

According to Pennebaker, Mehl, and Niederhoffer (2003), the words people use reflect their cognitive, social, emotional state and understanding of self. Most methods for studying language and word use assume that contextualized data are needed. Frequently, qualitative judgments of written/spoken text samples are used to assess personal state. When quantitative data in the form of word use are used, three main approaches are taken: a) judge-based thematic content analyses; b) word pattern analyses that explore word use from the bottom up; and c) word count strategies. Of the six more commonly used word count strategies, the Linguistic Inquiry and Word Count (LIWC) system (Pennebaker, Francis, & Booth, 2001) operates at a basic linguistic level that has been shown to be reliable in measuring emotional change over time, response to personal and societal crisis, and emotional state. The system requires transcription of written or spoken language using basic formatting procedures. The software then sorts words into 70 predetermined categories based on 2300 dictionary words. Additional words/categories can be added to create custom dictionaries.

From both a clinical and research perspective, in exploring caregiver stress and response to living with aphasia, it would be helpful to have a simple method that requires only transcription of language that could then be analyzed using a metric of word use reflecting cognitive and emotional state. Language samples could be obtained from conversation, interviews, written or spoken narrative on a designated topic, journals, or any other vehicle that provides text for comparison over time. The LIWC system may provide such a mechanism.

This poster presents LIWC analyses from five e-mail samples from the daughter of a stroke survivor. E-mails were written before and after attending stroke support group meetings. The purpose of this study was to determine whether LIWC analyses provide information that parallels or illuminates qualitative judgments of expressed thematic content and concern.

Methods

Subject: The e-mail writer was the daughter of a 69 y.o. man who experienced a left temporal CVA approximately seven months before the author's first contact. Resulting aphasia was initially classified as global. Although no follow-up testing was done, at seven months, the father presented with a classic Wernicke's aphasia including marked auditory comprehension deficits and fluent but empty output characterized by frequent paraphasias and word-finding deficits.

The daughter and her husband were very close to her parents. In multiple discussions with the family, it was clear that the father was the dominant figure in the family. From a family systems perspective, the family's homeostasis had been severely disrupted by the father's stroke and had not yet returned to any kind of satisfactory equilibrium (Norlin, 1981).

Clinical Encounter: The daughter originally made contact with the author by e-mail, requesting information about support groups and expressing distress about her family's situation, particularly their inability to find help locally. The family drove to the author's location where they were seen together for approximately one hour, then attended a stroke support group meeting. They returned for three additional meetings over the course of five months.

E-mail Data: Five spontaneous e-mails from the daughter provide the transcript data for this study. (Additional e-mails not included in this analysis were solely requests for meeting information.) The daughter wrote approximately two days post-attendance at the first support group meeting, then three months later after a health crisis, followed by e-mails at six and eight months post first contact.

Data Analysis:

1. E-mails were first analyzed independently for thematic emotional content by the author and a graduate student. The two sets of notes were compared; only notes where there was agreement were retained.
2. E-mails were analyzed using the LIWC software.
3. LIWC analyses were compared with thematic content notes to determine which, if any, LIWC categories provided information that paralleled thematic content notes and/or helped in interpreting family status.

Results and Discussion

LIWC data for selected categories of word counts are provided in Table 1. Categories with no data or judged not useful (e.g., punctuation counts) were eliminated. Some categories were included to verify that the LIWC accurately captured unique content domains. Table 2 provides the thematic content notes reflecting agreement between the author and a graduate student judge. Figures 1-5 display changes in key dimensions over time. Results from these domains are presented below, with implications for use of the LIWC to be discussed in the poster session.

Content verification. To determine whether LIWC software detected specific content, the categories of *achievement*, *physical*, *music* and *leisure* were examined (Figure 1). The daughter's e-mails highlighted *achievement* (lack of and new hobby) in the 1st, 4th, and 5th e-mails. These are paralleled clearly in Figure 1. A health crisis was the topic of e-mail 3, and this was supported by a spike in the *physical* dimension. The 4th and 5th e-mails specifically discussed the father's return to piano playing; both *music* and *leisure* spiked in the 4th e-mail.

Cognitive Mechanisms. The research literature suggests increased cognitive mechanism words are associated with emotional health. However, thematic content analysis of the e-mails suggested a focus on not knowing how to help in the first e-mail, followed by relief and less concern in the 2nd e-mail (although reflection on the experience), a shift to analysis/reflection about health problems in the 3rd e-mail and limited cognitive content in the final two. Of all the LIWC *cognitive mechanism* measures, the overall word count for this domain seemed to parallel e-mail content most closely (Figure 2).

Affect and Emotion. Content analysis of the e-mails suggested considerable negative emotion of all kinds in the first e-mail, followed by negative emotion related to health concerns in the third e-mail. There appeared to be little negative content in the final two e-mails. Content notes indicated a spike in positive emotion in the second e-mail, immediately after stroke group participation. These patterns are supported by LIWC data, particularly overall counts of *positive* and *negative emotion*, but also key markers of *anxiety*, *anger*, and *sadness* (Figure 3).

Past, present, future orientation. Content analysis of e-mails did not yield many impressions of time orientation. There was relatively consistent discussion of the *present*, with greatest focus in the first and third e-mails, reflecting concerns about current status. Content notes suggested a kind of *future* orientation in perceptions that health problems were resolving in the third e-mail, plus references to moving forward with life implied in the fourth and fifth e-mails. LIWC data support these impressions for *future* orientation (Figure 4). Discussion of the *past* was limited, although the fourth e-mail highlighted the father picking up a hobby from the past (highlighted in LIWC *past* references).

Pronouns. Previous LIWC research highlights the importance of pronoun use in understanding personal dimensions. Thematic content analysis of e-mails did not display any patterns related to pronoun use. However, LIWC actually revealed that, while overall level of pronoun use fluctuated, there was a decline in references to *we* and to *self* and a consistent increase in *other* pronoun use (Figure 5). With these patterns in mind, e-mail content was reexamined. It was clear that one change was the daughter's shift in references to the family's shared distress, as well as her personal distress, to references to her parents' life apart from herself and her husband.

Table 2. Thematic Content Notes

E-mail	Content Notes
1	<ul style="list-style-type: none"> • Personal and family helplessness • Negative emotions – fear, anger, overwhelmed, depressed • Don't know how to help • Impact on whole family • Lack of success
2	<ul style="list-style-type: none"> • Relief • Happiness • Less frustration • Hope • Family appreciation for others
3	<ul style="list-style-type: none"> • Health crisis that seems to be resolving • Details about physical problems • Trying to understand cause of health problems • Positive about resolution • Exchange with author on personal level unrelated to father's stroke
4	<ul style="list-style-type: none"> • Upbeat • More sense of future • Moving forward with leisure time activities/hobby from past--piano • Positive emotions – excited, thrilled, happy
5	<ul style="list-style-type: none"> • Positive emotions, including reported use of humor • Moving forward with life • Leisure time-piano • Renewed/increased motivation and determination • Improved physical state • Personal note of inquiry • Family

Figure 1. Content topics across five e-mails.

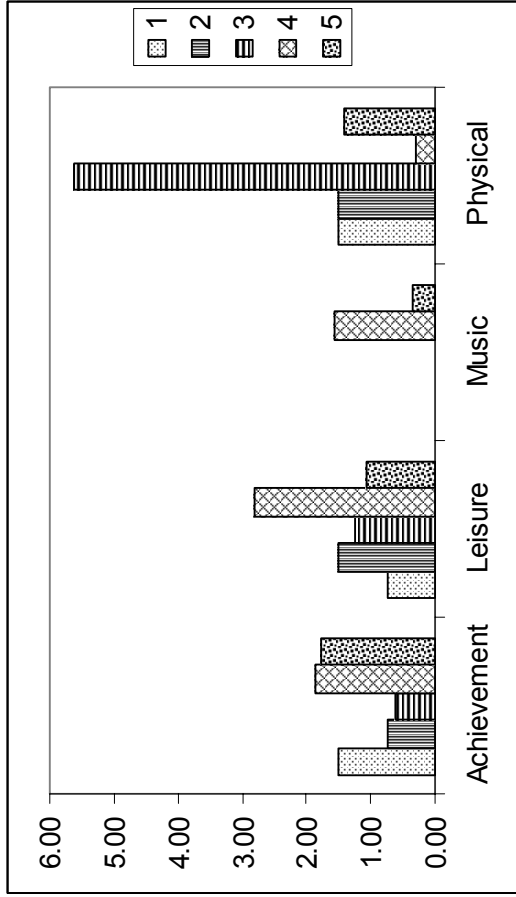


Figure 3. Emotional content word use across five e-mails.

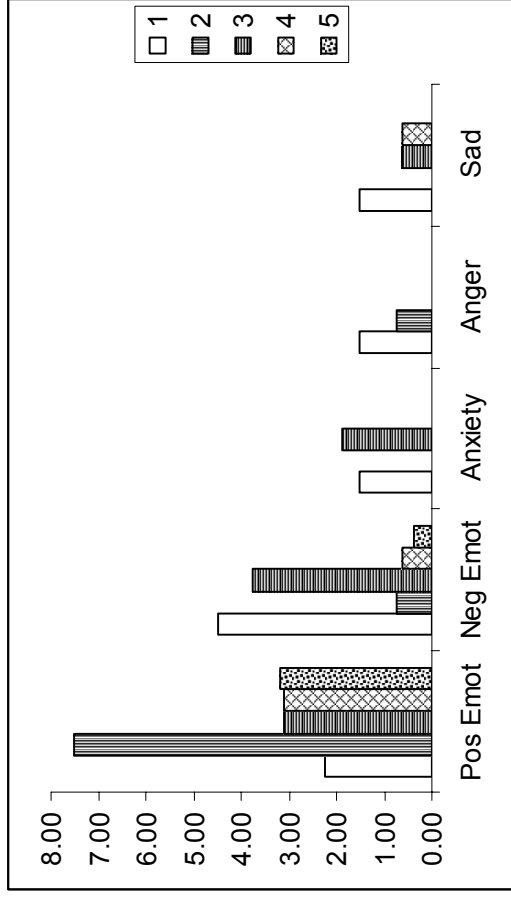


Figure 2. Cognitive mechanism word use across five e-mails.

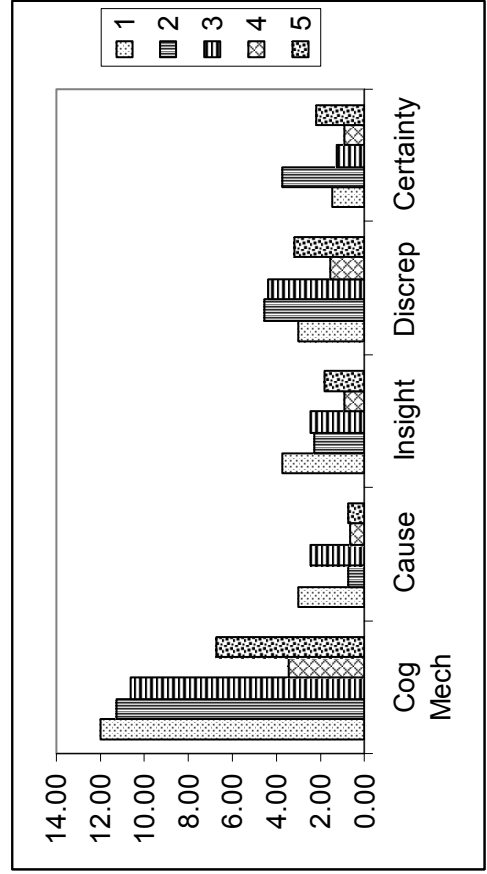


Figure 4. Time oriented word use across five e-mails.

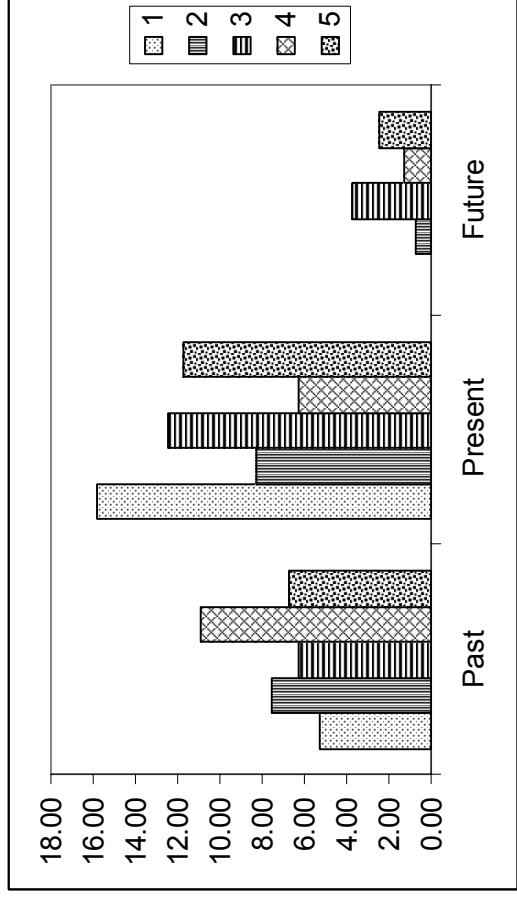


Figure 5. Pronoun word use across five e-mails.

