Use of the Two-Alternative Forced-Choice Paradigm in Training Aphasic Error Recognition

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One of the goals of speech and language therapy for the aphasic adult is to provide the individual with strategies for coping with aphasic deficits in communicative interactions. During the course of treatment, the patient learns strategies which aid him in the production or comprehension of some communicative unit. The patient must learn not only how to use a particular strategy, but when to use the strategy as well.

Inherent in the development and use of such self-generated cues for aphasic adults (Berman and Peelle, 1967) is the assumption that the patient is able to recognize his own errors. In the event that a patient does not always recognize his own errors, knowledge of a cueing strategy alone will not aid the patient in communicative interactions. During the typical course of speech and language therapy for the aphasic adult, error recognition is shaped through a variety of methods. Typically, the speech and language pathologist initially provides the patient with feedback regarding the accuracy of his response (e.g., by saying "good" or "no, that wasn't right"). At some later stage in treatment, the speech and language pathologist might require the patient to evaluate the accuracy of his own response (e.g., by asking "How did you feel about that?" or "How did that sound?"). Ultimately, the patient is expected to evaluate response accuracy on his own, and to do something to correct inaccurate responses. This sequence of events, however, does not guarantee that the aphasic patient necessarily will recognize his own production or comprehension errors.

The two-alternative forced-choice (2AFC) paradigm (Green and Swets, 1966) provides the framework for a different, but useful approach for training aphasic adults to recognize their own errors. As its name implies, the paradigm forces the individual to select a response in one of two intervals. This procedure has been used extensively in psychophysical experiments, and is designed such that subjects must make decisions about their perceptions of a signal. The intervals are constructed so that one of them contains a signal and the other one contains noise. When this model is applied to aphasic error recognition training, the notion of "signal" is analogous to "accurate response" while the notion of "noise" is analogous to "inaccurate response." Error recognition training is accomplished by pairing an inaccurate item with an accurate item, and the aphasic patient is forced to decide which item is the most acceptable.

In selecting stimuli for error recognition training using the 2AFC paradigm, the clinician first probes patient responses to a particular task (e.g., naming, sentence completion). The inaccurate items for the 2AFC pairs are generated on the basis of the patient's errors on this task, and the accurate counterparts are generated by the clinician. Unlike other approaches, the 2AFC procedure allows the aphasic patient the opportunity to judge the accuracy of his response with respect to a second response (or standard).

An alternate approach might be to "feed back" responses to the patient and require him to make a decision about the accuracy or acceptability of each response individually. This approach requires that the patient make a yes/no decision. Assuming that the patient has difficulty recognizing his own errors, patients will tend toward a yes bias with this approach. In other words, such patients will likely decide that most of their responses are acceptable. Also, procedures requiring this yes/no judgment do not afford the patient the opportunity to compare his response with any standard response, forcing the patient to rely solely on his intuitive communicative knowledge. The 2AFC procedure circumvents these two problems, and forces the patient to choose one item in the pair as being acceptable.

The 2AFC procedure is potentially useful in training error recognition for a variety of aphasic syndromes and therapy tasks. For example, neologistic misnamingsmight be paired with appropriate names for the patient with Wernicke's aphasia. Literal paraphasic repetition responses from the patient with conduction aphasia might be paired with the original stimuli. Similar pairings might be constructed for patients with Broca's or anomic aphasia, and for sentence completion or sentence formulation tasks. To avoid problems which might arise from patients who are unable to repeat verbal stimuli accurately, clinicians might find it useful to hold up one finger on the right hand simultaneously with presentation of the first stimulus in a pair, and two fingers on the left hand with presentation of the second stimulus in the pair. The aphasic patient can indicate acceptability then by pointing to "one" or "two." Also, clinicians should avoid providing additional suprasegmental or nonverbal cues during the presentation of verbal stimuli, so that, as much as possible, the patient can utilize segmental cues to judge acceptability.

The following case illustrates how the 2AFC procedure was utilized in training recognition of written language formulation errors. The patient, DT, age 55, was a retired pilot who suffered a CVA involving the left temporal and parietal regions in June, 1980. Initial testing with the Boston Diagnostic Aphasia Examination (Goodglass and Kaplan, 1972) revealed a moderate Wernicke's aphasia, characterized by impaired auditory comprehension in the context of fluent, well-articulated speech output. Speech and language treatment was initiated, and during the course of recovery and treatment, the patient's auditory comprehension improved to within normal limits, and neologisms disappeared. In August, 1980, the patient's primary communicative deficits were subtle word-finding problems (particularly for low frequency words such as inheritance and Ferris wheel), subtle reading comprehension problems, and disruptions in written language formulation.

Following two additional months of treatment, directed almost completely toward improving written language formulation skills, the patient's word-finding difficulties were no longer apparent in his communicative interactions. On rare occasions, when the patient had difficulty retrieving a word, he used circumlocutionary descriptions well in compensation. The patient was also able to compensate for minor reading comprehension difficulties by decreasing his reading rate and by reading aloud. A variety of written language formulation errors persisted and, moreover, the patient continued to have difficulty discriminating between his own well formed and poorly formed written sentences.

In a procedure borrowed from PACE therapy (Wilcox and Davis, 1978), samples of written discourse were obtained from the patient, who was seated behind a screen which separated him from the clinician. The patient was asked to write a three sentence paragraph about magazine photographs (which were obscured from the view of the clinician). Paragraphs were generated for twenty different pictures. Post hoc examination of these writing samples revealed numerous errors and awkward constructions. These included:

Sentence fragments (e.g., "Preparing to open a door");
Ambiguous sentences (e.g., "Her majesty is arriving by an airplane");
Anamalous sentences (e.g., "Women peasants appear to be dresses");
Functor deletions (e.g., "The seal is playing game");
Semantic inaccuracies (e.g., "Three clowns are mimics," written as a description of a picture which showed three children wearing clown make-up);
Coreferential difficulties (characterized by lack of pronominalization in adjacent sentences having the same referent, confusion of specific/non-specific articles having the same referent within a particular paragraph, etc., e.g., "The nurse captain is checking a young girl's throat. A nurse wears a white hat."); and
Syntactic confusions (e.g., "The lady sitting is having an applied mask").

While the patient had been asked to reread each paragraph aloud once it had been written in order to self-evaluate his productions, he made only six overt attempts at self-correction (he crossed out words or added words to a sentence).

Written discourse from ten of the stimulus pictures was selected for training purposes. In the first phase of training, the clinician selected isolated patient-generated sentences which contained errors and paired them with well-formed contrasts. The patient was required to read each of forty pairs aloud and to identify which "sounded better." An example of one of these pairs was:

a. Preparing to open a door. (ill-formed)
b. A man is preparing to open a door. (well-formed)

These contrastive pairs were read by the patient with the picture referents present, and the clinician provided verbal feedback about the quality of each of the patient's choices. When the patient had achieved criterion on this task (90% or better accuracy for two consecutive sessions), a second set of contrastive pairs was constructed. This second set consisted of errors and awkward expressions (e.g., reiterated noun forms) of coreferential forms taken from adjacent sentences in his written discourse paired with well-formed alternatives. An example of one of these pairs was:

a. An Eskimo protects two huskies. He wears a parka. (well-formed)
b. An Eskimo protects two huskies. An Eskimo wears a parka. (ill-formed)

Once again, the patient read contrastive pairs aloud, made a choice with the picture referents present, and the clinician provided verbal feedback about each of the patient's choices. When the patient had achieved criterion on this task (90% or better accuracy for two consecutive sessions), the task was replicated with three-sentence pairs, utilizing his original paragraphs and the clinician's well-formed alternatives in each pair. When the patient had achieved criterion on this third task, he was asked to generate 20 three-sentence paragraphs about the same magazine photographs he had used prior to the initiation of the 2AFC training. Examination of these written discourse samples revealed a dramatic decrease in the frequency of each written error type (Table 1), even on discourse about the ten photographs which were not used in training. It should be noted that the patient was able to self-correct his written constructions more often following treatment, as the post-treatment paragraphs revealed 17 overt attempts at self-correction. Figure 1 summarizes the patient's performance on 2AFC judgments during treatment.

Table 1. Types and frequency of written language errors for patient DT before and after 2AFC error recognition training. (N=20 three-sentence paragraphs).

Error Type	Pre-Tx	Post-Tx
Sentence fragment	2	0
Ambiguous sentence	9	2
Anomalous sentence	3	1
Functor deletion	4	1
Semantic inaccuracy	5	0
Coreferential difficulty	9	1
Syntactic confusion	3	0
Overt self-corrections	6	17

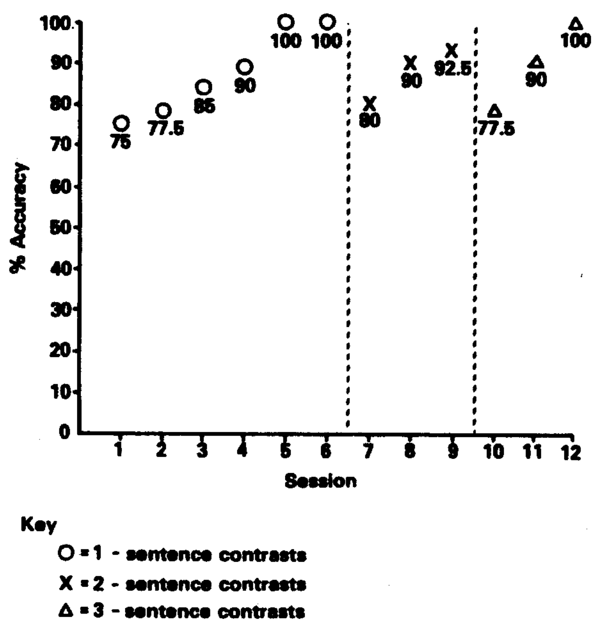

Figure 1. Summary of DT's performance on two-alternative forced-choice judgment tasks during therapy.

In summary, clinicians may find that the 2AFC procedure may be useful in training error recognition in some aphasic patients. In many instances, it may be more efficient to train self-recognition of aphasic errors by other means. The 2AFC procedure circumvents problems of the yes bias and affords patients the opportunity to compare their own errors with some standard, and it provides the framework for the development and use of self-cueing strategies for aphasic patients.

REFERENCES

Berman, M. and Peelle, L.M. Self-generated cues: A method for aiding aphasic and apractic patients. J. Speech Hearing Dis., 32, 372-376, 1967.

Goodglass, H. and Kaplan, E. The Assessment of Aphasia and Related Disorders. Philadelphia: Lea and Febiger, 1972.

Green, D.M. and Swets, J.A. Signal Detection Theory and Psychophysics. New York: John Wiley and Sons, Inc., 1966.

Wilcox, M.J. and Davis, G.A. Procedures for promoting communicative effectiveness in aphasic adults. Miniseminar presented to the American Speech and Hearing Association, San Francisco, 1978.