Methodological Issues in the Evaluation of Auditory Comprehension in Aphasia by Metalinguistic and Sentence Verification Procedures

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A revision in the traditional concepts of auditory comprehension involvement resulting from aphasia has been proposed during the past decade. The contemporary view is based upon the selective breakdown of semantic and syntactic elements in the expressive language of aphasic subjects, and arises from that body of literature which has investigated the hypothesis that localized brain damage might produce specific disruptions to psycholinguistic components in language comprehension. Utilizing evidence which appeared to be consistent with such a hypothesis, the impression of disordered auditory comprehension as a more or less global phenomenon has consequently been changed from one regarding degrees of involvement to that of selectivity of deficit.

In each of the studies which have tested this postulate, paradigms of a decidedly metalinguistic nature which require artificial tasks, have been employed. Generally, the tasks are of two types: those which examine the aphasic subjects' grammatical intuitions of his language by visually-mediated methods involving reading, and those which require sentence-to-picture matching for verification of sentence comprehension through auditorily-mediated means. For example, Zurif, Caramazza, and Myerson (1972) and Zurif and Caramazza (1976) used triadic comparisons to elicit relatedness judgments of words. Von Stockert (1972), Von Stockert and Bader (1976) and Gallaher (1979) used a sentence ordering task, while Ulatowska and Baker (1976) used a sentence anagram task. According to Zurif, Green, Caramazza, and Goodenough (1976), the information yielded by such metalinguistic responses were thought to parallel the processes of auditory comprehension. For this reason, conclusions regarding the selective breakdown of psycholinguistic operations have been formulated. Picture verification procedures were incorporated into a series of investigations which were reported about the same time and which also concerned themselves with the complex interactions between semantic and syntactic operations in auditory comprehension. Differences in comprehension for clinical subgroups of aphasic subjects when attending to a number of various syntactic structures were evaluated. Such studies include the investigations of indirect-to-direct object relationships by Heilman and Scholes (1976), center-embedded relative clauses by Caramazza and Zurif (1976) and grammatical morphemes by Goodenough, Zurif, and Weintraub (1977). In brief, the conclusions that have been suggested by this body of literature indicate that anterior damage to the brain results in a deficiency in the ability to integrate correctly understood lexical items into certain types of syntactic frames (Caramazza and Zurif, 1976) while patients with posterior brain damage demonstrate a lack of understanding for individual lexical items, but with retention of implicit understanding of the syntactic rules for combining words into grammatical sentences (Caramazza and Berndt, 1978).

As a technique, sentence verification procedures have also been used to measure the comprehension strategies of aphasic subjects without particular reference to selective semantic-syntactic involvements. Just, Davis and Carpenter (1977) investigated true-false affirmative and negative sentences in this way, while Goodglass, Blumstein, Gleason, Hyde, Green, and Statlender (1979) similarly investigated grammatically-encoded sentences. Brookshire and Nicholas (1980) and Berndt and Caramazza (1980) used sentence verification to judge the comprehension competence of aphasic subjects for active and passive, affirmative and negative, comparative and noncomparative sentences. The results of these studies were seen as contributing information concerning the mental operations involved in deficient auditory comprehension, as well as identifying the properties which increase the complexity of specific utterances for aphasic subjects.

The purpose of my discussion here is not so much to debate the content of the conclusions which have been suggested by these studies, but rather to present several methodological issues which threaten the validity of those conclusions when derived from metalinguistic procedures. Only after it is agreed that the means by which responses are elicited in a neurologically involved population are truly representative of their general daily-life behavior can a more profound analysis of the meaning of those results be undertaken.

The Relationship Between Metalinguistic Competence and Language Performance of Aphasic Individuals

The most critical issue to be addressed in a discussion of these investigations concerns the relationship between metalinguistic competence and the language performance of aphasic individuals. How might one's performance in dealing with tasks which reflect on language be representative of that same subject's ability to generate language? And what is the effect of aphasia on the capacity to perform such tasks?

Gardner, Denes, and Zurif (1975) have stated that "the judgment processes underlying linguistic intuitions do not appear to be independent of the specific psychological operations that produce and interpret utterances" (p. 62). It appears evident that such an assumption supplies the theoretical base for many of the studies which have employed metalinguistic procedures as a means of identifying certain aspects of language performance in context. Yet this assumption is not supported by some recent work in linguistics. Levelt, Sinclair, and Jarvella (1978) have written that "...the relations between explicit intuitions and underlying competence are less direct than those between phenomena of primary language usage (speaking, listening) and competence...Linguistic judgment is a form of behavior which should be explained in its own right, just like any other form of behavior." Gardner, et al. (1975) allude to this point in their discussion, but provide metalanguage a privileged status when related to aphasia. Gleitman, Gleitman, and Shipley (1973) assert that "there is broad agreement...that speakers follow the rules ...but (that) performances of this kind are hardly equivalent to our everyday understanding of what it means to know rules." Given the concept that a unified competence underlying all linguistic behavior does exist, then "explicit intuitions have at most a highly indirect and involved relation to this base of tacit knowledge." (Levelt, Sinclair, Jarvella, 1978). With regard to aphasia, patients cannot be asked to make judgments about grammaticality, synonymity, paraphrase, or relatedness of sentences for the analysis of the structure of pathological

language (Locke, Caplan, and Kellar, 1973). Even at elementary levels of comprehension, it appears more difficult for aphasic patients to handle metalinguistic tasks (Gardner and Zurif, 1976) than to perform tasks involving similar stimulus complexity in more natural language contexts.

Therefore, the conclusions derived from results obtained using these paradigms should not be confused with the processes inherent in extracting meaning from language for communicative purposes. To do so is to ignore a variety of conversational sources which contribute to the understanding of a message—for example, the relationships between old and new information, elaborations on a theme, expectations as to sentence structure--information useful for decoding language in its practical environment. Wilcox, Davis, and Leonard (1978) have demonstrated that extralinguistic information is utilized by aphasic subjects in a manner similar to normal subjects to successfully decode language. In deference to this latter point, sentence-picture matching tasks, while ostensibly less removed from communicative language usage than other metalinguistic tasks, introduce artificiality into evaluation of auditory comprehension by requiring overt attention to language describing a shared referent. This situation rarely occurs in a natural language setting where comment upon the shared referent is assumed. Performance on metalinguistic tasks should be recognized as distinct from, rather than parallel to language comprehension of a functional nature.

Contradictions to Generalization of Metalinguistic Reponses to the Receptive Language of Aphasia

Considering the foregoing comments, what might the role of brain damage in general and aphasia in particular be on the capabilities of the subject to respond to metalinguistic tasks such that conclusions regarding specific language comprehension deficits can be formulated? Ulatowska and Baker (1976) found that right-brain-damaged subjects who demonstrated no language difficulties in everyday communication made errors on a sentence construction task, suggesting that deficits in some metalinguistic tasks may be affected by damage to operations which are more diffusely represented than has been previously purported. One must then consider whether selective damage to syntactic and semantic processes purportedly discovered following left-hemisphere brain damage may actually be a byproduct of more general difficulties which affect language at the metalinguistic level.

All of the metalinguistic tasks described thus far require nonverbal output responses as a proposed means to measure receptive language behavior. As such, the potential for a patient's response to be mediated covertly by rehearsal appears to be great. This proposal appears to be consistent with the view of Nisbett and Decamp Wilson (1977) who contend that awareness seems to be restricted to the outcome or results of mental processes. When aphasic patients are asked to respond to metalinguistic tasks, the results in fact may be a representation of the patient's language as transmitted through a deficient output processor. Consequently, an agrammatic patient's performance on such a task might be expected to appear agrammatic. Evaluation of receptive processes would be confounded in these cases by the output requirements of the task.

There is further reason to believe that the performance of aphasic subjects on metalinguistic tasks might be at least partially explainable by comprehension deficits which would preclude the ability to respond to the tasks themselves. Gardner (1974) has demonstrated that aphasic subjects have difficulty in reading written symbols because of reductions in

their ability to utilize symbols. When reading words, aphasic subjects exhibit a reduction which is related to the degree of semantic association rendered by each word as a function of its grammatical class. Marshall and Newcombe (1966), Gardner and Zurif (1975) and Klatt (1980) all reported that in word list reading nouns are the easiest word type to read for aphasic subjects while adjectives and verbs presented increasing difficulty. Prepositions, adverbs, determiners, and grammatical particles posed appreciable difficulties to all groups of aphasic subjects, including those who featured such words prominently in their spontaneous speech (Marshall and Newcombe, 1966; Gardner and Zurif, 1975). Similar patterns with regard to patients' ability to deal with variations in semantic content at the word level are evident at the phrase level as well (Gardner and Zurif, 1976). The results of metalinguistic tasks requiring relatedness judgments, in which grammatical words of little semantic value were ignored, is consistent with the results of studies of reading comprehension, but not for the same reasons. While Zurif and his coworkers (1972, 1976) interpret their findings to represent a basic syntactic deficit in agrammatic patients, the reading requirements of the task, with isolated words conceivably approximating a situation similar to list reading, beg the question of whether the results are due to difficulty in the extraction of semantic meaning from words which perform a purely syntactic function. The difference, of course, is related to supposing whether the deficit is due to syntactic manipulation of these items or if the semantic deficit precludes the ability to perform such a syntactic operation. The select involvement of psycholinguistic operations according to site of lesion has also been suggested at the sentence level for metalinguistic tasks by Gardner, Denes, and Zurif (1975) and Samuels and Benson (1979). While it is beyond the scope of this paper, there is alternative evidence to suggest that the degree of comprehension involvement is a key factor so that an interaction may exist between word class and severity of aphasia (Gardner and Zurif, 1976) regardless of the site of lesion. Since differential comprehension involvement is characteristic of types of aphasia which are based upon site of lesion, the greatest difficulty in associating semantic meaning for those patients with higher comprehension levels should be for words which have minimal semanticity. These items are the grammatical devices, and as well known, are exactly the words with which Broca's aphasic patients have demonstrated the most problems in metalinguistic tasks. Even when such items as functors assume greater semantic meaning by their syntactic role in an utterance, the Broca's patient's performance in comprehending them increases as well (Zurif and Caramazza, 1976). Collectively, the evidence appears to favor a semantic interpretation of comprehension deficits across aphasias than to assume selective syntactic-semantic deficiencies (Gardner and Zurif, 1976). Such a view appears consistent with the impressions of normal language comprehension provided by Greene (1972): "neither syntax nor semantics can be understood in isolation, since the only purpose of using different syntactic transformations is to communicate some particular aspect of meaning. When transformations are being used to perform this natural function of conveying a meaningful relationship, they will be produced and understood perfectly easily. The special difficulties with them in psycholinguistic experiments are explained by the fact that transformations are being used in contexts in which they are not performing their natural semantic function." David McNeill

(1979) summarized the issue in this way: "the listener computes a single, multifaceted representation in which syntactic and semantic information are not functionally distinguished."

Sentence Verification as an Evaluative Technique

I would like to conclude with a few remarks about sentence verification procedures. These procedures, which often utilize sentence-to-picture matching, appear to provide a better approach to language comprehension evaluation than the metalinguistic procedures described so far. As mentioned before, the verification technique is one which probably is less removed from functional language comprehension. Unlike metalinguistic procedures that test auditory comprehension through reading tasks, sentence verification also has the advantage of testing language input through the specific modality to which the results are to be generalized. However, the ability to match stimulus equivalents is critical to this task (Jones and Wepman, 1961). In other words, the ability to perform the task of matching one stimulus with another may be disrupted following aphasia quite separately from any concomitant disruption of language, and as such, may influence the results obtained from such a task. Wepman and Jones have also demonstrated that the ability to match stimulus equivalents is age-related, with diminished performance accompanying increasing age. As these authors state, brain damage in the elderly patient exacerbates this deficit to an even greater degree than is observed in normals. Birchmeier (1980) comments that performance of matching depends upon a number of capacities which include unimpaired visual analysis of pictorial data, the capacity to produce associations, the ability to sample associations according to a given principle, and the ability to move from one idea to another while sampling. Errors, therefore, may be due to deficits in any one of these capacities.

In closing, the position of this paper should not be construed as an overall indictment of the use of metalinguistic procedures in aphasia research. To advocate such an attitude would indeed be too conservative, and would ignore the positive contributions to our understanding of the effects of aphasia which can be attained through these methodologies. Rather, it is proposed that greater emphasis be placed upon the recognition of these results as indicative of a psycholinguistic behavior which is unique and not necessarily representative of more general language functions which operate in the pragmatic decoding of communication. An additional suggestion which follows from this review is the need for a more comprehensive evaluation of a patient's ability to match stimulus equivalents, from simple to complex symbolic levels, before proceeding with sentence-to-picture matching paradigms. This additional measure may aid in alleviating one potential confounding factor in aphasia research. Perhaps the incorporation of these proposals into subsequent experimentation in aphasia may produce a more specific operational definition of aphasia for clinical aphasiologists.

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