Auditory Comprehension Problems in Adult Aphasic Individuals

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Whether an aphasic patient understands what is said appears to be influenced by many factors in addition to the message itself, among them: how the material is presented, what the situational context is, the nature of the response required, the individual's cognitive functioning, his/her motivation, and the location and extent of the cerebral lesion. Of course, the individual engaged in the comprehension task is also important. The nature of auditory comprehension problems in adult aphasic individuals is indeed complex, but we are making headway. To paraphrase Shakespeare, To understand or not to understand is a complex question.

Researchers now generally agree that all aphasic patients demonstrate auditory comprehension problems. Of less consensus is whether all comprehension problems are similar in type.

Whenever we communicate with an aphasic patient, during testing or in conversation, some of the time we talk and the patient listens. These interactions require that the aphasic person understand our linguistic messages. Whether that understanding takes place is influenced by many factors operating in the situation, including auditory perception, auditory comprehension, and factors which influence auditory comprehension.

Presumably, the ultimate goal of processing messages is to comprehend them, that is, to assign appropriate meaning to them. Take the message "Gotcha". What does it mean? Interpretation depends upon linguistic aspects, context, and extralinguistic variables. Said by a parent to a young child, "Gotcha" represents "I've got you, you're not going to fall." But in the context of playing a game of tag, or changed slightly to "Caughtcha", it means "Tag, you're it." Said by an adult during conversation, it might mean "I understand what you said," or, in another context with a different intonation pattern, it might mean "You fell into the trap I set for you." Uttered during a game of cowboys and rustlers, "Gotcha" represents "Bang, bang, you're dead." The point of this example is to illustrate that whether a person understands or fails to understand depends on many dimensions of the communication situation as well as the processing of the auditory and linguistic message components (Figure 1). This applies to aphasic patients functioning in everyday situations and in the clinical setting.

Processing Auditory Stimuli: Perceptual Data

Auditory perceptual deficits do not appear to be the major contributing factors to aphasic patients' inability to understand auditory messages. The auditory perceptual problems may involve discrimination, recognition, and/or temporal ordering, using verbal or nonverbal material, and may be found among several aphasic types. However, the disociation between perceptual problems and comprehension problems in many aphasic patients precludes using perceptual problems as the explanatory cause for comprehension deficits. Recognizing a "towel rack" as a "motorcycle", as one of our aphasic clients did, probably represented a semantic confusion that did not involve a failure of perceptual processing.

Processing Auditory Language: Understanding the Linguistic Input

Comprehension of spoken language requires individual processing of the linguistic components - phonology, semantics, and syntax - as well as interactive processing among them.

Phonology

Comprehension requires the ability to perceive speech and to identify phonemes with some accuracy, but the suprasegmental aspects of phonology are also important. Perception of stress as a phonemic cue appears to be maintained in aphasic adults (Blumstein & Goodglass, 1972), allowing them for example to distinguish "record" from "record". Stress is an important factor in aphasic patients' performance on receptive-
guage tasks and exaggerating stress can assist comprehension (Kellar, 1978; Pashek & Brookshire, 1980).

In addition, research has shown that semantic and syntactic processing may be redundant for normal adults, they appear to be necessary for aphasic patients with severe comprehension problems. Boller & Green, 1972; Green & Boller, 1974; When presented with questions, statements, or commands, aphasics made fewer correct responses. However, they make numerous responses, which matches the type of grammatical structure suggested that they were obtaining relevant information from the intonation contour of the message.

**Lexical Processing**

Part of the aphasic patient's difficulties in understanding language stems from impairment in the lexicon, which Schuell, Jenkins and Jimenez-Palon (1964) described as a "reduced availability of vocabulary". Frequency of occurrence of lexical items and their semantic category membership are known to influence comprehension (Goodglass et al., 1986; Shewan & Canter, 1971). The research data for the effects of grammatical form class on comprehension, however, have been less consistent, and more controlled study is needed before firm conclusions are drawn (Goodglass, Oken & Hyde, 1970; Parisi & Pazzamiglio, 1970; Shewan, 1976; Smith, 1974).

Aphasic patients' performance on auditory identification tasks may also represent an impairment in semantic representation or semantic knowledge. Aphasic patients have been shown to have difficulty grouping lexical items on the basis of semantic feature (Zurif et al., 1974). Furthermore, their semantic category boundaries were found to be different from those of normal adults in terms of scope and hierarchical organization (L'hermitte, Derouesne, & Lecours, 1971; Derouesne & Lacours, 1972). Therefore, lexical impairment may involve not only a less accessible vocabulary but also disturbed semantic representation.

**Semantic and Syntactic Processing**

Work in semantic and syntactic processing has indicated that, as the grammatical complexity of a sentence increases, there is a corresponding decrease in comprehension accuracy. A typical difficulty hierarchy is shown in Table 1. Not only is the sentence type itself an important contributor to comprehension, but there are also differences within types. Reversible sentences are more difficult than nonreversible ones (Lasky; Weidner, & Johnson, 1976; Canacazza & Zuff, 1978). Sentences which follow an order of mention strategy are easier to understand than those which do not (Ansell & Flowers, 1980). Whether sentences are true or false also influences comprehension (Brookshire, 1980). Whether sentences are true or false also influences comprehension (Brookshire, 1980). Whether sentences are true or false also influences comprehension (Brookshire, 1980). Whether sentences are true or false also influences comprehension (Brookshire, 1980).

Other dimensions to consider are context, manner of presentation, form of response, psychology, and extra-linguistic. Both linguistic and situational content variables can influence comprehension. A supportive linguistic context usually aids comprehension (Gardner, Albert, & Winner, 1976; Wailer & Darby, 1978) by creating a set for the aphasic person (e.g., structuring all questions in a "yes-no" format rather than random presentation of several variables), by reducing the number of likely alternatives, or by providing cues about what is to follow. Although linguistic context is generally used by speech-
language pathologists and family members to aim comprehension, correct in the form of competing messages or indirectly worded messages can reduce comprehen·sion (Greene & Bolter, 1974).

Situational context may also positively influence comprehension performance by adding redundancy to the linguistic message. This facilitates linguistic processing by biasing the subject toward using one strategy rather than another by limiting the number of possibilities in a situation. For example, the patient does not need to comprehend the entire question: "Would you like orange socks?" since this is more likely to occur than "Would you like orange socks?" in the context of a breakfast situation. Research has shown that patients with aphasia may perform better in the clinical situation with a speech-language pathologist that in other environments (Green & Boiler, 1974). Moreover, a speaker's intended meaning does not always correspond to the literal meaning of the words used. Aphasic individuals' difficulty comprehending indirect requests, such as "Must you tap that pencil?", demonstrates the importance of context in determining an appropriate interpretation.

How messages are presented to the aphasic patient can influence understanding. Timing aspects of verbal messages are important to aphasic patients' comprehension. Expanding the speech signal by inserting pauses has a positive effect on comprehension, either on the accuracy or on the speed of response (file/1s & Brocairhine, 1975; Shepard, Aseltine, & Edwards, 1973). Longer pauses appear to be more facilitory. Aphasic individuals may use different strategies during pause time (Salatore, 1975). Expanding both speech and pause intervals has been shown to improve aphasic patients' performance in an auditory digit span task, and may be processed differently from related items, words in sentences. The psychological dimension can be divided into motivation, intelligence, and memory variables. As a speaker interacted with an aphasic patient, one can motivate better performance. With positive instructions, responses were improved (Brookshire, 1972; Yorkston, Marshall, & Butler, 1977; Yor­kston, Beukelman, & Waugh, 1979).

Presentation aspects, such as repetition of the mes­sage, frequently improve aphasic patients' performance (Brookshire, 1972; Schuell, Jenkins, & Arriola-Pabin, 1964). Live voice presentation of auditory material is superior to tape recorded presentation (Bolter et al., 1974). The sequence of events presented may also be important because presentation of difficult commands, interspersed among easy ones, has been shown to interfere with aphasic performance. The order of presentation is important because it imposes memory demands on memory. Auditory memory factors play a role in an aphasic patient's ability to decode, retain, and recall verbal material. However, specifying and quantifying exactly how memory influences understanding is difficult, especially since measures of memory have frequently used unrelated items. Numbers are unrelated in an auditory digit span task, and may be processed differently from related items, words in sentences.

The response required from an aphasic person can affect performance on an auditory comprehension test. Response modality, choices, and scoring system are important variables to consider. Most recent research in aphasia has recognized the necessity to avoid verbal responses and to employ gestural responses, such as pointing or manipulation of objects, when measuring audi·ory comprehension (Shewan, 1979; Goodglass & Kaplan, 1972, 1983). Also the number of choices in a response array can affect the difficulty of the comprehen­sion task and an aphasic adult's chance score. With only two choices, the chance score is 50% which is reduced to 25% when four choices are provided. The types of response choices also influence task difficulty. Selection of "ball" from the array of "ball, house" is much easier than from "ball, bat, wheel, doll." The former contains only an unrelated decision while the latter contains semantic association, a perceptual similarity, and a phonetic similarity.

The scoring system employed in an auditory comprehension task can determine the amount and quality of information obtained. While accuracy scores are important, multidimensional scoring systems provide more information. The 16-point PICA scale measuring accuracy, responsiveness, completeness, efficiency, and promptness (Porch, 1967) is a good example. This kind of system is not without its drawbacks, however, as outlined by Silverman (1974).

Although aphasia does not cause intellectual impairment, it is important to consider an aphasic patient's premorbid intellectual level when selecting goals and materials for rehabilitation. To state the obvious, it is inappropriate to use materials that exceed a patient's premorbid intellectual level. Whether a sentence is understood also depends, to some extent, on the con­text in which it is presented. For example, a sentence that is presented without context may be understood as a question. Patients with aphasia may need to be motivated better in treatment than unmotivated ones. Although motivation is an important factor, it is a difficult variable to quantify empirically.

Clinical experience, however, repeatedly tells us that motivated patients generally do better in treatment than unmotivated ones. Multidimensional scoring systems provide more information on the effect of task difficulty on performance. The 16-point PICA scale measuring accuracy, responsiveness, completeness, efficiency, and promptness (Porch, 1967) is an example. This kind of system is not without its drawbacks, however, as outlined by Silverman (1974).
problems that reduce the amount of information an aphasic patient is able to process (Tidman & Genstman, 1977).

High emotional content of material has been found to facilitate auditory comprehension (Boiler et al., 1979). However, comprehension of affectively toned or melodi­
callyintoned sentences, which are neutral in semantic content, was no superior to comprehension of normally
toned sentences (Wallace, Center, & Sherman, 1980). Also, familiar content can facilitate auditory comprehen­
sion. Several impaired aphasic patients have been shown to be able to follow familiar conversational topics, but became confused and misunderstood less familiar topics (Stachowiak et al., 1977). Interest and familiarity probably interact with listener motivation and directly affect it.

Summary

Comprehension problems in the aphasic adult gen­
erally encompass understanding the meaning of the lingu­
istic message; that is, they involve semantic and syntactic
processing. Explanations of these problems on the basis of the auditory perceptual disturbances are no longer widely accepted. Although perception may be involved in some cases, it is not the underlying explanatory factor in most.

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