

Surface Markers as Facilitators of Aphasic
Subjects' Responses to WH- Questions

Anne V. Davis
United Cerebral Palsy Center, Hartford, Connecticut

Ann A. VanDemark
University of Michigan, Ann Arbor, Michigan

Auditory language comprehension is an essential factor in any consideration of the nature of aphasia. Goodglass, Gleason and Hyde (1970) presented evidence that both the degree and the nature of the disorder vary widely within the aphasic population, making it impractical and uninformative to deal with auditory comprehension as a global entity. It is necessary to evaluate, and ultimately to facilitate, the comprehension of specific language forms.

This paper addresses the facilitation of response accuracy in comprehension of wh-question forms. Wh-questions are frequently used in diagnostic test batteries to measure comprehension of verbally-presented materials. However, such tasks do not take into account the possible confounding effects of different levels of difficulty in responding to particular wh-forms, nor do they provide an alternative wh-form which might be less difficult for the aphasic client and make it easier to evaluate the patient's response to the remainder of the question's content.

Gallagher and Guilford (1977) and Brennan and Fausone (1983) reported significant differences in frequency of correct responses among wh-forms. Although the two studies found somewhat different hierarchies of difficulty, it was clear from their results that wh-elements tested were not of equal complexity, and that "what" questions elicited more correct responses than "when" and "where" questions. In addition, Gallagher and Guilford reported that the most common error response among aphasic subjects was that of treating other wh-items as if they were "what-verb" questions.

Pierce (1981) reported that additional surface structure markers facilitated auditory comprehension of tense-related sentences. A similar approach with wh-forms seemed worthy of further exploration. The hypothesis tested in this experiment was that the addition of surface markers to wh-question forms would facilitate auditory comprehension of those forms. The wh-forms "when" and "where" were selected for study because they produced the fewest accurate responses in Gallagher and Guildord's study, and because a comparable marked form could be generated for each item. Specifically, the authors compared the comprehension of the pairs "when" and "what time" and "where" and "what place."

METHOD

The subjects were 16 aphasic adults, 7 female and 9 male. All subjects experienced left hemisphere damage from a single infarction. The mean time post onset was 4 years 2 months, with a range from 7 months to 10 years 5 months. The mean age of the subjects was 47 years 11 months, ranging from 20 years 11 months to 66 years. A control group of neurologically-intact subjects of comparable age, sex, and education was also tested. Scores on the Boston Diagnostic Aphasia Examination (BDAE) (Goodglass and Kaplan, 1972)

and the Porch Index of Communicative Ability (PICA) (Porch, 1967) were available for all aphasic subjects. Severity ratings on the BDAE ranged from 1 to 4 with a mean of 2.4; PICA overall scores ranged from 10.05 to 14.01 with a mean of 12.8.

Visual stimuli consisted of 10 color plates depicting an individual or a small group of individuals engaged in an activity. Each picture included elements which depicted both temporal and locative characteristics. For example, a dark sky, sunshine, or a clock for temporal responses, and an obvious place, such as a room, a street, or a position at the table for the locative responses. Auditory stimuli were 40 questions, four for each picture, using each of the wh-forms, "when," "where," "what time," and "what place." The auditory stimuli were tape recorded and were presented at a listening volume comfortable for the subject. The auditory stimuli were presented in a predetermined order such that the order of the pictures remained constant but the order of the wh-forms varied for each picture.

Responses were scored correct if they were appropriately locative in response to "where" and "what place" questions or appropriately temporal in response to "when" and "what time" questions. Subjects were permitted to respond by speaking, by pointing to the picture, or by gesturing. The first author and another observer independently scored all of the subjects' responses. The agreement between scorers was 97.5%.

RESULTS

The mean score for control subjects was 38.8 of a possible 40, or 97% correct, and there were no significant differences among the responses to the wh-question forms. Errors were few and apparently random.

The mean score across all four wh-forms for the aphasic subjects was 24.8 of a possible 40, or 62% correct. Table 1 presents the means, ranges and standard deviations for accurate responses by aphasic subjects to the four question types. The order of response accuracy, from most to least accurate was "what time," "what place," "where," and "when." Analysis of variance revealed a significant difference in the frequency of correct responses among the four question types ($F = 5.138$; $d.f. = 3,60$, $p = .01$). A WilcoxinMatched-Pairs Signed-Ranks test indicated significant differences between responses to "when" and "what time," "when" and "where," and "when" and "what place." The difference between responses to "where" and "what place," "where" and "what time," and "what place" and "what time" were not significant.

Table 1. Mean percent of correct responses to four wh-question forms by 16 aphasic adults.

Wh-stimulus	X	Range	S.D.
What time	83.12	30-100	22.36
What place	64.36	10-100	36.69
Where	63.12	10-100	30.08
When	35.97	0-100	33.95

Looking specifically at the marked and unmarked pairs under investigation, it is evident that response accuracy was significantly greater for "what time" than for "when," and that the aphasic subjects responded with equal accuracy to "what place" and "where."

Table 2 presents the distribution of error types for each of the wh-question forms. Approximately 75% of the total errors consisted of responses appropriate to "what-do" or "what-it" question forms. "When/where" confusions comprised slightly less than 20% of the errors. Comparison of the error patterns for "when and what time" and for "where and what-place" indicates that in both instances the distribution of errors was virtually identical.

Table 2. Distribution of error types for four wh-questions.

Stimulus	Error				
	What-do	What-it	Where/When	Who	NR
When	38%	37%	25%	1%	0%
What time	41%	36%	18%	0%	6%
Where	37%	38%	18%	0%	7%
What place	38%	41%	16%	6%	0%

The correlation between PICA overall percentiles and total correct responses to the wh-question forms was .73, and the correlation between combined scores on PICA subtests VI and X and correct responses to the wh-forms was .78. These correlations suggest that although an overall measure of language ability (the PICA) and a specific test of auditory comprehension (PICA subtests VI and X) are significantly related to auditory comprehension of wh-questions, they do not account for all the variance observed.

The total scores of the aphasic subjects fell into two clusters, one above and one below the mean performance on the wh-task. Table 3 presents comparison data for these two clusters of subjects. Although the numbers are too few for anything but descriptive comparisons, it does appear that subjects who performed poorly on the wh-task had lower overall percentiles on the PICA and lower severity ratings on the BDAE. Their errors, shown here as the percent of the total errors falling in each category, were spread over the four wh-forms, while the subjects who scored above the mean concentrated 60% of their errors in the "when" category. The predominant type of error made by the poorer performing subjects was to respond as if to a "what-" question. While this was also true for the better-performing subjects, they did show a somewhat higher percentage of errors in other categories.

DISCUSSION

The findings of this experiment support previous studies which report that aphasic subjects respond differently to different wh-question forms, that they respond more accurately to "what" questions than to other wh-forms, and that they tend to treat most wh-forms as if they are "what" questions. It was hypothesized that the use of a surface structure marker which transformed the "when" and "where" forms into "what" constructions would facilitate comprehension of the question. This hypothesis was accurate in the case of the "when-what time" constructions. All aphasic subjects performed more accurately

Table 3. Comparison of subjects scoring above and below the mean on a wh-question comprehension task.

	Above the Mean N=9	Below the Mean N=7
PICA Overall Percentile	83.62	62.16
Boston Rating Scale	3.11	1.28
Total Errors	67	179
% errors on WHEN	60	32
% errors on WHAT TIME	5	14
% errors on WHERE	20	27
% errors on WHAT PLACE	15	27
% when/where confusions	34	15
% what-do or responses	66	78
% other responses	0	7

to "what time" questions than to "when" questions. The "what time" construction may be easier for several reasons. "What" signifies that a question is being asked, providing the listener the opportunity to form an expectation about the sentence. The word "time" occurs after processing of the wh-question tag, when the listener is more prepared to process the semantic element of the question. The facilitatory effect of the two-component construction is consistent with Brookshire's (1974) description of a "slow rise time" pattern of auditory comprehension.

Responses to "where" and "what place" were not significantly different. "What place" did not elicit more accurate responses than "where." "What place" appears to be a nonpragmatic construction which produces confusion and inaccurate responses in the subjects. Pierce (1981) reported the same phenomenon in his study of tense markers. Apparently additional markers are only efficient in aiding auditory comprehension when those markers follow pragmatic rules.

Careful investigation of the hierarchy of difficulty of wh-question forms and of the alternative forms which yield more accurate responses should be useful in deriving better methods of assessing and treating auditory comprehension disorders.

REFERENCES

- Brennan, A. and Fausone, B., Unpublished replication study: Wh-questions: responses by aphasic patients. University of Michigan, 1982.
- Brookshire, R., Differences in responding to auditory verbal materials among aphasic patients. Acta Symbolica, 3, 1, 1974.
- Gallagher, T.M. and Guilford, A., Wh-questions: responses by aphasic patients. Cortex, 13, 44-54, 1977.
- Goodglass, H., Gleason, J.B., and Hyde, M., Some dimensions of auditory language comprehension in aphasia. Journal of Speech and Hearing Research, 13, 595-606, 1970.
- Goodglass, H. and Kaplan, E., The Assessment of Aphasia and Related Disorders. Philadelphia: Lea and Febiger.
- Pierce, R., Facilitating the comprehension of tense-related sentences in aphasia. Journal of Speech and Hearing Disorders, 46, 364-368, 1981.
- Porch, B.E., The Porch Index of Communicative Abilities. Palo Alto: Consulting Psychologists Press, 1967.