

## Discourse Before and After the Onset of Aphasia

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In neurolinguistic research, matching on the basis of age or education is sometimes undertaken in an attempt to control for differences in premorbid language, which are often presumed to play some part in an aphasic speaker's language or at least in his reaction to the language disorder. Whether or not this is indeed the case could only be verified in prospective studies in which individual subjects serve as their own controls. However, there are no studies comparing the language of a group of aphasic persons, or even of a single aphasic individual, with their premorbid language. The opportunity for such a case study presented itself when a family friend of an aphasic patient came upon a tape of a marketing interview which she had held with the patient some ten years prior to the onset of the aphasia. The tape was offered to this investigator as an example of "how J. used to talk," and all concerned agreed to repeat the interview.

A second question, which to date has been answered only inferentially, is how normal speakers adjust their language to accommodate to the language changes in aphasia. Here again the tapes present a unique opportunity to observe how the same interviewer adjusts her language in asking the same general questions to the same individual before and after the onset of aphasia in the interviewee. In such a study, any changes in the language or discourse methods of the interviewer can be presumed to reflect a response to the aphasia and not to the personalities of different interviewees.

The following three questions were asked. 1. What is the nature of the changes in an individual's language when he becomes aphasic? 2. What is the nature of the changes in a normal speaker's language when a familiar conversational partner becomes aphasic? 3. How does the interactive discourse of two speakers change after one of them becomes aphasic?

### METHOD

JR is a left-handed electrician with two years of college education. In January 1983, at the age of 56, he suffered a seizure while at work, preceded by an episode of "talking funny". CT scan revealed a right temporal lesion with surrounding edema. One month later JR underwent a right temporal lobectomy, with removal of approximately 5 cm. of the tip of the right temporal lobe. Postoperative diagnosis was glioblastoma multiforme, giant cell variety. He went through a follow-up course of radiation therapy. He was reported to be severely aphasic, and received some language therapy while in the hospital, but none immediately following discharge. Approximately six months later, he was evaluated by this investigator. His language at that time was fluent, with verbal and literal paraphasias and neologisms, poor comprehension and repetition, and severely impaired naming. His severity rating on the Boston Diagnostic Aphasia Examination (BDAE; Goodglass and Kaplan, 1972) was 2, and his rating scale profile was that of Wernicke's aphasia. He was placed in therapy. Approximately one year later the patient's wife reported that a friend had found a taped conversation with JR which had been made some ten to twelve years prior to the onset of his aphasia when the friend, a marketing researcher, had been preparing a

survey on aftershave lotions and had asked JR to serve as "guinea pig" as she practiced her interview. The tape had reappeared as the friend was looking through her tape file for a blank tape.

Both JR and his friend ("Q" for Questioner) agreed to repeat the interview. The original interview was transcribed and the gist of Q's questions were extracted, so that the repeat interview would have the same topic and same general framework. Both interviews were conducted at Q's home with JR's wife present. By the time of the second interview JR/s BDAE severity rating had risen to 3, his rating scale profile remained that of Wernicke's aphasia, although less severe than previously, and his subtest scores ranged between the 50th and 70th percentiles for aphasic subjects (Table 1).

Table 1. JR's Boston Diagnostic Aphasia Examination scores at about the time of the second interview (6/19/85).

	PERCENTILE	0	10	20	30	40	50	60	70	80	90	100
SEVERITY RATING										3		
FLUENCY												
Articulation rating [7]										7		
Phrase length [7]										7		
Melodic line [7]								7				
AUDITORY COMPREHENSION												
Word discrimination [72]							56					
Body part identification [20]						12						
Commands [15]						9						
Complex material [12]								6				
NAMING												
Responsive naming [30]										19		
Confrontation naming [114]								79				
Animal naming										7		
ORAL READING												
Word reading [30]										18		
Sentence reading [10]										3		
REPETITION												
Word repetition [10]										9		
High-probability [8]								4				
Low-probability [8]							1					

Both tapes were then independently transcribed by two graduate students, following guidelines similar to those for the Lingquest I program. Discrepancies between the two sets of transcripts were rectified by the investigator, and a final transcript for each interview was typed. Each transcript

was then divided into two sets of utterances, one for the aphasic subject (JR) and one for the interviewer (Q), and these were then independently coded for Lingquest I analysis by two graduate students, again with discrepancies settled by the investigator. The material was then put on data disks, and the following linguistic analyses were performed on each of the four sets of utterances (pre- and post-onset for each speaker): lexical analysis (list of all words used, type-token ratios); form analysis (eight grammatical form categories); mean length of utterance; structural analysis (32 different phrase and sentence types); and verb tense analysis (12 verb tenses). In addition, a discourse analysis (Halliday and Hasan, 1976) was carried out on a portion of the interviews.

## RESULTS

Output. In attempting to accomplish the same communicative work, Q very nearly doubled her verbal output, from 1210 words in the first interview to 2060 in the second. In contrast, there was an inconsequential decrease in JR's output, from 1834 words to 1820 (Figure 1). Q's mean length of utterances was virtually unchanged, with an increase in number of utterances that coincided with her increase in number of words. Although JR had uttered about the same number of words in the second interview as in the first, he did so in more utterances, so that his mean length of utterance dropped by a full point. See Figures 2 and 3. In contrast to these measures of the amount of output, the type-token ratios reveal a change in the quality of the output, at least in terms of vocabulary. For both speakers there was a reduction in the type-token ratios, as the number of different words used dropped relative to the total number of words (Figure 4). The influence of Thorndike-Lorge (1944) word frequency ratings on this qualitative change in vocabulary was examined. As illustrated in Figure 5, Q increased her total output across all frequencies, whereas there was a small increase in JR's use of the highest frequency (AA) words and a nearly 50% decrease in the low frequency words. When looking at the number of different words used, however, one sees that with decreasing frequency of occurrence there was increasing loss from JR's vocabulary and increasing addition to Q's vocabulary (Figure 6).

There was virtually no change in the syntax of either speaker. In spite of his lowered MLU, JR used exactly the same sentence types and verb tenses after the onset of his aphasia as he had used prior to it.

Looking at the relative proportions of the five major word classes (nouns, pronouns, verbs, adjectives, adverbs), it is again apparent that Q did not change her language structure (Figure 7). These charts represent numbers of words in each category, not numbers of different words, and are thus probably more indicative of sentence structure than of actual quality of vocabulary. Figure 8 shows a major change in JR's language--an increase in pronoun usage and a concomitant decrease in noun usage. In the pre-onset interview, he used about 1.8 pronouns for every noun, a ratio very close to that of Q's 1.6 in both interviews, but this ratio rose to 2.9 pronouns per noun in the post-onset interview, a change that probably influenced the coherence of the second interview. A word class not included in Figure 8 was conjunctions. Overall, there was an increase in the number of conjunctions in JR's vocabulary in the second interview, but Figure 9 illustrates an important qualitative difference. Both inter- and intrasentential conjunctions were divided into the five categories used by Halliday and Hasan

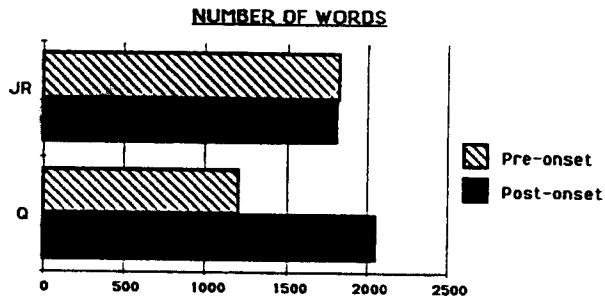


Figure 1. Total words spoken by both speakers in both interviews.

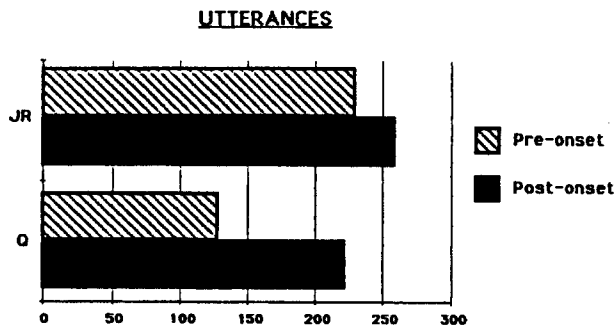


Figure 2. Number of utterances by both speakers in both interviews.

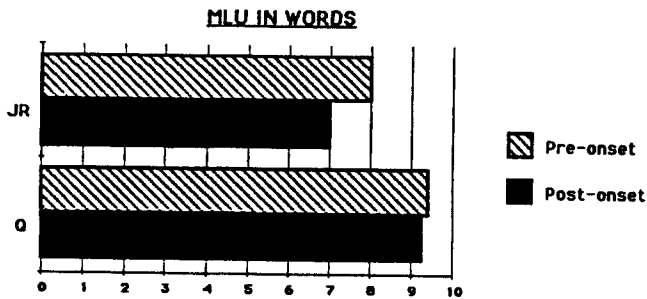


Figure 3. Mean length of utterance for both speakers in both interviews.

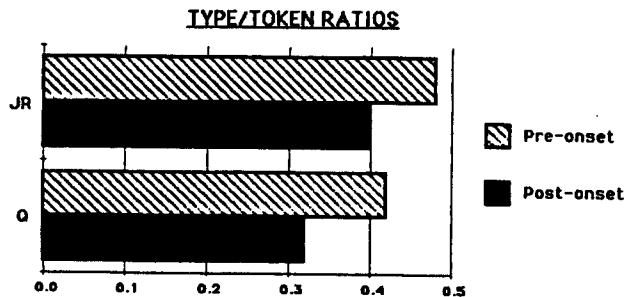


Figure 4. Type-token ratios for both speakers decrease in the post-onset interview, as they repeat the same words more frequently.

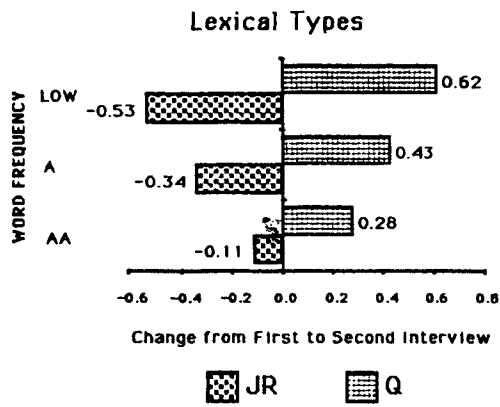


Figure 5. Change from the first to the second interview in number of different words (types) in three broad categories of frequency of occurrence. "Low" includes all words whose frequency was lower than "A" in the Thorndike-Lorge count.

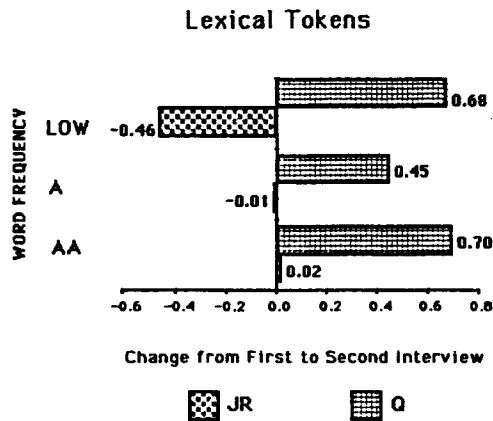


Figure 6. Change from the first to the second interview in the total number of words used (tokens) in the three broad categories of frequency of occurrence.

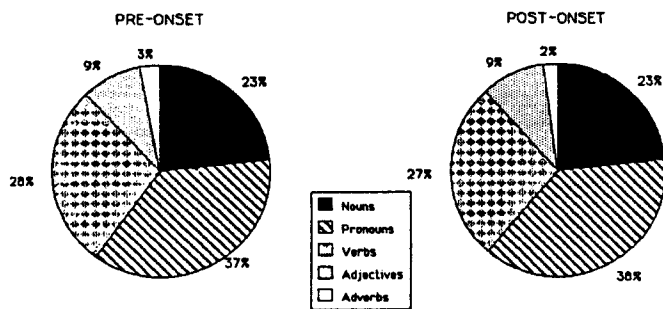


Figure 7. Q's vocabulary by major word class in the two interviews.

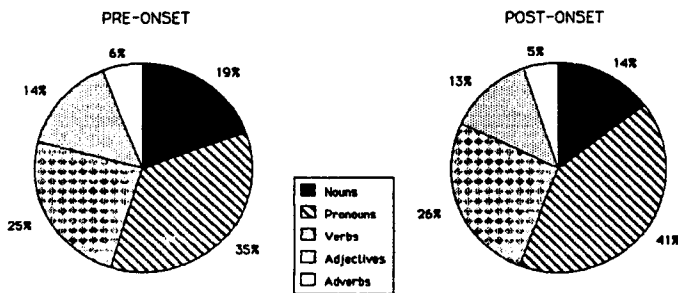


Figure 8. JR's vocabulary by word class in the two interviews.

(1976) in their discourse analysis. Additives (e.g., "and", "besides") and adversatives (e.g., "but," "however") form the bulk of most conversational conjunctions, and there was little change in JR's use of them. Temporals (e.g., "before," "afterwards") and causals (e.g., "if," "so," "therefore," "thus") are cognitively more complex terms and would be included among what Luria refers to as "logicogrammatical" relations. There was a five-fold decrease in this type of conjunction in JR's output in the second interview. Finally, continuatives are relatively meaningless place holders such as "well" or "anyway," and there was a ten-fold increase in these words.

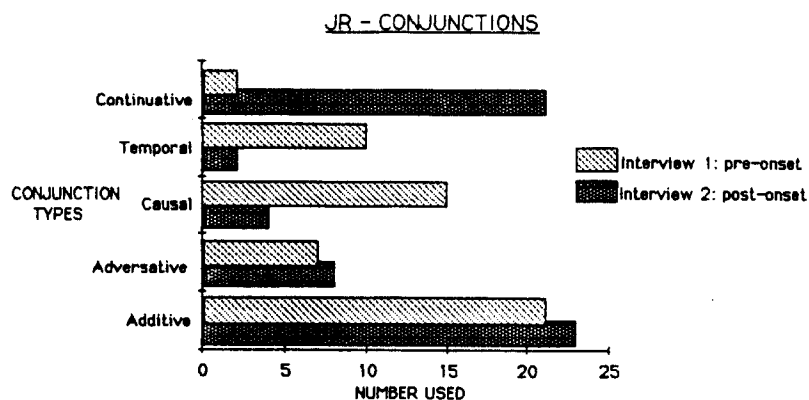


Figure 9. JR's use of inter- and intra-sentential conjunctions, classified according to Halliday and Hasan.

Discourse. According to Halliday and Hasan (1976) textual cohesion occurs when an element in one sentence is related to an element in another sentence in the text. For instance, the occurrence of a pronoun in one sentence ties that sentence to another in which the antecedent noun is used. There are five categories of cohesive ties in the Halliday and Hasan paradigm. Reference includes the use of pronouns, the definite article, demonstratives, and other words that refer the listener or reader to an antecedent in an earlier sentence. Substitution occurs when general purpose words link back in the text to specific nouns or verbs or clauses. An example of nominal substitution would be "I'll have the same" following a statement such as "I'll have a martini." Verbal substitution might be "Please do" in response to a question such as "May I sit down?" Finally, clausal substitution might be "I hope not" in which the word not substitutes for the entire clause "It's going to snow." Ellipsis is essentially the substitution of nothing for something, as in "I'll have another (...)." Conjunction includes the five categories mentioned above, except that in cohesion analysis only those conjunctions that serve to connect two utterances are considered. Finally, lexical cohesion refers to the use of the same or related words in a text.

Any of these ties may occur between consecutive sentences -- what is called an "immediate" tie -- but they may also relate sentences that are "remote" from one another. In fact, Halliday and Hasan believe that the farther back into the text a tie can be traced, the more cohesive it is. A cohesion analysis for any given sentence looks at the number of cohesive ties, the types of cohesion, whether each tie is immediate or remote, and assigns numerical values to non-immediate ties reflecting the number of intervening sentences.

In order to make the analysis a little more manageable, I divided the interviews into smaller subsets of "mini-conversations," two each from the

beginning, middle and end of the full tape. In all, these six subsets accounted for about one-third of the total output. Looking simply at total numbers of cohesive ties (combining the data from both speakers), the post-onset discourse was more cohesive than pre-onset (194 cohesive ties in the first interview, 251 in the second). When the data are broken down by speaker, as shown in Figure 10, it is apparent that there was a large increase in all cohesive ties in Q's output in the second interview, although the bulk of her increase was in lexical cohesion. This apparently occurred as she attempted over and over to rephrase her questions and statements in compensation for JR's comprehension difficulties. JR's contributions were also slightly more cohesive in the second interview than in the first. The greatest increase was in referential cohesion, which was partially offset by a drop in lexical cohesion. These changes are no doubt related to JR's difficulty with lexical access in the second interview, as demonstrated by the loss of nouns (primarily low frequency) and the compensatory increase in pronouns, shown in Figures 5, 6 and 8. One also sees that there was a considerable drop in ellipsis, a rather sophisticated linguistic manipulation. Further, there was a slight quantitative increase in conjunctive cohesion, but qualitatively there was a degradation similar to that shown for all conjunctions (cohesive and otherwise) in Figure 9.

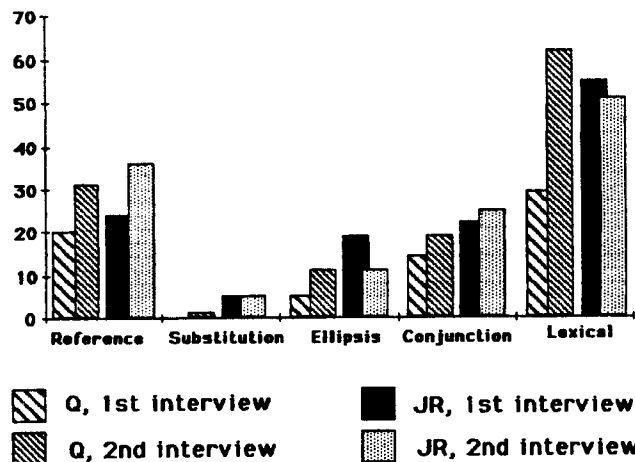


Figure 10. Cohesive ties (Halliday and Hasan) in six selected "mini-discourses."

A good example of the effect of JR's shift in vocabulary from nouns to pronouns can be seen with regard to the word "aftershave," the general topic of the entire interview. JR did not use the word at all in his 1820 words in the second interview (Figure 11). The effect of the loss of this single word on the efficiency of the discourse can be seen in Figure 12, a sample analysis of one segment of discourse surrounding the question "Tell me about the first time you used aftershave." In the first interview, JR acknowledged the topic in his first turn, and thereafter the speakers were able to continue with pronominal reference until JR brought the conversation to a close with one final mention of the topic. The second interview was twice as long and half as efficient as the first, as Q seemed obliged repeatedly to reintroduce the topic. Nevertheless, an "it" counts as highly as an "aftershave" in the cohesion analysis. In fact, the second interview was 50% more "cohesive" than the first. There were 75 cohesive ties in the second and 51 in the first. Cohesive or not, however, the second interview was certainly not very coherent. Aside from the difficulties with lexical access and the increase in pronominal reference, it was not clear

FREQUENCY OF USE OF THE WORD "AFTERSHAVE"

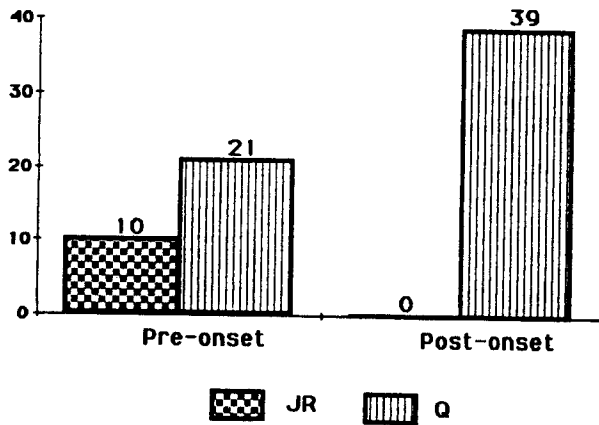


Figure 11. "Aftershave" is the topic of the interviews. The word disappears from JR's vocabulary in the second interview and nearly doubles in Q's.

REFERENCE TO "AFTERSHAVE"

"Tell me about the first time you used aftershave"

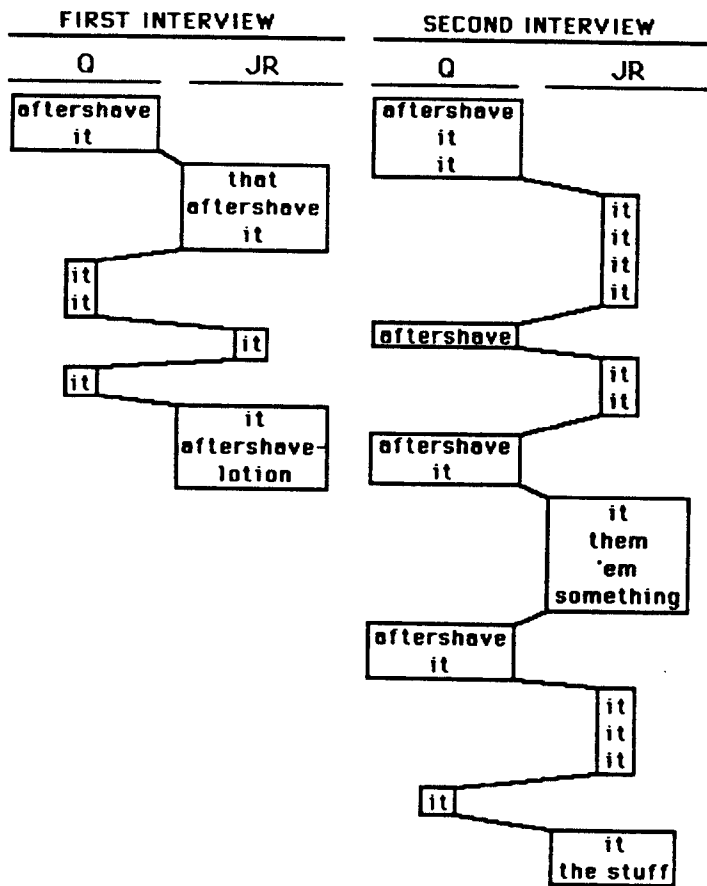


Figure 12. Reference to aftershave in the first "mini-discourse" concerning JR's recollections of the first time he had ever used aftershave. Words enclosed in a box represent a single turn in the conversation.



that JR understood what Q was talking about. He indicated that he used "the stuff" when he didn't have time for a bath or when he "smelled dirty," and both Q and JR's wife reported that he gestured that he used it under the arms. Q then began the next "mini-discourse" by explaining that "After-shave is for your face. After you shave, you put it on your face."

To say that the post-aphasia interviews were more cohesive does not say anything about the quality of those discourses. Even though there were consistent ties back to some presupposed element (correctly or incorrectly comprehended), it was quite obvious that the second discourse was incoherent, as illustrated in the following dialogue:

Q: How do you think you appeal to women?

JR: Well if we meet the right people at that age well we'll go with them. I don't mind and uh.

Q: No no, what do you think women think about you?

JR: I think so.

Q: They find you compatible?

JR: Yeh, I think they're very nice.

Q: What do you think appeals to women about you? What about you appeals to women?

JR: Do women appeal to me?

Q: No, what do you think you -- how do you think you appeal to women?

JR: Appeal to women? My heaven sakes. Well I'm glad I can be alive.

An ad hoc method of assessing communicative efficiency was developed. Two behaviors were counted: first, the number of reformulations and rephrasings of Q's questions; and second, the nature of JR's responses.

In four selected "mini-discourses" there was a total of 12 questions to be presented. In the pre-onset interview Q formulated these questions a total of 23 times, while in the post-onset interview she made 32 attempts at phrasing only 10 of the questions. Thus, Q rephrased each question an average of once in the first interview and twice in the second. One of the questions which she chose not to ask in the second interview was a "why" question in follow-up to a previous question. Since JR had not given an adequate response to the original question, the follow-up would have been inappropriate. The other question which Q avoided in the second interview was a request for JR to list five characteristics that would describe him, a task that she apparently felt he would not be able to handle.

Figure 13 illustrates the nature of JR's responses to these questions. It was no surprise that 33 (52%) of JR's responses in the second interview were vague or off-target, compared to only 5 (9%) in the first. A typical vague response was "I use all types" in answer to a question regarding the specific type of fragrance that he preferred, while an example of an off-target response was "I'm glad I can be alive" in response to the question "How do you think you appeal to women?" On the other hand, 18 (33%) of JR's responses in the first interview were spontaneous, appropriate, and on target, in contrast to only 9 (14%) in the second.

The balance of JR's utterances consisted of three types of conversational conventions. First, approximately 20% of his responses in both interviews consisted of repeating all or part of the preceding questions as a means of acknowledging them. Second, a small portion of both interviews (7% of the first, 5% of the second) consisted of echoed responses in those instances in which Q provided responses for him. Thus, JR continued to use these ritualistic conventions in an appropriate fashion following the onset of his aphasia, but there was an intriguing difference between the interviews in the

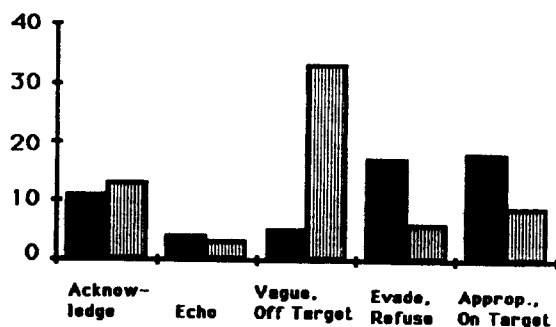


Figure 13. Ad hoc qualitative analysis of JR's responses in four selected subsets of questions.

#### JR's Responses in Four Mini-Discourses

- Pre-Onset: 55 utterances
- ▨ Post-Onset: 64 utterances

third -- a drop from 17 (31%) to 6 (9%) in his evasions or outright refusals to answer specific questions. Evasions included responses such as "I'm no good at names" to the request to think of a good name for an ideal aftershave. "I won't tell you" or "I really don't know" were refusals. The discrepancy between interviews in this type of conversational ploy was particularly telling in the conversation in which JR was asked to supply a name for an ideal aftershave lotion. Even before his aphasia he was uncomfortable in performing this sort of exercise, and evaded and refused several times until Q accepted his unwillingness to respond. In the second interview, however, Q refused to give up and repeated her request a total of seven times while JR continued to give vague or inappropriate responses, interspersed with occasional evasions. In this instance Q was more demanding of JR after he became aphasic than she had been before. An explanation may be that 20% of his pre-onset utterances were refusals, compared to only 2% (one response) in the post-onset interview. Perhaps we should remind ourselves that even normal speakers do not always like to answer every question put to them, and remind our fluent aphasic patients that "it's okay to say no."

#### SUMMARY

This study has reported two conversations on the same topic involving the same two speakers, one approximately 10 to 12 years prior to the onset of Wernicke's aphasia in one of the speakers, and the other about two years after the aphasia onset. Quantitatively, the aphasic speaker's output in terms of numbers of words and of utterances changed very little, while the normal speaker nearly doubled her output in the second interview as she attempted to compensate for the comprehension difficulties of the conversational partner. The aphasic speaker demonstrated diminished lexical access, with a decrease in nouns and concomitant increase in pronouns in his vocabulary. Most of the vocabulary loss was found among low frequency words. The change in the relative proportions of nouns and pronouns influenced the subjective coherence but not the cohesiveness of the discourse, which actually increased in the second interview. Although there was a slight increase in the number of conjunctions used overall, a qualitative

analysis showed that there was a large decrease in complex "logicogrammatical" conjunctions (temporal and causal) and a concomitant increase in empty continuatives. A subjective, ad hoc assessment of the aphasic speaker's responses in a set of "mini-discourses" revealed virtually no change in the social aspects of conversation, a decrease in the proportion of appropriate or on-target responses, and a decrease in the number of evasions and refusals to answer questions. This latter seems to reveal a loss of control over the flow of the conversation, and may explain the increased number of reiterations on the part of the interviewer.

Finally, as evidence that some fifteen years and a case of aphasia do not alter the man, the following are JR's responses to a question regarding other people's opinions of him.

Pre-aphasia interview: "Oh well I'd say some people think very highly of me and I'd say I'm rated pretty low by a lot of other people. I mean I fall in between that group, I think."

Post-aphasia interview: "Well I think there's a lot of people think me all right. There's some that don't like me, but there are some that like me. It's a good average."

#### ACKNOWLEDGMENT

This study was supported by a grant from the Beaumont Faculty Development Fund, Saint Louis University. Thanks to graduate students Carla Turner, Theresa Louiselle, and Sallie Kramer for much of the dirty work.

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#### DISCUSSION

- Q: With regard to the ties, you seemed to include all the pronouns in the chains whether they were successful or not. You weren't sure whether the "it" referred to "aftershave" but you still included it in your chain.
- A: The "its" were clearly referring to the word that he had heard, whether or not he had comprehended it correctly.
- Q: Hasan found in her 1980 work on lexical chaining that you could often put together a text that just had repetitions and things that were relating to each other that were still incoherent. One other thing-- this was a dialogue as opposed to a lot of other studies which have been monologues, and it's quite interesting how much the speakers contribute to the coherence together.
- A: That's right. It was certainly the case that when the aphasic individual lost the ability to maintain cohesion, the other speaker seemed to step in to provide it. This was an untrained individual who was a wonderful communicator. She repeated, she rephrased, she explained.

- Q: It didn't surprise me that the number of cohesive ties was greater post-onset than before, because there have been studies of cohesive ties in LD kids, finding that cohesive ties increase until the children are 12 or 13 years old and then decrease. Communicative effectiveness is mediated by more than just cohesive ties. The number of words used or the efficiency of use is not measured by cohesive ties, so you might look at that and see what happened with the effectiveness of the words rather than just their occurrence.
- A: Thank you.