Auditory Comprehension in Aphasia: Type vs. Severity

Barry M. Klor and Anthony G. Mlcoch
Veterans Administration Hospital, Hines, Illinois

The literature reports several investigations that have examined the effects of syntax and grammar on auditory-verbal comprehension deficits in aphasia (Shewan, 1969; Parisi and Pizzamiglio, 1970; Goodglass, Gleason and Hyde, 1970; Shewan and Canter, 1971; Shewan, 1979; Klor, 1979). Results of these studies have portrayed the obvious departure from normal receptive functioning in aphasia as solely a unitary disorder based upon an quanitiative continuum. Disorders of understanding have not emerged consistently as an interaction of aphasic type and grammatical structures.

In assessing performance on 20 syntactic structures that included various tense, count, negative, reflexive, gender, and locative constructions, Parisi and Pizzamiglio (1970) reported a gradual depression in total test score from normal to right-brain-damaged nonaphasic adults to aphasic subjects. Closer examination of their findings revealed no significant departures among groups in the type of errors produced. Similarly, Shewan and Canter (1971) also demonstrated a hierarchy of performance (normal, anomic, Broca's, Wernicke's aphasia, respectively), but could demonstrate no interaction between linguistic parameter and type of aphasia. Goodglass (1968) reported that fluent and nonfluent aphasic subjects demonstrated the same hierarchy of receptive difficulty for 10 syntactic structures, with no specific type by structure interactions.

Only one investigation uncovered distinct comprehension differences partial to individual aphasic groups (Goodglass, Gleason, and Hyde, 1970). Through the use of an analysis of covariance, it was found that subjects with Broca's aphasia displayed significantly more difficulty with prepositions; subjects with Wernicke's aphasia experienced the most problem with verbs; and subjects with anomic aphasia performed more poorly on nouns.

It was of considerable interest that only one study was able to uncover receptive linguistic differences that paralleled expressive skills and was correlated with type of aphasia. To this end, this investigation focused on a more discrete task of auditory-verbal comprehension; The Auditory Comprehension Test for Sentences (Klor, 1979; Shewan, 1979), because of its rigorous standardization and documented ability to tap subtle disorders of understanding. It was wondered if aphasic groups (Broca's, Wernicke's, and anomic) would respond in a quantitatively or qualitatively different manner or if such differences in aphasia would appear when only the severity of overall aphasia was considered.

Procedures

Subjects. Ninety aphasic adults participated in this investigation. These subjects were collected from hospitals, clinics, and rehabilitation centers in the metropolitan Chicago area. All subjects demonstrated left hemisphere damage, medical stability, premorbid right handedness, no previous history of neurologic damage, normal hearing for 500-1000-2000 Hz at 25 dB (ANSI) and English as a native language. All subjects within the study were male. Age ranged from 23 to 82 years with a mean age of 61.2. Time post

onset ranged from two weeks to 183 weeks (3 years, 6 months) with a mean of 11.7 weeks.

Subjects were classified in two ways. First, based on total ACTS score individuals were placed into the mild (16-21 total points), moderate (11-15); or severe (0-10) group. A secondary classification based on classic type of aphasia resulted in Broca's, Wernicke's and anomic aphasic groups. This classification was completed at the time of testing by the examiner through the use of a spontaneous speech and language sample, articulation-repetition task for words and phrases, a word-retrieval task and tests of auditory comprehension. The following speech and language performances were employed by the investigators for classifying subjects.

Broca's aphasia: Effortful, halting speech, impaired articulation, agrammatism, reduced phrase length, auditory comprehension is intact relative to oral expression. (Apraxia of speech was present in several of these patients but was not considered essential in the diagnosis.)

Wernicke's aphasia: Effortless output, presence of semantic and/or phonemic paraphasia often to the point of neologistic jargon, paragrammatism, increased phrase length, press of speech, poor auditory comprehension.

Anomic aphasia: Effortless, well-articulated speech, normal to near normal phrase length, no observable difficulty with grammar, marked word-retrieval deficits relative to other expressive skills, often an empty, circumlocutory style of output, good auditory comprehension.

Method

The Auditory Comprehension Test for Sentences (Klor, 1979; Shewan, 1979) was administered to each subject. This 21-item test taps receptive skills by systematically varying sentence length, syntax, and vocabulary over three levels of difficulty. It allows for a quantitative comparison based on total score (maximum 21 points). The ACTS also allows for constituent linguistic analysis (i.e., noun phrase, verb phrase, prepositional phrase) of error responses and was selected for this strength and the strong quantitative standardization data that it possesses. Analysis of errors was possible because of the construction of the ACTS. Within each field of four response items, the target response and each foil differ by one linguistic constituent, i.e., noun, verb, or prepositional phrase.

The data obtained from the ACTS were analyzed in two ways. First, the total number correct was tallied for each subject. Second, a linguistic analysis of grammatical element errors exhibited by each subject and by each group was tallied. Analysis of variance procedures were conducted for 1) severity of aphasia vs linguistic error and; 2) type of aphasia vs linguistic error and 3) total ACTS score. (It should be noted here that while maximum total ACTS score is 21, the maximum total phrase score would be 13. This reduction in items was necessary to maintain an equal number of responses per phrase type. That is, those ACTS items that did not differentiate all three linguistic types were omitted.) Means and standard deviations were expressed in terms of items erred per linguistic unit. The level of statistical significance was set at $p < .01$.

Results

Severity of aphasia. As was expected, mild aphasic subjects performed significantly better than moderate aphasic subjects, and moderate aphasic subjects better than severe aphasic subjects (Table 1). However, the lack of a differentiation among these groups linguistically could suggest the heterogeneity of deficit brought about by collapsing various aphasic types by severity alone. Note that the mild aphasic groups performed equally well for each parameter although the variability in noun and prepositional comprehension could have been due to the anomic-Broca mix, respectively.

Table 1. Means, S.D. and F-ratios for Mild, Moderate, and Severe Groups by Linguistic Phrase.

Phrase	GROUP						
	Mild		Moderate		Severe		
	X	SD	X	SD	X	SD	F
Noun	1.00	0.31	1.10	0.60	1.80	0.22	5.01*
Verb	0.80	0.30	1.60	0.50	1.50	0.39	16.24*
Prep	0.90	0.42	2.80	0.69	2.80	0.94	16.98*

Type of aphasia. As groups, the traditional anomic, Broca's, Wernicke's hierarchy was repeated. However, the specific linguistic differences are more apparent through this analysis. Anomic subjects had significantly greater difficulty with noun phrases and Wernicke's subjects had greater difficulty with verb phrases. Although a level of statistical significance was obtained in the prepositional phrase category, it was believed that this was more reflective of the lack of difficulty presented by the anomic group. As can be seen in Table 2, the Broca's and Wernicke's groups had almost equal performance on this parameter.

Table 2. Means, S.D. and F-ratios for Broca's, Wernicke's and Anomic Groups by Linguistic Phrase.

Phrase	GROUP						
	Broca		Wernicke		Anomic		
	X	SD	X	SD	X	SD	F
Noun	1.20	0.44	1.30	0.48	2.30	.70	6.82*
Verb	1.50	0.37	2.50	0.55	1.30	.41	6.67*
Prep	2.50	0.84	2.10	1.00	1.10	.62	9.08*

These results suggest that, while comprehension is generally viewed along a severity continuum, this may mask the subtle receptive deficits that occur with specific aphasia types. Furthermore, the type of aphasia may provide the examiner/clinician with a signpost of where to look for the primary deficit (Davis, 1983). It is reasonably clear that the primary receptive deficits for

the classical aphasia groups varied with typology (Wernicke's = verbs; anomic = nouns), whereas those on the severity continuum did not.

To use a severity continuum as the only measure of aphasic deficit is to make aphasia a generic disorder. To employ only typology is to become equally restrictive in our ability to interpret the condition. Aphasia should be considered along a dual continuum - type and severity. To illustrate this, we took a small sample of subjects (N=15) and reduced each type of aphasia into mild, moderate, and severe components. The trends from this rather cursory undertaking (Table 3) illustrate that some masking of performance across linguistic parameter occurs as a result of severity interacting with type of aphasia. While the trends described earlier for the classical group data continue they are most evident in the moderate set of subjects. Furthermore, the greatest depression of verb comprehension for the Wernicke's group appears in the most severe clustering. So, we may be offsetting these differences by collapsing severity across types of aphasia.

Table 3. Type vs Severity vs Linguistic Parameter (mean number incorrect).

	SEVERITY								
	Mild			Moderate			Severe		
TYPE	N	V	P	N	V	P	N	V	P
Broca's	1.0	0.8	1.4	0.6	1.6	3.4	2.0	1.8	3.4
Wernicke's	0.6	1.2	1.2	1.6	2.0	1.8	1.4	3.4	3.2
Anomic	1.4	0.6	0.2	4.6	1.6	2.2	X	X	X

Finally, if I may return to the moderate subjects in Table 3, these are the patients who may benefit the most from our treatment. To view and compare them with mild and severe patients as a result of artificial collapsing of aphasia by type regardless of severity is to minimize their potential.

In closing, it is important that we perceive differences in aphasia not only from type or only from severity but from both perspectives. For type sans severity or severity sans type is only a partial diagnosis. It is critical that we perceive the differences so that we can effectively categorize, isolate the primary deficit, and rehabilitate the individual.

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