathologist, to ensure reliable transcription. Discrepancies were discussed between the investigator and the second listener. Some of these discrepancies were resolved upon agreement. Inter-judge reliability was calculated to examine consistency of transcription by counting the number of unresolved discrepancies per sample over the total number of words per sample. The mean inter-judge reliability was calculated as 92% per sample.

## Pragmatic Analyses

The pragmatic features examined are contained within the four discourse maxims put forth by Grice (1975). These include: amount of production and communicative efficiency (quantity); content accuracy (quality); lexical selection, and topic maintenance (relevance); and coherence (manner). To arrive at some of these pragmatic measures (e.g., quality, relevance, and manner), three Arabicspeaking speech-language pathologists were recruited to judge the language samples. Each of the measures gathered is defined below (Bloom et al., 1993; Grice, 1975; Prutting & Kirchner, 1987).

### 1. Quantity

This functional feature refers to the ability to provide enough information to convey the content of the message without it being too brief or excessively wordy. Two measures were utilized to evaluate discourse quantity – amount of production and communicative efficiency.

# a. Amount of Production

Discourse length was measured by counting the number of words – including function words and articles – for each language sample. The mean number of words was obtained for each group per emotional valence category (average of three video-clips per emotional valence). All tokens were counted as separate words including paraphasias and neologisms. Words containing contractions were counted as one word, and immediate repetitions of the same word were also included in the count. Although previous studies did not find a significant difference in discourse length across emotional and non-emotional conditions for adults with left-brain damage (Bloom et al., 1992), this measure would be valuable in confirming previous results. Additionally, this measure was required to calculate communicative efficiency.

#### b. <u>Communicative Efficiency</u>

Communicative efficiency refers to the use of utterances that are informative without being too wordy. It was measured by calculating the total number of content units (CU) over the total number of words per sample. Determining content units was done as previously explained in the stimuli validation experiment. It is of interest to examine the influence of emotionality on communicative efficiency, which is important in determining the communicative strength of utterances produced.

# 2. Quality (Content Accuracy)

This feature is concerned with the accuracy of information, without conveying excessive details, in relation to the target video-clip. Accuracy of productions was measured by dividing the number of CUs over the number of core content units per video-clip as revealed in the stimuli validation experiment. Content accuracy by adults with aphasia was compared with those by normal controls across valence conditions as a measure of the influence of emotionality on quality of information. Correct content units which refer to words that are informative, intelligible, and accurate in relation to the target video-clip were calculated.

# 3. Relevance

This feature refers to the use of words and concepts that are relevant to the topic at hand. Two measures were used to evaluate relevance – lexical selection and topic maintenance.

# a. Lexical Relevance

Lexical relevance refers to the use of words that are appropriate for the text. Appropriate word choice is essential for determining the relevance of discourse components. Single nouns, verbs, and adjectives produced by at least 30% of normal speakers in the stimulus validation experiment were listed and designated target lexemes. The mean number of target lexemes was calculated per emotional valence for each group.

# b. Topic Maintenance

Topic maintenance was measured by rating the degree to which each utterance had a clear semantic relation to the entire macrostructure. The analysis involved parsing texts into utterances, and rating each utterance for relevance (Christiansen, 1995). Each utterance was rated by three research assistants on a five-point scale, where '1' corresponds to "completely irrelevant" and '5' corresponds to "completely relevant." The mean rating across judges per utterance, per sample was calculated for each group. A mean utterance relevance rating was calculated for each emotional valence per group.

# 4. Manner (Coherence Ratings)

Each utterance was rated for global and local coherence following a procedure adopted by Coelho and Flewellyn (2003). Global coherence refers to

the relationship of utterance content to the overall discourse topic, while local coherence refers to the relationship between utterance content to the preceding utterance (Coelho & Flewellyn, 2003). The first utterance was not rated for local coherence. *Table 6* summarizes the procedure for scoring utterances as described by Coelho and Flewellyn (2003). Mean global coherence and mean local coherence were calculated per sample, per emotional valence, per group.

# Statistical Analysis

Separate ANOVAs were computed to compare performance of the two subject groups on each of the six discourse measures as a function of emotionality. Specifically, each measure was analyzed separately using a mixed ANOVA design with Group (Aphasia, Healthy Controls) as a between-groups factor with repeated measures on Emotion (positive, negative, neutral). The results of the ANOVA were also used to infer the general effects of emotionality (positive, negative) vs. non-emotionality (neutral) on each discourse measure between groups.

	Scores	Description
Global	1	Utterance is unrelated to general topic or is a comment on
Coherence		the discourse
	2	Utterance contains multiple clauses, wherein one clause
		possibly relates to general topic and one does not
	3	Utterance provides information possibly related to general
		topic or is an evaluation statement without providing
		substantive information, or the topic must be inferred from
		the statement
	4	Utterance contains multiple clauses, wherein one clause
		relates directly to the topic and the other relates indirectly
	5	Utterance provided substantive information related to the
		general topic
Local	1	Utterance has no relationship to content of the immediately
Coherence		preceding utterance
	2	Utterance contains multiple clauses, wherein one possibly
		relates to the content of the preceding utterance but the
		other(s) may not
	3	Utterance topic generally relates to that of the preceding
		utterance, but with a shift in focus from the subject or
		activity of the preceding utterance, or the utterance is
		referentially vague or ambiguous so relation to the
		preceding utterance must be inferred
	4	Utterance contains multiple clauses, wherein one clause
		definitely relates to the content in the preceding utterance
		but another may not
	5	Topic of the preceding utterance is continued by
		elaboration, temporal sequencing, enumeration of related
		examples, or maintaining the same actor, subject, action,
		or argument as the focus
		×

# Table 6. Global & local coherence ratings adopted from Coelho & Flewellyn (2003)

# Results

The performance of the two groups on each of the six pragmatic measures is provided in *Table 7* according to the emotionality of the stimulus. Data were examined using a 2 X 3 ANOVA in a mixed factorial design; for each pragmatic measure, GROUP (Aphasia, Normal) constituted the between-subjects factor and EMOTION (Positive, Negative, Neutral) served as the within-subjects factor. Data derived from the three "positive" discourse samples, the three "negative" discourse samples, and the three "neutral" discourse samples were collapsed within each emotion condition prior to statistical analysis. Statistically significant effects were explored post hoc using Tukey's HSD procedure (p<.05), where appropriate.

Pragmatic Measure		Aphasia (N=9)		Controls (N = 15)					
	Pos	Neg	Neu	Pos	Neg	Neu			
1. Word Count Mean	28.00	36.52	23.63	73.71	66.76	67.67			
Standard Deviation	21.00	18.92	16.92	37.94	28.46	39.10			
2. Communicative Efficiency Mean	0.47	0.53	0.36	0.70	0.72	0.67			
Standard Deviation	0.21	0.18	0.19	0.12	0.13	0.18			
3. Content Accuracy Mean	0.37	0.62	0.28	1.71	1.57	1.52			
Standard Deviation	0.24	0.31	0.16	0.66	0.43	0.47			
4. Lexical Selection Mean	0.95	0.92	0.92	0.94	0.94	0.93			
Standard Deviation	0.02	0.02	0.03	0.03	0.03	0.03			
5. Topic Maintenance Mean	3.31	3.24	3.14	4.26	4.46	4.11			
Standard Deviation	0.92	0.55	0.96	0.28	0.23	0.34			
6. Local Coherence Mean	2.64	2.71	2.06	4.12	4.22	4.06			
Standard Deviation	0.66	0.64	0.52	0.23	0.26	0.29			

## Table 7. Effect of emotional category on pragmatic measures for aphasia & controls

# Discourse Quantity:

# 1) Amount of Production

The mean number of words produced by each of the two participant groups as a function of emotional condition (positive, negative, neutral) is presented in *Figure 4*. The (GROUP X EMOTION) ANOVA performed on these data revealed a significant main effect for GROUP  $[F_{(1,22)} = 10.21, p < .005]$ . In general, the control group produced a significantly higher number of words than the aphasia group when narrating the events of the video-clips. There was no significant main effect for EMOTION (p < .05) although the interaction of GROUP X EMOTION was significant for this analysis  $[F_{(2,44)} = 5.21, p < .01]$ . Post-hoc analyses revealed that the aphasia group produced a significantly higher number of words in the negative emotion condition [p < .05] than in the neutral condition. There were no differences in word count between the positive and negative conditions nor between the positive and neutral conditions for the aphasic group. Healthy controls demonstrated no differences in the amount of production across the three emotion conditions.



#### Figure 4. Mean word count per group by emotion condition

In addition to examining group means, the performance of individual participants was examined. Individual means per emotional category for each of the six pragmatic measures are supplied in *Table 8*. To provide an indication of the influence of emotional valence categories on the pragmatic discourse features under study based on the actual performance of individual participants, each participant's mean word count across samples elicited using the three categories of emotional valence stimuli was compared. For the majority of participants with aphasia (5/9 = 56%) mean word count for discourse elicited using negative stimuli was greater than that for positive or neutral stimuli. For 2/9 participants with aphasia (22%), mean word count for discourse elicited using negative stimuli was roughly equal to that elicited using positive stimuli, but greater than that elicited using neutral stimuli. For one participant, mean word count for discourse elicited using neutral stimuli. For one participant, mean word count for discourse elicited using neutral stimuli. For one participant, mean word count for discourse elicited using neutral stimuli. For one participant, mean word count for discourse elicited using neutral stimuli.

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ace	Neu	1.77	2.03	1.80	2.17	1.60	2.17	1.97	1.67	3.33	2.06	3.67	3.70	3.57	3.93	4.10	4.53	4.33	4.20	4.43	4.27	4.03	3.70	4.10	4.20	4.17	4.06
Coherei	Neg	2.53	2.83	2.90	2.43	2.20	2.00	3.07	2.27	4.13	2.71	4.47	4.27	4.00	4.33	4.10	4.57	4.20	4.13	4.27	4.40	4.03	3.63	3.97	4.67	4.30	4.22
	Pos	2.47	3.13	2.30	1.47	2.97	2.60	2.83	2.20	3.83	2.64	3.97	3.80	3.70	4.20	4.43	4.30	4.50	4.13	4.20	4.27	3.83	4.20	3.97	4.20	4.03	4.12
tain	Neu	3.33	4.13	2.40	1.67	3.50	3.43	4.10	1.77	3.97	3.14	3.67	3.70	3.90	3.93	3.73	4.53	4.60	4.43	4.43	4.53	3.97	3.70	4.10	4.20	4.17	4.11
c main	Neg	2.73	4.07	4.07	3.10	3.10	2.73	3.60	2.70	3.03	3.24	4.47	4.27	4.40	4.87	4.47	4.57	4.40	4.50	4.57	4.40	4.70	4.23	3.87	4.53	4.70	4,46
Topi	Pos	2.97	3.70	2.30	1.47	3.77	4.03	4.10	3.30	4.17	3.31	3.97	4.13	3.70	4.20	4.03	4.77	4.50	4.47	4.20	4.27	4.20	4.50	3.97	4.53	4.47	4.26
tion	Neu	0.94	0.90	0.94	0.91	0.87	0.94	0.90	0.95	0.94	0.92	0.96	0.99	0.95	0.94	0.94	0.90	0.92	0.91	0.92	0.94	0.94	0.90	0.92	0.91	0.96	0.93
al selec	Neg	0.90	0.88	0.91	0.94	0.91	0.95	0.94	0.91	0.95	0.92	0.96	0.94	0.95	0.94	0.98	0.93	0.92	0.91	0.93	0.91	0.87	0.93	0.96	0.98	0.96	0.94
Lexico	Pos	0.95	0.93	0.96	0.99	0.91	0.96	0.93	0.97	0.95	0.95	0.96	0.99	0.94	0.91	0.94	0.90	0.89	0.89	0.95	0.95	0.95	0.93	0.95	0.99	0.96	0.94
racy	Neu	0.24	0.21	0.31	0.12	0.3	0.17	0.42	0.14	0.61	0.28	1.48	1.44	1.99	1.74	1.20	1.70	1.14	1.85	0.84	0.98	1.01	1.08	2.30	1.76	2.29	1.52
nt accu	Neg	0.60	0.53	0.67	0.23	0.66	0.44	0.76	0.39	1.32	0.62	1.82	1.43	2.07	2.02	1.45	1.95	1.52	1.89	0.76	0.92	1.38	1.06	2.06	1.31	1.89	1.57
Conter	Pos	0.42	0.27	0.43	0.16	0.32	0.19	0.42	0.16	0.93	0.37	2.23	1.30	2.56	2.28	1.58	1.91	1.43	2.24	0.73	0.95	0.84	0.90	2.46	1.72	2.53	1.71
ency	Neu	10%	33%	28%	23%	47%	45%	28%	35%	76%	36%	65%	78%	56%	65%	79%	53%	76%	54%	94%	81%	94%	77%	39%	50%	40%	67%
Effici	Neg	27%	57%	39%	59%	62%	81%	42%	40%	74%	53%	20%	78%	77%	73%	80%	71%	86%	80%	75%	85%	84%	79%	49%	53%	45%	72%
Comm	Pos	17%	31%	33%	55%	65%	70%	36%	37%	81%	47%	%69	85%	67%	<b>66%</b>	82%	64%	80%	%69	87%	79%	78%	%69	51%	53%	53%	70%
	Veu	2.00	6.00	8.33	2.67	7.00	9.67	7.00	0.00	0.00	3.63	3.67	7.33	0.33	5.67	4.33	8.00	2.67	00.9	2.00	1.33	7.33	5.67	47.33	8.00	45.33	7.67
Count	် ညိ	00	00	33 2	67 1	00	33	67 3	67 1	00	52 2	33 6	00 4	61 9	33 6	33 4	67 7	33 4	67 8	33 2	00 3	67 2	33 3	.00	67 8	00.	76 6
Word (	Ž	65.	24.	55.	11.	30.	15.	50.	27.	49.	36.	77.	52.	76.	79.	52.	80.	50.	.07	27.	31.	45.	41.	123	72.	121	66.
	Pos	67.00	24.00	55.67	8.67	13.00	7.67	31.00	14.00	31.00	28.00	91.00	42.33	113.67	93.00	51.67	83.00	49.67	96.00	23.00	33.33	28.33	36.67	134.00	98.00	132.00	73.71
Ss		<b>A</b> 1	A2	A3	A4	A5	9V	A7	A8	<b>A9</b>	Mean	C1	C	C	C4	CS	C6	C7	C8	ව	C10	C11	C12	C13	C14	C15	Mean

There was a trend for adults with fluent aphasia (A1, A7, A9) or mild nonfluent aphasia (A3) to produce greater word counts across all three emotional valence categories. Additionally, participants with intact or relatively intact auditory comprehension (A5, A6, A7, & A9) had a tendency to produce higher word count in discourse elicited using negative stimuli than either positive or neutral stimuli. There was also a trend for adults with moderate-to-severe naming deficits (A2, A4, A5, A6, A8) to have lower mean word count across all three conditions. For the control group, 40% produced slightly longer samples in response to negative stimuli, 47% produced slightly longer samples in response to positive stimuli, and 13% produced slightly longer samples in response to neutral stimuli. However, the within-subject differences were minimal.

# 2) Communicative Efficiency

Communicative efficiency indexes whether spoken utterances are concise, to the point, and not unnecessarily wordy (here calculated as the total number of content units (CU) divided by the total number of words produced per sample). The (GROUP X EMOTION) ANOVA performed on these data revealed a significant main effect for GROUP [ $F_{(1,22)} = 14.13$ , p < .001] and a significant main effect for EMOTION [ $F_{(2,44)} = 15.31$ , p < .001]. In addition, there was a significant GROUP X EMOTION interaction for this analysis [ $F_{(2,44)} = 4.18$ , p < .05]. Posthoc analysis of the interaction revealed that the aphasia group had a significantly higher proportion of content units to the total number of words for both the positive [p < .05] and negative conditions [p < .001] than the neutral condition, unlike the control group which showed no differences across emotion levels. For the aphasic patients, there was no significant difference in communicative efficiency between the positive and negative conditions. The mean communicative efficiency measure for each of the participant groups as a function of emotional condition (positive, negative, neutral) is presented in *Figure 5*.



#### Figure 5. Mean communicative efficiency per group per emotional condition

Comparisons of each participant's mean communicative efficiency across the three emotional valence categories were subsequently performed. For the aphasia group, 78% of participants had a higher communicative efficiency mean for negative stimuli, and 22% had a higher mean for positive stimuli. For the control group, 47% achieved higher efficiency for negative stimuli, 13% for positive stimuli, 13% for neutral stimuli, and 27% had roughly equal means for positive and negative stimuli.

#### Discourse Quality:

# **Content Accuracy**

Content accuracy was measured by calculating the total number of content units (CU) divided by the total number of Core CUs (i.e., CUs produced by at least 70% of healthy participants in the stimulus validation study) per discourse sample. The mean content accuracy measure for each of the two participant groups as a function of emotional condition (positive, negative, neutral) is presented in *Figure 6*. The (GROUP X EMOTION) ANOVA performed on these data revealed a significant main effect for GROUP [ $F_{(1,22)} = 43.29, p <.001$ ] and for EMOTION [F(2,44) = 7.47, p <.005]. There was also a significant GROUP X EMOTION interaction for this analysis [ $F_{(2,44)} = 7.92, p <.001$ ]. Post-hoc analyses revealed that the aphasia group had a significantly higher proportion of CUs to the total number of Core CUs for the negative condition than either the positive [p <.05] or neutral conditions [p <.001] (the positive and neutral conditions did not differ). There were no significant differences for the control group in content accuracy across the three emotional conditions.

Individual data were inspected to further understand how the three emotion conditions influenced content accuracy. All participants in the aphasia group (100%) showed greater content accuracy in response to negative stimuli. For the control group, the highest percentage (40%) of participants showed greater content accuracy scores in response to positive stimuli. There were no other obvious patterns of interest in these data.



#### Figure 6. Mean content accuracy per group per emotional condition

## Discourse Relevance:

# 1) Lexical Selection

Recall that lexical selection was measured by counting the number of lexemes relevant to the text; and calculating the percentage of these relevant lexemes over total number of lexemes per sample in relation to the text and videoclip content. The mean lexical selection measure for each of the two participant groups as a function of emotional condition (positive, negative, neutral) is presented in *Figure 7*. The ANOVA revealed a significant main effect for EMOTION [ $F_{(2,44)} = 4.36$ , p < .05] but no main or interactive effect involving GROUP. The effect of emotion was explained by the fact that lexical selection was more accurate in response to positive emotional stimuli.


#### Figure 7. Mean percentage relevant lexemes per group per emotional condition

Examination of individual mean lexical relevance scores indicated that the majority of individuals (66%) in the aphasia group achieved higher mean scores for the positive condition, while 33% had roughly equal positive and negative lexical relevance means. As for the control group, the highest percentage (33%) of participants received higher lexical relevance means for the positive condition. As suggested by the lack of overall group differences, the majority of participants had roughly equal means across two or three of the emotional categories when the individual data were inspected.

## 2) Topic Maintenance

A rating scale was used to measure how three raters – speech-language pathologists – perceive the level of topic maintenance in a discourse sample. After the investigator had parsed discourse samples into utterances, each utterance was rated for the degree of relevance to the entire discourse on a 5-point scale ranging from '1' = "completely irrelevant" to '5' = "completely relevant." The mean rating for each of the two participant groups as a function of emotional condition (positive, negative, neutral) is presented in *Figure 8*. The (GROUP X EMOTION) ANOVA performed on these data revealed a significant main effect for GROUP [ $F_{(1,22)}$  = 34.94, p<.001]. Overall, ratings of topic maintenance were lower for patients in the aphasic group than healthy adults without aphasia. There was no significant main effect for EMOTION for this analysis and no significant GROUP X EMOTION interaction. Reporting of individual patterns for topic maintenance is combined with reporting of the local coherence measure.



Figure 8. Mean topic maintenance rating per group per emotional condition

## Discourse Manner:

## Coherence

A rating scale was used to measure how three raters – SLPs – perceive the level of local and global coherence in a discourse sample. However, as raters reported that they could not distinguish between the rating scale for global coherence described earlier and that for topic maintenance, it was decided to discontinue rating global coherence and have raters focus on local coherence. Accordingly, the previous topic maintenance measure can be seen to reflect global coherence; and the results reported here are limited to local coherence.

The mean rating for each of the two participant groups as a function of emotional condition (positive, negative, neutral) is presented in *Figure 9*. The ANOVA yielded significant main effects for GROUP  $[F_{(1,22)} = 119.11, p < .001]$ and EMOTION  $[F_{(2,44)} = 14, p < .001]$  and a significant GROUP X EMOTION interaction  $[F_{(2,44)} = 6.76, p < .001]$ . Post-hoc analyses on the interaction revealed that the aphasia group received a significantly higher local coherence rating for both the positive [p < .001] and negative conditions [p < .001], which did not differ, when compared to the neutral condition. There was no significant difference across emotionality categories for the control group.

For topic maintenance, 78% of participants with aphasia received higher topic maintenance rating for either the negative or positive conditions, while 66% of the control group received higher rating for either emotional condition. For coherence rating, all participants with aphasia received higher coherence ratings for either positive or negative conditions, while 53% of healthy controls received higher ratings for either of the two emotional conditions.



## Figure 9. Mean local coherence rating per group per emotional condition

## **Chapter Six**

### DISCUSSION

The current study was designed to examine the influence of emotional content on pragmatic features of discourse produced by adults with aphasia. Analyses of both group and individual performance confirmed the prediction that most adults with aphasia in the current sample produced discourse with less appropriate pragmatic features than healthy control participants. However, of major interest here, participants with aphasia selectively responded in a positive manner to the emotional content of video stimuli for many of the measures gathered. For example, the aphasia group showed signs of enhanced discourse quantity and quality in response to negative stimuli, and they also demonstrated improved communicative efficiency and lexical relevance when positive stimuli were presented. The local coherence of aphasic discourse appeared to be enhanced when either negative or positive stimuli were utilized. The only measure on which performance was comparable across both groups was that of lexical relevance.

For each of the pragmatic measures, adults without brain damage were not affected by variations in emotional content – that is, they produced discourse that was more pragmatically appropriate than the aphasia group regardless of the emotional valence of stimuli used. For the control group, the observation that emotionality did not affect many of the pragmatic measures is likely to reflect a ceiling effect; however, this does not reduce the value of these data for understanding aphasia and factors which may facilitate pragmatic features of discourse in this group. Since the present sample of aphasic participants exhibited mild to moderate production deficits, the generalizability of these results is currently limited to patients of this nature. In addition to severity of aphasia, individual communicative profiles may have been a determinant of how some aphasic patients responded to emotional content as will be discussed in the course of this section. The current analysis was also limited by the small number of participants with aphasia. Despite sample-size limitations, our findings offer insight into pragmatic processes that are retained following left hemisphere damage. Some of these findings correspond to popular assumptions about pragmatic function after left hemisphere damage, while other findings are not consistent with previous data.

### Pragmatic Measures within Grice's Framework

## Discourse Quantity

Due to the nature of aphasia as a language disorder, it was not surprising that the control group produced longer and more efficient discourse samples than the aphasia group regardless of emotional valence category. Negative emotional content facilitated discourse quantity for adults with aphasia. These results were inconsistent with previous findings which had indicated no difference in discourse length across emotional and non-emotional conditions for adults with left-brain damage (Bloom et al., 1992). Perhaps the number and type of stimuli utilized in previous studies – single picture-sequencing items within each of three categories – can help account for these discrepancies. This limitation is likely to have increased individual stimulus effects. Additional methodological factors worth noting are not pre-validating stimuli prior to testing with experimental groups, and eliciting various genres (e.g., emotional narrative vs. non-emotional procedure vs. non-emotional descriptive).

On the other hand, Bottenberg et al. (1987) have also reported a facilitative influence of emotional content on discourse length. Having used stimuli with obvious emotional content – Cookie Theft picture, a fire scene, and a depiction of the Kennedy assassination – Bottenberg et al.'s (1987) stimuli seemed to correspond to varying degrees of emotional intensity. The picture sequence with the most intense emotional association (assassination) elicited longer samples than the picture sequence with moderate emotional intensity (fire), which in turn elicited longer samples than the single picture with minimal negative contents (Theft). This is suggestive that emotional intensity enhances discourse length, which is in agreement with the current findings where results of the stimulus validation study revealed that negative video-clips used in the current study were rated as most intense and more interesting than neutral video-clips, and perhaps that is why they elicited a higher word count.

Emotional intensity and interest level of emotional video-clips may have facilitated the production of more content words that are critical to the events in these clips, as revealed by the communicative efficiency results. Based on evidence that longer samples do not necessarily provide more information content than shorter samples (Potechin et al., 1987), it was important to measure communicative efficiency. Both negative and positive stimuli elicited more efficient discourse than neutral stimuli, an effect that was not found in the control group. These findings are in agreement with earlier findings that emotional content facilitates discourse 'conciseness' (i.e., producing utterances that are informative without providing unnecessary details) (Bloom et al., 1992, 1999; Borod et al., 2000). Judges rated discourse elicited from adults with aphasia using emotional stimuli as more concise than that elicited using procedural content, but less concise than that elicited using visuo-spatial content (Bloom et al., 1992). As the current study did not control for potential visuo-spatial effects, it is difficult to speculate why this may have happened. In more controlled studies with regard to emotional stimuli, Bloom et al. (1999) and Borod et al. (2000) found that discourse elicited using emotional words was rated as more concise than that elicited using non-emotional words.

Furthermore, Borod et al. (2000) provided evidence that discourse elicited using positive words was more concise than that elicited using negative words, whereas in the current study, there was no difference between the two valence categories for this measure. This inconsistency might be explained by differences between the actual measures used. Although 'conciseness' does not fully correspond to communicative efficiency, it is the closest measure found in the relevant literature. The two measures differ in that 'conciseness' guards against excessive detail, whereas communicative efficiency is concerned with communicating more information using fewer words. Additionally, while the 'conciseness' measure is based on subjective ratings by SLPs (Bloom et al., 1992, 1999; Borod et al., 2000), communicative efficiency is measured objectively by calculating number of content units over total word count. Finally, Bloom and colleagues (1999) consider 'conciseness' to be a quality rather than a quantity measure. As the Bloom et al. (1999) and Borod et al. (2000) investigations elicited personal narratives which did not control for length and topic variety, it may have been feasible to conduct conciseness ratings. However, it was not possible to measure communicative efficiency because there are no predetermined content units, a primary requirement for calculating communicative efficiency.

Moreover, the findings of the current study that the control group was more efficient than the aphasia group were not consistent with previous data which demonstrated that adults with aphasia have not been rated differently from non-brain-damaged participants in discourse 'conciseness' (Bloom et al., 1999; Borod et al., 2000). This discrepancy may also be explained by differences in the subjectivity of the measures as mentioned above. It is surprising that adults with aphasia would receive similar 'conciseness' ratings to normal controls as it is not expected that adults with aphasia would produce excessive detail, especially nonfluent aphasia. It also makes sense that communicative efficiency may be lower for adults with aphasia than healthy controls.

## Discourse Quality

The purpose of this measure was to answer the question whether emotional content facilitates the accuracy of discourse in reference to a set of predetermined core content units. As expected, healthy controls produced discourse with more accurate content than individuals with aphasia. These findings correspond to those of Bloom et al. (1992), who found that adults with aphasia produced fewer content elements when talking about picture sequences than healthy controls. The current results also demonstrate that emotionality did not influence the performance of healthy controls, yet influenced the performance of individuals with aphasia.

Our findings support a trend for adults with aphasia to produce more correct content elements in discourse elicited using emotional rather than nonemotional stimuli, as revealed by Bloom et al. (1992). The effect was specific to negative stimuli, which indicates that not all emotional stimuli have a facilitative effect on discourse quality. As stated earlier, it may be that higher interest and intensity ratings associated with negative stimuli, as revealed by the stimulus validation study, facilitated better content accuracy (Harris & Pashler, 2004; Keil et al., 2005; Öhman et al., 2001; Vuilleumer, 2000).

As previous studies investigating the influence of emotion on pragmatic features have not measured content accuracy in a similar way, it is difficult to compare findings. This is primarily due to the fact that previous studies elicited personal monologues (Bloom et al., 1999; Borod et al., 2000). As such, no reference points were available to determine core content units, which are required to conduct this kind of analysis. Although Bloom et al. (1992) did use pictures to elicit discourse which made it possible for them to specify core content units, they had not done that. They did not determine a set of content units based on a percentage of items produced by normal controls. Hence, measuring quality in the manner adopted by the current study was also not possible. Additionally, Bloom et al. (1992) examined amount of information, rather than accuracy of information. Bloom and colleagues evaluated quality using the conciseness measure described above, which shares with the content accuracy measure its

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exclusion of excessive details. Accordingly, conciseness seems to fall roughly between content accuracy and our previous measure, communicative efficiency.

#### Relevance

To evaluate relevance, a subjective and an objective measure were used: topic maintenance ratings and lexical relevance. Our findings for lexical relevance were perhaps the most interesting and least expected. Primarily, adults with aphasia were as successful as healthy controls at producing relevant lexemes. However, when considering how lexical relevance was measured, this finding may not be as surprising after all. The criterion for a lexical item to be considered as relevant is that it had been produced by at least 30% of participants in the stimuli validation study, which is less stringent than qualifying as a core content unit (70% minimum occurrence). This criterion specifies that lexemes produced can be associated with the topic at hand even if these lexemes do not qualify as core content units. In other words, adults with aphasia may use relevant lexemes (e.g., "captain" in the airplane clip), but not necessarily produce all critical lexemes (e.g., "airplane" in the same clip). Producing critical lexemes is measured by content accuracy as previously discussed.

Additionally, there was a significant emotion effect demonstrating that discourse elicited using positive stimuli in both experimental groups had more topic-relevant lexemes than discourse elicited using negative or neutral stimuli. This finding corresponds to results obtained by Borod et al. (2000) who evaluated lexical selection using a rating scale. They found that emotionality facilitated lexical selection. Specifically, positive discourse was rated higher in lexical

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selection than negative or non-emotional discourse. Thus, despite differences in measures used, results from our study are consistent with those of Borod et al. (2000).

It was not surprising to find that the control group produced discourse that was more on topic as rated by our three raters than the aphasia group. Neither negative nor positive emotional stimuli influenced topic maintenance in any significant way for either experimental group. Our results are consistent with previous research where it was found that discourse by adults with aphasia may contain irrelevant propositions and information gaps (Christiansen, 1995a, 1995b). These attributes are likely connected to ratings of reduced topic maintenance, as found by Borod et al., 2000.

## Manner

Similar to topic maintenance, our findings indicate that discourse by adults with aphasia was perceived as less coherent than that by healthy controls, corroborating previous findings (Bloom et al., 1995; Ulatowska et al., 1981, 1983). The finding of enhanced coherence as a function of emotional content may be interpreted in light of Christiansen's (1995a) results which demonstrated prevalence of attributes in discourse by adults with aphasia that leads to ratings of reduced coherence. Christiansen (1995a, 1995b) found that the presence of information gaps, irrelevant propositions, and repeated propositions affects overall coherence ratings. This effect becomes even more pronounced when only considering immediately preceding or following utterances. As we have seen for the majority of previous measures, emotional content positively influenced some of these measures, which in turn led to increased content accuracy, enhanced lexical relevance, and improved topic maintenance. Improved content accuracy reduces the likelihood of information gaps, while enhanced lexical relevance and topic maintenance result in reduction of irrelevant propositions. With fewer information gaps and fewer irrelevant propositions, coherence ratings can be expected to be higher, which explains why coherence ratings improved for emotional conditions.

But why was local coherence more impaired than topic maintenance in general? It may be that when rating local coherence, one takes into perspective the utterances immediately preceding or following, and if utterances do not flow smoothly, coherence would be affected. For topic maintenance, on the other hand, one considers the overall semantic content of the discourse. Hence, even if an utterance is not directly semantically related to a preceding utterance because of a word finding deficit or an information gap, yet is semantically related to the discourse as a whole, then topic maintenance would be rated as high. Thus, the main difference between topic maintenance and coherence is that topic maintenance is a semantic attribute, whereas coherence is an organizational attribute which is dependent on semantics nonetheless. As such, organization and event sequencing on their own do not seem to be sufficient for discourse to be perceived as coherent, as the amount and degree of relevant information available definitely affects coherence ratings (Ulatowska et al., 1981, 1983). This may explain why adults with aphasia performed better on topic maintenance compared to local coherence.

In attempting to understand how emotionality is facilitating these different pragmatic features, it is important to highlight the fact that many measures used in previous studies do not fully correspond to measures used in the current investigation, as previously mentioned. This fact is reflective of the difficulty in teasing apart one pragmatic attribute from another, which in turn suggests the inter-dependence amongst all these variables. None of Grice's (1975) maxims exist in isolation, but rather they function in unison to create the discourse entity.

As listeners interpret a speaker's communicative intentions, they tend to take in these maxims as a whole rather than teasing them apart. These maxims cannot be seen other than being inter-related and inter-dependent (Bloom et al., 1999). Our notion is that listeners' interpretations are either directly or indirectly influenced by how these maxims are perceived as a whole. This notion presupposes that we consider these attributes in terms of a hierarchy, emphasizing the relationships between them. Each attribute influences the next and each compensates for another's limitations. Word count is an important measure to determine amount of speech and length of production. Yet, it is not sufficient in that we need to determine how much of that speech is informative. Next, there is a need to determine which of that informative speech corresponds to the actual stimuli (i.e., content accuracy) as determined by testing normal participants. It is important to then examine lexical elements that may not be critical, but are nonetheless relevant to the stimuli. Additionally, these relevant lexemes need to occur within the context of relevant utterances to the topic as a whole. Finally, all of these elements work together creating a coherent discourse entity that flows well as it follows a logical sequence from one utterance to the next.

Adopting Grice's framework provides an alternative method of approaching pragmatics, especially for adults with aphasia due to the nature of the disorder. Our participants with aphasia demonstrated typical pragmatic deficits that are strongly associated with their linguistic deficits. Nonetheless the results of the present investigation support the anecdotal evidence that adults with aphasia benefit from emotionality in discourse production. However, due to the small sample size and the heterogeneity of participants with aphasia, it is quite difficult to generalize the findings. It would be of value to expand the methodology of the current investigation to a larger sample size, looking specifically at the differential effects of specific aphasia types. It is also important in future not only to examine valence categories, but also to investigate the effects of specific emotions, starting off with the so-called 'basic' emotions (e.g., sadness, anger fear, happiness, and disgust).

#### **Emotionality and Resource Allocation in Aphasia**

One question posed in the introduction relates to the nature of the deficit underlying aphasia; whether it reflects language loss or a processing deficit. The current findings support the latter approach as most descriptions of linguistic deficits cannot account for the observed influence of emotionality on pragmatic features. In particular, the current findings are potentially in line with a description of aphasia as representing a resource allocation deficit (McNeil et al., 1991). As mentioned earlier in the discussion, negative clips were evaluated as more interesting and of higher intensity than neutral clips. This may have led to allocating more attentional resources towards negative stimuli (Keil et al., 2005; Öhman et al., 2001) and better memory for specific details of affective stimuli (Kengsinger et al., 2006). Consequently, this may have led to enhanced event recall and freed mental resources which could be used in speech production. The Resource Allocation hypothesis presumes that these resources can be modulated under different circumstances. That is, different variables may influence resources to be directed towards language abilities, leading in turn to enhanced language abilities. The current results indicate that negative emotional content may be especially effective for modulating processing resources towards language production mechanisms.

Language abilities may also be impaired due to underlying deficits in executive functioning – for example, working memory – wherein language units are not retained long enough to allow combinations of these units into meaningful processes (Kolk, 1998; Linebarger et al., 2007). Linebarger et al. (2007) recommends the use of a 'processing prosthesis' which results in improved linguistic performance. It does so by decreasing the effect of processing limitations. Linebarger et al. (2007) claim that the system works in two ways: by refreshing working memory repeatedly and by enhancing self-monitoring opportunities for individuals with aphasia. It may be that emotional content may also reduce the effect of processing limitations. One can speculate that emotionality may work to accelerate processing time of working memory, so that linguistic information is retained for longer periods of time. As a result, decay of linguistic information is not as rapid as would be otherwise. This would be an area of interest for future research.

## **Clinical Implications**

Our findings demonstrating how adults with aphasia may benefit from emotional content in facilitating various pragmatic features of discourse are of clinical value. In keeping with trends of evidence-based practice, it is important to utilize emotional stimuli in assessing various pragmatic skills of adults with aphasia. Assessment findings will facilitate selection of appropriate treatment targets, according to an individual's area of deficit. Planning therapy goals and selecting treatment tasks and materials can be based on knowledge of the specific emotional valence that may enhance performance. Moreover, understanding how performance may improve or be hindered under various emotional conditions is important for patient and family education regarding the disorder.

Obtaining a thorough case history, which includes major life events that may have strong emotional reactions and repercussions, can be extremely valuable in planning therapy. For example, knowledge that a patient has sustained the CVA immediately following the news of the death of a daughter (an extremely negative emotional event) prepares the clinician working with the patient in terms of functional tasks that may prove to be quite emotional (e.g., "name your children"). In addition, learning about a patient's interests, likes, and dislikes (i.e., what makes him happy, sad, or angry) can be useful in manipulating clinical activities based on this information. The following section illustrates some specific management goals depending on a patient's pragmatic profile as revealed by the current results.

## Specific Individual Profiles

Communicative Efficiency is a measure concerned with quantifying the proportion of informational content (CUs) to amount of speech (total word count). One concern with adults with aphasia may be excessive speech production (i.e., too many words) with insufficient informational substance or vice versa. Individual data analysis revealed that participants with aphasia presented with one of four profiles with regard to communicative efficiency. The first profile reflects non-fluent participants who were agrammatic with a mild naming deficit. These participants tended to have reduced speech output with large numbers of content words and missing function words, yet they provided information that was critical to the video-clips. Participants with this first profile manifested high communicative efficiency. The second profile reflected participants with non-fluent aphasia who were agrammatic with a severe naming deficit. This group had reduced speech output with reduced informational content.

The third profile represented fluent participants with anomia who had relatively high speech output. However, due to their naming deficits, their communicative efficiency was influenced by the number of hesitations, repetitions, and self-corrections which increased the total word count, yet the number of content units remained minimal. This resulted in relatively reduced information content, leading to lower communicative efficiency scores. Despite their high speech output, this group received low communicative efficiency scores because of these intrusive features. The final profile represented a single individual with mild fluent aphasia (Wernicke's) and mild auditory

comprehension deficit. This participant produced speech samples that were

considered adequate in length. However, the speech contained extraneous and irrelevant information which led to low communicative efficiency scores. These findings correspond to those of Berko-Gleason et al. (1980) who found that adults with non-fluent aphasia are more efficient than adults with fluent aphasia.

Rudimentary observation of individual participant data indicated that all participants with aphasia benefited to varying degrees from negative emotional stimuli. Comparing performance on neutral and negative stimuli, the majority of participants with aphasia had at least doubled the content accuracy scores between neutral and negative conditions. Only one participant who presented with fluent aphasia characterized by mildly impaired auditory comprehension, benefited minimally from negative stimuli. This same participant had lower mean content accuracy across all conditions than the rest of the participants with aphasia. On the other hand, one of the two participants with mild anomia performed within normal limits for the negative condition, and approached normal range for the positive condition.

It is of interest to note that individual findings indicate that high performance in lexical relevance does not necessarily imply that these participants would be rated highly in topic maintenance. This may be explained by the fact that the topic maintenance rating which is based on listener perception, and hence weighed more importantly in Grice's (1975) model, is a subjective measure. Lexical relevance, on the other hand, may be considered more objective. However, judging lexical relevance was likely to be biased by knowledge of the actual contents of the clips, whereas raters were blind to testing stimuli and were only exposed to written transcripts.

## SLPs as Raters

It is worth noting that SLPs functioning as judges for these measures were not blind to the criteria of participants who were being recruited for the study. Although they were not specifically aware and familiar with individual participants, they were generally aware of the types of participants who were being recruited for the current investigation (e.g., with aphasia, mild-to-moderate production deficit, intact or mildly- impaired auditory comprehension deficit, etc.). However; these raters were blind to the hypothesis of the study and the emotional conditions under investigation. In addition, there was no identifying information on the written transcripts such as patient name, group membership, communicative profile, age, gender, or education level, which may have biased rater judgment.

It was not possible to recruit SLPs to rate these samples who were blind to participant inclusion criteria, due to the limited number of qualified Arabicspeaking SLPs. These same SLPs assisted in referring participants for the study. This may be a source of bias; however it was unavoidable for the current study. It would be important to control for this bias in future studies. In addition, these raters were professionals in communication disorders, which further increased the bias. It would be valuable in future to have laypersons judge these samples, which may provide an indication of the communicative effectiveness of a person with aphasia beyond the clinical setting.

It may also be of value to have judges listen and rate original recordings without modifications to assess how intelligibility issues may affect perception. Utilizing written transcripts removes effects of speech intelligibility issues that may accompany aphasia such as reduced or affected voice quality or articulatory precision associated with dysarthria or apraxia. Moreover, written transcripts do not include lengthy pauses that may be present in the speech of a person with aphasia and hence affects how their communicative effectiveness is perceived. Although orthographic representations of these pauses may be provided (e.g., 2 sec. pause, 30 sec. pause), the effect they have on the recipient as a reader is likely to be different than the actual effect they have on the recipient as a listener.

This study has attempted to answer whether or not emotional content acts as a facilitating agent for specific pragmatic features of discourse. Although our findings support a presence of such a facilitative effect, due to the extremely small sample size, the heterogeneity of the group, and limitations in stimuli construction and validation, this study has been an exploratory one guiding the way to the importance of expanding this line of research in the future.

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## **EMOTIONALITY QUESTIONNAIRE – ARABIC ORIGINAL**

Clip number:		Participant Initials:					
	شاعر	استبانة تحديد نوعية المشاعر					
لامة (صح) في المربع	صورة ؟ ضع ء	دة هذه اللقطة الم	عليك مشاه	اطفي الذي تركته	- ما الانطباع الع		
	ä	ulu clina –		ار ماردة	مىسىب . مىشاھ		
(0) انعدام الأنطباع	، بحیث یمتل الے ل اختیارك .	ع بين (0) و(4) ؟ ضع دائرة حو	اس يتر او ع ، قوي جداً	طباع العاطفي بمقي (4) انطباع عاطفي	ر- ما شدة هدا الاند عاطفي وتمثل الـ ا		
4	3	2	1	0			
بابة بنعم ، اختر المشاعر	ة ؟ إذا كانت الإج ، الأقل؟	باللقطة المصور ها من الأكثر إلى	ة مرتبطة جة ارتباط	توجد مشاعر محد ثم رتبها حسب در	- في رأيك ، هل ن القائمة التالية ،		
جئة	🗌 🗌 مفا.	🗖 محايدة		🗖 حزن	]] غضب		
و اضبح	ا ا غیر	🗖 قر ف		🗌 🗌 خو ف	ا 🗆 سعادة		
	بنعم ، أذكر ها	ذا كانت الإجابة ا	ة أعلاه ؟ إ	اعر غير المذكور	- هل لاحظت مش		
<u></u>		· · · · · · · · · · · · · · · · · · ·					
، بحیث یمثل الـ (0) مع دائرة حول اختیارك .	ح بين (0) و(4) ل المنطقي ؟ ضر	سة بمقياس يتر او بة جداً من التسلس	ة المعروض درجة قوي	سل المنطقي للقص طقي وتمثل الـ (4)	- ما مستوى التسا عدام التسلسل المن		
4	3	2	1	0			
					1-2111		
ثل الـ (0) انعدام جذب مح .	و(4) ، بحيث يما ائرة حول اختيارا	بتر اوح بين (0) الانتباه ؟ ضع دا	ک بمقیاس ب ا من جذب	بة المصورة انتباها 4) درجة قوية جداً	- هن جدبت اللعظ (نتباه وتمثل الـ (		
ثل الـ (0) انعدام جذب کی . 4	و(4) ، بحيث يمذ ائرة حول اختيارا 3	بتراوح بين (0) الانتباه ؟ ضع دا 2	ک بمقیاس ب من جذب 1	لة المصورة انتباها 4) درجة قوية جدا 0	- هن جدبت النقط (نتباه وتمثل الـ (		
ئل الـ (0) انعدام جذب ک . ختیارك .	و(4) ، بحيث يمأ ائرة حول اختيارا عنبع دائرة حول ا.	بتر اوح بين (0) الانتباه ؟ ضع دا 2 لقطة من قبل ؟ م	ك بمقياس ب ا من جذب 1 ن مقاطع الا	مة المصورة انتباها 4) درجة قوية جدا 0 مقطع مر	- من جدبت النقط (نتباه وتمثل الـ ( - هل تذكر أنك ش		
ئل ال (0) انعدام جذب ک . ختیار ک .	و (4) ، بحيث يمن ائرة حول اختيارا عنع دائرة حول ا. لا	بتر اوح بين (0) الانتباه ؟ ضع دا 2 لقطة من قبل ؟ د	ك بمقياس ب ا من جذب 1 ن مقاطع ال	لة المصورة التباهل 4) درجة قوية جدا 0 اهدت أي مقطع مر نعم	- من جدبت النقط (نتباه وتمثل الـ ( - هل تذكر أنك ش		

# Appendix C

## **EMOTIONALITY QUESTIONNAIRE – ENGLISH TRANSLATION**

Clip n	number:			Participar	t Initials:					
1.	After viewing t on you? Check Positive	he video, wh the box nex	nat general en t to your choi ] Negative	notional imp ce.	oression did i	t make				
2.	How intense was this emotional impression on a scale of 0 to 4, where '0' represents 'not at all' and '4' represents 'very strong'? Circle your choice.									
	0	1	2	3	4					
3.	For you, were t specify from lis anger neutral	here any spe st below. If r Sadi D fear	cific emotion nore than one ness	s associated , please rand happines disgust	l with the film k order. s	n? If so, surprise not clear				
4.	Did you observ them	e any emotio	ons not in the	list above?	If 'yes' plea:	se write				
5.	How would you video on a scale represents 'very	u rate the log e of 0 to 4, w y logical'? C	tical sequence where '0' repre- ircle your cho	e of the stor esents 'no lo bice.	y presented i ogical order'	n the and '4'				
	0	1	2	3	4					
6.	How interesting represents 'not Circle your cho	g did you fin interesting a ice.	d the video or t all' and '4'	n a scale of represents '	0 to 4, where very interest	e '0' ing'?				
	0	1	2	3	4					
7.	Are there any s before?	egments or a	spects of this	video that	you rememb	er seeing				
	No				Yes					