USE OF THE CLOZE PROCEDURE TO DETERMINE MORPHOLOGICAL OR SEMANTIC BASED TREATMENT FOR APHASICS

Sheldon L. Stick
Department of Speech Pathology and Audiology
The University of Nebraska

Marguerite Hartwig
School of Human Communication Disorders
Dalhousie University

ABSTRACT

Experimental data is lacking on how aphasics comprehend language. This study compared aphasic and nonaphasic subjects' encoding strategies on selected cloze tasks. The questions posed were (1) did aphasics manifest a predictable impairment in the use of selected linguistic rules; (2) could the degree of impairment to auditory comprehension skills be used as an indicator of the degree of overall language impairment. Performances from ten adult aphasics were compared to the performances from ten adult brain-damaged nonaphasics; ten normal adults; ten fourth grade, and ten sixth grade children.

An early effort at displaying a model of the language hierarchy was presented by Myklebust (1954). He suggested that understanding preceded speaking, which in turn was followed by reading and then writing. This position was extended into adult language disorders by Smith (1971), who reported that an aphasic's ability for comprehending was indicative of the severity of interference to the other three aspects of verbal and nonverbal language (speaking, reading, and writing). This position argues for careful examination of the input and output mechanisms involved in communication, because difficulties in receiving information (comprehension) could result in spuriously depressed efficiency of the mechanisms involved in language expression (speaking or writing) or reception (listening or reading). This study sought to learn whether: (1) adult aphasics manifested a predictable impairment in their use of selected linguistic rules; (2) the degree of impairment to auditory comprehension skills in adult aphasics was indicative of the degree of overall language involvement.

Subjects

Selected verbal and nonverbal data were obtained from ten adult male aphasics, all patients from a Veterans Administration Hospital or a veterans home. The onset of aphasia reportedly was sudden in all cases and no subject had previous known brain damage. However, the apparent types of aphasia and known etiologies were not uniform. The chronological age range, at the time of testing, was 49 to 80 years with a mean of 59.4 years. The mean interval between ictus and examination was 29.8 months. None of the patients had received extended speech and language therapy.

Severity of impairment to the language functions was determined by performance on the Minnesota Test for Differential Diagnosis of Aphasia (Schuell, 1965). Smith's (1971) rating scale for severity of involvement was followed. This procedure enabled subjects to be classified according to the percentage of errors in the five major areas on the Minnesota Test for Differential Diagnosis of Aphasia: 1-25% (slight); 26-70% (moderate); 71-100% (severe). In addition, the MTDDA classifications were correlated to classifications noted on selected other items from Smith's neuropsychological test battery.

Comparison linguistic data was obtained from ten adult males who were medically reported to be brain damaged but not aphasic, and an additional ten adult males with no apparent communicative disorders. These twenty comparison subjects were patients and residents of the same Veterans Administration facilities. An effort was made to equate these two groups of comparison subjects with the ten aphasics on the variables of age, socio-economic background, and educational level. Additional linquistic data was obtained from twenty ostensibly normal children (PPVT scores, school performances, and auditory screening, 20 dB ISO for 500, 1000 and 2000 Hz) varying in chronological ages from nine to twelve, and evenly divided between the sexes. These subjects provided referential data for identifying the existence of a regression phenomenon that affected morphological and/or syntactical rules. The selected neuropsychological test battery (Smith, 1971), including the MTDDA, was administered only to the ten aphasics.

Testing

The aphasics and two adult comparison groups (ten nonaphasic brain damaged and ten normals) were tested individually in a room either at the Veterans Administration Hospital or in the veterans home. Both rooms were well lighted, had good ventilation, and were free of distracting visual and auditory stimuli. The twenty children were tested individually in private rooms at their respective schools. All testing environments were comparable.

Cloze Tasks

Selected linquistic units were deleted from predetermined stimuli and replaced with blanks of standard length. All subjects were required to give a nonverbal (graphic) or verbal response to each missing letter, word, or sentence for each of the following:

1) deletion of every third letter.

2) deletion of every other letter.

3) deletion of every third word.

Subjects were given exact copies of all reproduced sentences in the same order and were instructed to fill in all blanks by guessing from the context of the remaining sentence structure what the missing elements should be. This cloze procedure required that a subject:

1) Supply a verbal, graphic, or gestural response for the missing elements. (Plastic letters were provided for oral apraxics);

2) Had to employ previously acquired rules for determining succeeding linguistic units in a sequence, such as a consonant, a vowel, or a word;

3) Complete a sentence using correct morphological and syntactical rules.

Test stimuli consisted of twelve selected sentences; three of each of the following four constructions: active, passive, singular/plural inflection for nouns and verbs, and negative affirmative (Figure 1).

Figure I: Sentence Constructions Used in Cloze Procedure

Active:

1) Pe_pl_/ ea_/ fo_d. (Every third element)
People eat food.

2) S_e / _s / _a_h_n_ / t_e / _i_h_s. (Every other element)
She is washing the dishes.

3) Heavy winds / ____ / the picture / ____.(Every third word)
Heavy winds broke the picture window.

Passive:

1) Tw_ / ro_in_ / we_e / s_ng_ng.
Two robins were singing.

2) H_ / w_s / _e_y / _n_r_.
He was very angry.

3) The mountains / ____ / capped / ____ / snow.
The mountains were capped with snow.

Noun/Verb Agreement:

1) Th_ / ch_ld_en / _la_ / ch_ck_rs.
The children play checkers.

2) M_s_ / b_y_ / p_a_ / f_o_b_l_.
Most boys play football.

3) My father's / ____ / runs all / ___ / in the / ____.
My father's horse runs all day in the pasture.

Negative Affirmative:

1) He / _as / _ot / _nj_re_.
He was not injured.

2) S_e / _o_l_ / n_t / _o_e.
She could not come.

3) Brave men /____ / not hesitate / __ / fight for / ____ / country.
Brave men will not hesitate to fight for their country.

Scoring

The total number of responses required to complete each item (letter and word) was obtained and then group mean scores were determined for each sentence construction. The average scores for each sentence construction then were contrasted to determine which were easiest to complete. It was anticipated that the logical sequence of difficulty would be active sentences (easiest), passive sentences, noun/verb agreements, and finally the negative sentences (most difficult). The order of presentation of the four sentence types were randomized for presentation to each of the subject groups. Additionally, each of the three items within a sentence type also was randomized.

Results

Simple central tendency data was used for comparing the aphasic subjects' performances with each of the other groups. It was not deemed necessary to ascertain if statistically significant difference existed between the aphasic comparison subjects because there were a number of variables (i.e., types of aphasia) that had not been controlled. Instead, emphasis was given to the varying patterns of responding.

As shown in Table 1, below, the aphasic subjects performed poorer than any of the comparison groups on the active sentence constructions.

Table I: Mean scores and standard deviations for the sub-groups on each type of deletion for the active sentence constructions (N=50).

E.O.L. = Every other letter
E.T.W. = Every third word
E.T.L. = Every third letter

	E.O.L.		E.T.L.		E.T.W.	
	$\overline{X}$	S.D.	$\overline{X}$	S.D.	$\overline{X}$	S.D.
Aphasics	64.2	28.37	14.4	15.96	89.7	12.24
Brain Damaged	21.4	8.76	7.4	2.17	19.67	5.34
Normal	29.5	13.51	4.2	0.42	28.8	11.04
6th Graders	21.4	12.90	4.0	0.00	24.2	11.78
4th Graders	22.1	8.39	4.0	0.00	26.3	11.21

The above Table shows that the mean number of responses made by the aphasics was at least twice, and sometimes three times, the greatest number made by any of the other groups. The easiest cloze task for all groups, on the active sentence constructions, was when every third letter was omitted. Generally, the most difficult task was when every third word was omitted.

On the passive sentences, Table 2, the same pattern was seen; the aphasic subjects needed two or three times as many responses for a given deletion task. Generally, the deletion of every third word was of comparable difficulty to the task in which every other letter was deleted only for the four comparison groups. For the aphasic subjects, the deletion of every third word was the most difficult task. Deletion of every third letter was the easiest cloze task for all five subgroups.

Table II: Mean scores and standard deviations for the sub-group on each type of deletion for the passive sentence constructions (N=50).

E.O.L. = Every Other Letter
E.T.W. = Every Third Word
E.T.L. = Every Third Letter

	E.O.L.		E.T.L.		E.T.W.	
	$\overline{X}$	S.D.	$\overline{X}$	S.D.	$\overline{X}$	S.D.
Aphasics	42.2	28.06	26.4	24.56	64.6	19.16
Brain Damaged	10.3	2.31	7.1	1.37	9.1	1.37
Normals	12.9	9.59	7.4	2.50	18.5	16.26
6th Graders	18.2	13.22	6.6	1.35	17.4	11.95
4th Graders	12.4	2.41	6.0	0.00	11.8	7.67

On the noun/verb agreement (Table 3) sentences the aphasic group clearly was different. The cloze task on which every third letter was deleted was easiest for all groups; a pattern observed earlier. Deletion of every third word again was the most difficult.

Table III: Mean scores and standard deviations for the sub-groups on each type of deletion for the noun/verb agreements (N=50).

E.O.L. = Every Other Letter
E.T.W. = Every Third Word
E.T.L. = Every Third Letter

	E.O.L.		E.T.L.		E.T.W.	
	$\overline{X}$	S.D.	$\overline{X}$	S.D.	$\overline{X}$	S.D.
Aphasics	50.9	36.83	27.2	19.04	104.3	45.72
Brain Damaged	11.2	1.48	8.0	0.94	28.7	6.27
Normals	13.2	4.85	7.0	0.47	24.7	6.50
6th Graders	10.6	2.76	7.0	0.00	33.0	10.93
4th Graders	13.3	3.37	7.0	0.00	27.3	8.98

The cloze tasks on the negative sentences produced results that were different from any of the previous performances (Table 4). Deletion of every third letter clearly was the easiest activity for all the control groups. For the aphasic subjects the easiest cloze task was the deletion of every other letter. The most difficult task for the aphasics, as with the other sentence constructions, was the deletion of every third word. By contrast, three of the four control groups evidenced the greatest amount of difficulty on the task that deleted every other letter. It is noteworthy that this was the very same task that the aphasics found the easiest.

Table IV: Mean scores and standard deviations for the sub-groups on each type of deletion for the negative sentence constructions (N=50).

E.O.L. = Every Other Letter
E.T.W. = Every Third Word
E.T.L. = Every Third Letter

	E.O.L.		E.T.L.		E.T.W.	
	$\overline{X}$	S.D.	$\overline{X}$	S.D.	$\overline{X}$	S.D.
Aphasics	43.2	14.41	46.8	21.40	81.6	35.12
Brain Damaged	15.4	1.84	6.9	1.73	13.2	1.55
Normals	23.0	9.13	7.7	4.03	14.7	6.75
6th Graders	17.1	4.77	7.2	1.81	20.7	12.66
4th Graders	20.7	7.69	7.9	1.73	16.1	2.33

The second aspect of this study examined the relationship between severity of impairment to auditory comprehension abilities, of the aphasic subjects, and the average number of responses made to each sentence type. Table 5, below, shows there were three subjects (5, 9, and 10) who had sum scores of ten or less (slight involvement), four with sum scores between 12 and 14 (moderate involvement), and three with sum scores of 15 or more (severe involvement). Sum scores of four or less were considered as reflecting no involvement to language abilities.

Table V: Degree of involvement on the Language and Nonlanguage tasks (N=10), and Sum Scores for each aphasic subject. Sli = slight (1); M = moderate (2); Se = Severe (3), N = no impairment (0).

Subject	Auditory Comprehension Language	Speech & Language	Reading	Writing	Double Simultaneous Stimulation Verbal	Nonverbal	Sum Scores
1	M	M	M	Se	Se	Se	15
2	M	Se	M	Se	Se	Sli	14
3	M	M	Se	Se	Se	Se	16
4	M	Sli	M	Se	M	M	12
5	Sli	Sli	Sli	Se	M	M	10
6	Se	M	Se	Se	Se	Se	17
7	M	M	M	Se	Se	Sli	13
8	M	M	M	Se	M	M	13
*9	Sli	Sli	Sli	M	M	M	9
*10	Sli	Sli	M	Sli	N	N	5

* Right hemispheric lesions and left hemiplegia

The aphasic subjects were grouped according to degree of involvement to their auditory comprehension abilities. For each of the three subgroups (slight, moderate, severe) the four sentence types were ranked (easiest to most difficult) according to the average number of responses made. It can be seen (Table 6) that there was no apparent pattern to the hierarchy. However, each subgroup made more responses than the preceding subgroup, except for the active sentences; fewer responses made by the moderate group than the slight group.

Table VI: Mean No. of responses and the Hierarchy of difficulty on sentence types according to degree of involvement on Language and Nonlanguage Abilities (N=10).

	Average No. of Responses	Slight (N=3)	Average No. of Responses	Moderate (N=4)	Average No. of Responses	Severe (N=3)
	30.2	Noun/Verb	36.2	Passive	69.1	Passive
Range:		27.3-35.3		25.6-50.6		62.0-74.0
	36.4	Passive	45.8	Active	73.5	Negative
Range:		22.6-45.3		31.3-59.6		58.3-84.0
	42.0	Negative	54.7	Negative	82.5	Active
Range:		23.6-76.6		46.3-74.0		68.3-100.0
	50.8	Active	55.1	Noun/Verb	98.1	Noun/Verb
Range:		37.3-67.3		38.3-73.3		79.6-113.0

DISCUSSION

The data show that the four comparison groups performed similarly. In contrast, the aphasic subjects needed to make many more responses before they were able to complete any one of the three cloze tasks. On the active, passive, and noun/verb agreement sentence constructions, the mean number of responses made by the aphasics was two to four times the greatest number made by any of the four comparison groups. It was noteworthy that all five subject groups displayed similar patterns when supplying the missing elements. Sentence constructions generally were easiest, when every third letter was omitted, and most difficult when every third word was omitted, particularly for the aphasics. The substantially higher mean scores from the aphasics can be attributed to a decreased efficiency in using available information, which is comparable to a reduced ability for information processing but retention of all or most of the capacity for using language. Chapey, Rigrodsky, and Morrison (1977) claim that this is a divergent semantic impairment, because, "The individual ... is unable to change the direction of his response or to use a flexible semantic strategy ... (p. 293)."

The negative sentences produced different results. Deletion of every third letter was the easiest cloze task for all comparison groups, and, except for the sixth grade children, the deletion of every other letter was the most difficult. For the aphasic subjects deletion of every other letter was easiest and deletion of every third word was the most difficult. Conceivably, the interjection of a negative concept, between the noun and verb, altered the normal flow of ideas to the extent an individual had problems determining a sentence meaning, which subsequently caused confusion in the application of linguistic rules.

The implication of this study is that the semantic basis of a task should be the primary focus of language treatment to aphasic patients. Intervention based only upon the application of morphological and syntactical rules attend to surface structures and can be viewed as symptomatic therapy. Before an aphasic patient can be expected to use linguistic rules there must be an understanding of the deep structure (message meaning). Practitioners should give special attention to the relationships between nouns and verbs within a sentence, number of concepts contained in a given sentence, and the sentence complexity (i.e., number of transformations required before reaching the deep structure).

After observing that the aphasic and nonaphasic subjects had markedly similar strategies for completing the cloze tasks, the aphasic group was subdivided according to degree of involvement to auditory comprehension abilities. No apparent pattern of responding was found to be associated with any of the three subgroups. Instead, within each subgroup there was considerable variation. This suggested that individual strengths and weaknesses had to be considered when developing clinical intervention programs, but that the greater the degree of auditory comprehension defect, the poorer would be the expected performance (Darley, 1977). However, that fact was not consistent. Some sentence forms apparently imposed minimal demands, on an individual's capacities, which allowed subjects with greater degrees of impairment to respond appropriately. It was only when the complexity of the stimuli increased that a distinct difference became apparent among the aphasic patients who had varying degrees of impairment to their auditory comprehension abilities. These sentences (noun/verb agreements and negatives) apparently required more linguistic transformations before reaching the deep structure. This position is similar to that of Howes (1964) who stated the severity of involvement was related to the size of the cerebral lesion.

The results of this study support the contention that aphasics have an impairment to their language efficiency but not to their language capacity. Furthermore, language deficits became more obvious when increasingly complex linguistic stimuli are used (Goodglass, Gleason, and Hyde, 1970), and when there is a greater degree of auditory comprehension impairment. The implications for treatment are: 1) aphasics must understand the semantic component of the task before they are expected to respond to the surface structure Kushner and Winitz (1977); 2) consideration should be given to systematically arranging noun/verb relationships and controlling the number of transformations required for retrieving the deep structure; 3) aphasics should be allowed more time to complete a task and be required to process smaller amounts of information, particularly during the incipient stages of language intervention.

REFERENCES

Chapey, R., Rigrodsky, S., and Morrison, E., Aphasia: A divergent semantic interpretation. **Journal Speech and Hearing Disorders**, 42, 287-295 (1977).

Darley, F., A Retrospective View: Aphasia. **Journal Speech and Hearing Disorders,** 42, 161-169 (1977).

Goodglass, H., Gleason, J., and Hyde, M., Some dimensions of auditory language comprehension in aphasia. **Journal Speech and Hearing Research,** 13, 595-606 (1970).

Howes, D., Application of the word frequency concept to aphasia. In A.V.S. de Reuck and M. O'Connor (Eds.) **Disorders of Language.** Boston: Little, Brown 47-74 (1964).

Kushner, D., and Winitz, H., Extended comprehension practice applied to an aphasic patient. **Journal Speech and Hearing Disorders,** 42, 296-306 (1977).

Schuell, H., Jenkins, J., and Jimenez-Pabon, E., **Aphasia in Adults: Diagnosis, Prognosis, and Treatment.** New York: Hoeker (1964).

Smith, A., Objective Indicies in Severity of Chronic Aphasia in Stroke Patients. **Journal Speech and Hearing Disorders,** 36, 167-206 (1971).

Address correspondence to:
Sheldon L. Stick, Ph.D.
Department of Speech Pathology and Audiology
202 Barkley Memorial Center
The University of Nebraska
Lincoln, Nebraska 68583