Cohesive Harmony in Aphasic Discourse and its Significance to Listener Perception of Coherence

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The ultimate test of a speaker's coherence is in listeners' reactions to that speaker. Any measure of aphasic speech which is going to relate to reality therefore must have some relationship to how a listener would react to that speech. Hence, when proposing a new analysis as a viable clinical tool, proponents of that analysis have a responsibility to make some effort to demonstrate that such a relationship does exist. This is of particular pertinence to conversation and discourse analyses which are being introduced more and more into the clinical setting.

Various analyses have been used thus far, ranging from the early word-tally approaches, measuring frequency of certain parts of speech in discourse (Howes, 1964; Howes and Geschwind, 1964) to syntactic analyses (Goodglass et al., 1972; Crystal, 1976), content analyses (Yorkston and Beukelman, 1980; Berko-Gleason et al., 1980) and those focusing on specific discourse strategies, e.g., the use of pronominals (Kimbarow and Brookshire, 1983). Detailed analyses of the structure of narrative and procedural discourse have also been reported (Ulatowska et al., 1980, 1981, 1983).

In 1976, Halliday and Hasan proposed a system for analyzing the cohesion of normal discourse, looking at the phenomena of reference, substitution, ellipsis, conjunction and lexical relationships as the mechanisms for maintaining cohesion in a text. They see cohesion as being directly related to the ultimate coherence of a text. Only recently has this analysis been applied to aphasia (Ulatowska et al., 1980, 1981, 1983; Piehler and Holland, 1984; Bottenberg et al., 1985). In later developments of this system, Hasan (1980, 1984, 1985) has addressed the issues of cohesion and coherence further and has developed the notion of cohesive harmony which has only recently been applied to discourse in aphasia by Bottenberg et al. (1985). Cohesive harmony is a measure of the way in which a text 'hangs together' to form a coherent whole -- both in terms of lexical and grammatical relationships (Hasan, 1985). A composite measure of the cohesive harmony of a text can be calculated by means of the cohesive harmony index (CHI), a percentage measure of the cohesive ties in a text. Hasan has postulated a 50% criterion level as being necessary for textual coherence (Hasan, 1985).

In this study, I investigated aphasic speakers' discourse in relation to Hasan's 50% criterion and tested the relationship between this concept of cohesive harmony and the ear of the listener. Because cohesive harmony analyses promise significant insights into the coherence of aphasic speakers and as the CHI becomes a clinically viable measure, it is important to test the relationship between the measure and ultimate reality; i.e., listener reactions to the aphasic speaker.

METHOD

Subjects. Three fluent aphasic speakers served as subjects in the study. They are known hereafter as Eileen, Lola and Kate. Their ages were 73, 55 and 41 respectively, and they were classified as fluent according to the following

measures taken from a 500-word sample of conversational speech from each subject; phrase length ratio (Goodglass et al., 1964), words per minute (Kerschensteiner et al., 1975) and those criteria specified by Goodglass and Kaplan (1972).

Each subject was rated by two speech pathologists as '3' on the Aphasia Severity Rating Scale of the Boston Diagnostic Aphasia Examination (Goodglass and Kaplan, 1972). Two of the subjects had suffered ruptured middle cerebral artery aneurysms and one had a CVA in the middle cerebral artery territory. At the time of speech sampling, Eileen was 1 month post onset, Lola was 48 months post onset and Kate was 12 months post onset of aphasia.

The Data Base. In order to investigate contextual variation as part of a larger study, each speaker produced texts in six different contexts. These were as follows:

1. The subject described her daily activities.
2. The subject gave the interviewer directions how to travel from Point A to Point B.
3. The subject described a story depicted in a series of pictures.
4. The subject described her illness.
5. The subject described events seen in a videotape played to her in the absence of the interviewer.
6. The subject relayed a telephone message to the interviewer taken by her while the interviewer was out of the room.

Thus, a total of 18 texts were obtained, ranging in length from 10 to 86 clauses. The texts were audiotape recorded and orthographically transcribed. They were divided into clauses according to Halliday's principles of clause delineation (1985). A cohesive harmony analysis was performed on each text. The 18 texts constituting the data were analyzed by the investigator and a linguist for reliability purposes. Any discrepancies (found primarily in the area of reference) were discussed and resolved with 100% agreement being obtained at the four stages of the analysis -- clause delineation, lexical rendering, lexical chaining and chain interaction.

The Analysis. The cohesive harmony analysis involved the extraction from the texts of lexical chains which were formed through the relations of co-referentiality, co-classification or co-extension (Halliday and Hasan, 1976). Examples of such chains are given below.

Text: The man walked towards the car. He saw that it was cream coloured, as he had requested. Red or blue would have been too conspicuous for his purpose. As he turned, he saw his partner walking towards him.

Chain (i): man - he - he - his - he - he - his - him
Chain (ii): car - it
Chain (iii): cream - blue - red
Chain (Iv): walked - walking

In the first chain, the rponominals he and his and him are co-referential with man and similarly, it with car in the second. In the third chain, the colors all fall into the same lexical field of meaning, this being in a relationship of co-extension with each other. The fourth chain is one formed by co-classification, the two instances of walk representing the same activity but different occurrences of it.

Tokens (lexical items carrying content) entering into chains were known as Relevant Tokens. Those not entering into chains were called Peripheral Tokens. Chain interaction, representing the actual cohesive harmony, was

then examined; i.e., the number of times tokens in two chains entered into the same grammatical relationship with each other (e.g., actor-action, action-location). A minimum of two tokens from one chain in such a relationship with two tokens from another chain was necessary in order for chain interaction to be said to have occurred. Those tokens involved in chain interaction were called Central Tokens. The cohesive harmony index (CHI) was the number of central tokens as a percentage of the number of total tokens in the text.

The Listening Procedure. Six listeners, unfamiliar to the subjects, were asked to rate the coherence of each text on a scale of 1 to 4. The rating scale was as follows:

1. I could make sense of all of it.
2. I could make sense of most of it.
3. I could make sense of some of it.
4. I could make sense of none of it.

Listeners were presented with each subjects' 6 texts at monthly intervals -- first Eileen's, then Lola's, then Kate's. This was done in order to avoid contamination of one speaker's texts by another, as three of the contexts involved the same information. Two speech pathologists agreed on the 'best' and 'worst' speakers so that the more impaired texts could be presented first in order to prevent a cumulative effect of information.

RESULTS

Each subject scored very low on the CHI. Except for one text, all were below the 50% criterion stated by Hasan as being necessary for textual coherence. The subjects' scores ranged from 0% to 54% (see Table 1).

Table 1. Subjects' CHI scores for texts from Contexts 1 - 6.

CONTEXT	EILEEN	LOLA	KATE
1	18%	16%	54%
2	13%	34%	49%
3	0%	21%	14%
4	25%	28%	34%
5	11%	25%	7%
6	0%	21%	17%
$\bar{X}$	11%	24%	29%

A Spearman Rank Order Correlation Coefficient was calculated between the CHI and the listeners' mean ratings for each text. A positive correlation of 0.66 was found ($p < .05$).

CONCLUSIONS

The low CHI scores achieved by each of the subjects in the various contexts confirms the notion that aphasic speakers have difficulty forming cohesive texts. They demonstrate the fact that Hasan's notion of cohesive harmony is a viable one to consider in aphasic discourse, as all the texts except one fell below the 50% criterion level considered by Hasan as necessary for textual coherence.

The fact that listeners' ratings of coherence correlated with the CHI scores of the texts gives the cohesive harmony analysis significance in reality. The scores were, in fact, related to what listeners hear, indicating that cohesive harmony is responsible, to some extent, for listeners' perception of levels of coherence.

While the number of subjects in this study was small, the range of contexts supplied sufficient data to make possible some preliminary statements regarding the usefulness of the cohesive harmony analysis. Aphasic speakers certainly demonstrate abnormal scores on the analysis, and in the ultimate analysis of the texts using the cohesion perspective, the speech pathologist is provided with new insights into the conversational speech of his or her patients. As the CHI correlated well with listeners' ratings, it would seem a useful clinical measurement and one which warrants further investigation and application to aphasic discourse.

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DISCUSSION

Q: Did you look at accuracy of cohesive ties? I know Betty Liles has done some work with what she calls adequacy of cohesive ties. That seems to have some potential -- I didn't hear you mention that. If they in fact did have a situation where there was a referent, was it accurate? Did you just eliminate those instances where, for instance, they said 'the man...she...' or did you count that as a cohesive tie?

A: No I didn't.

Q: So did you look at accuracy in any way?

A: I don't know if accuracy would be the best way to describe it -- I worked at a scale of recoverability of referents, which was actually more or less a 'guessing' scale, from one end of the continuum being that the referent was perfectly clear and perfectly recoverable to the other end, at which referents were totally unrecoverable. This involved going through a process of guessing, which is what listeners do with aphasic speakers. So I looked at recoverability of referent in degrees and anything that went beyond the limits of accuracy, like a she referent for a man, I tossed out immediately. But others; e.g., when I had he all the way

through but no actual ultimate referent as to who that he was, I did include it in the chain, as long as it was clear that the he referred to the same person throughout. Perhaps weighting of ties might be a good way to go with this, because it's certainly not clear-cut that one tie is successful and another isn't. There's a whole range of accuracy or adequacy of these ties.

Q: Could you talk about the effects of different contexts?

A: As far as significant differences between contexts went, we got differences at 0.10 level. From the trends, however, the contexts that involved conversation tended to be more coherent than ones that involved structured tasks. The ones that were rated most coherent were the ones where I asked 'What have you been doing today?' and 'Tell me what happened when you had your stroke.' The ones that were the least coherent were conveying the telephone message, explaining what the videotape was about and the worst one was the picture story.

Q: How long does it take someone to do a cohesive harmony analysis on a 100-word speech sample? Is this something that is going to be useful clinically or are we going to have to come up with an abbreviated way of doing it?

A: At this point it's hard to see an abbreviated way of doing it. I think it's a long way from being a reliable measure that's consistent over time, taking contextual effects into account, and the time certainly is an issue as far as clinical practice always goes with discourse analysis. Any of the ones that I've used have been fairly lengthy. The content unit analysis is probably the quickest, but others such as Wagenaar, Snow and Prins' analysis or the LARSP take a considerable amount of time to perform. I think the CHI will be a valid clinical tool and I think any time constraints will have to be weighed against the information that we can gain from discourse analysis. I think a quick discourse analysis might do a disservice to discourse and if we're going to look at it properly, the time issue should not be a factor -- in the beginning anyway. Perhaps we can refine it as we go along.

Q: The listeners that your subjects were communicating with -- was it the same listener throughout all the tasks or did the listeners change?

A: No it was the same one.

Q: Do you think that in part, some of the responses on the part of the patients were influenced by meta-pragmatic awareness -- that in fact they probably had a sense that the researcher or listener did have an awareness of what was going on and consequently they may not have had to establish cohesive ties in the same way as they would have in a normal everyday conversation?

A: Yes, I think that's a valid point and I think this is one of the things in an analysis like this which will present problems in getting reliability. There are many factors, such as shared knowledge between speakers, your knowledge of a patient, and my knowledge of her are going to be different, so our interpretations of her referents might be different also. I think to try and quantify all the variables involved at this stage may be premature. To take the analysis as a descriptive one may be more useful.