The Efficacy of Five Self-generated Strategies for Facilitating Auditory Processing

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INTRODUCTION

The use of self-generated and clinician supplied strategies has become popular, if not plentiful, among clinical aphasiologists in the recent past. Perhaps this popularity has been motivated by Luria's (1948) suggestion that it is one of the clinician's roles to direct aphasic persons toward the strategies that help them. The great majority of strategies have been used to facilitate word and sentence retrieval and formulation. These have taken the form of both clinician supplied and self-generated strategies. They include:

1. Word-association attempts ["It's a table, no, a desk." Also includes synonyms, antonyms, and rhymes.] (Berman and Peelle, 1967; Marshall, 1976; Whitney, 1975)
2. Verbal descriptions [Circumlocutions in an attempt to converge on a target or to cue word retrieval if clinician supplied.] (Berman and Peelle, 1967; Linebaugh and Lehner, 1976; Marshall, 1976; Whitney, 1975)
3. Gestural or graphic cues [To aid in word retrieval or sentence formulation.] (Berman and Peelle, 1967; Linebaugh and Lehner, 1976; Whitney, 1975)
4. Stop strategies [Slowing down or stopping inefficient attempts, to aid self-monitoring.] (Whitney, 1975)
5. Go strategies [Encouragement to continue when initiation difficulties are present. This would include the generalization strategy of Marshall.] (Marshall, 1976; Whitney, 1975)
6. Cloze technique [Sentence completion.] (Berman and Peelle, 1967; Linebaugh and Lehner, 1976; Wepman and Jones, 1967)
7. Stimulus repetition [Orienting toward the task if clinician supplied.] (LaPointe, Rothi, Campanella, 1978; Linebaugh and Lehner, 1976)
8. Articulo-phonetic cues [Providing first letter, syllable, word, or articulatory position of correct target.] (Linebaugh and Lehner, 1976)
9. Delays [Between stimulus and response.] (Marshall, 1976)

A few strategies have been directed at the facilitation of input. These include:

1. Repeats (Whitney, 1975)
2. Alternate more intact modality [Given by the clinician or asking for by the patient.] (Weigl, 1961; Weigl and Bierwisch, 1973; Whitney, 1975)
3. Organizing and Clustering [Grouping a series of stimuli according to an essential relationship between members.] (Lubinski and Chapey, 1978; Sharf and Goldfarb, 1978; Tillman and Gerstmann, 1977)

While each of the strategies could be either provided by the clinician or self-generated by the patient, the goals in their utilization are always to work towards efficient self-generation. The evidence from several of these studies suggests that aphasic persons can learn strategies, and that these strategies can be facilitory and/or compensatory.

The purpose of this investigation was to determine the degree to which five different self-generated strategies aided auditory processing. In order to do this, answers to the following three general questions were sought.

1. Are some strategies more successfully employed than others?
2. Is the effectiveness of a strategy directly related to the nature of the task being performed?
3. Are the strategies which are used more frequently those strategies which are most successful?

PROCEDURES

Definitions. Any behavior which is observed after the breakdown of a cognitive or motor process does not necessarily quality as a strategy. According to Webster (1964), a strategy is defined as "the skillful employment and coordination of tactics." We define a self-generated strategy as a mechanism for resolving a processing inefficiency over which the patient has some volitional control, at either a conscious or subconscious level. Those behaviors which were considered as strategies in this investigation were:

1. Vocal or subvocal rehearsal (14) of the stimulus during the performance of an imperative.
2. Delay (13) in initiating a response after the stimulus, or a delay in carrying out the response after initiation of the response. This is to be separated from generally slow processing, which is somewhat independent of task difficulty.
3. Immediacy (12) An abnormally fast response on the first stage of a two-stage imperative. This response is to be separated from impulsivity, which is a basic cognitive style and is somewhat independent of task difficulty.
4. Repeat (9) A requested repetition of the stimulus.
5. Cue (8) A request of a second stimulus repetition.

Subjects. The subjects for this study were 30 left-hemisphere damaged aphasic adults. They were heterogeneous in age, etiology, time post-onset, severity, nature of aphasic involvement, and speech/language diagnostic categories (aphasia, apraxia of speech, dysarthria--and combinations thereof).

Data Collection and Analysis. The thirty aphasic subjects were administered the Revised Token Test (McNeil and Prescott, 1978). Each subject's response to 100 imperative commands was scored in standard fashion with the 15 point multidimensional scoring system. The instances in which any of the five strategies were used from the 3000 stimulus items were then tabulated by individual subtest, and by successful or unsuccessful usage.

For the determination of a strategy's effectiveness, success in the use of a strategy was defined in a relative manner. The mean item score determined the success level of any particular strategy for within and between strategy comparisons. For example, for interstrategy comparisons, the use of a delay (which is a 13 on the Revised Token Test) was judged to be more successful than use of a strategy of vocal-subvocal rehearsal (which is

scored as 14) if the mean item score was higher when the delay was used than when rehearsal was used. A lower limit of .50 below the strategy number was used as the cut-off for success or failure for intrastrategy comparisons, (e.g., a mean item score of 13.00 to 12.50 was judged as successful use of delay, while a mean item score of 12.00 for delay was judged as unsuccessful.) Comparisons were made between items where a strategy was employed, and where no strategies were employed and no inefficiencies in processing were evidenced.

A Pearson Product Moment Correlation Coefficient (Weiner, 1962) was computed to determine the relationship between successful strategy use and the frequency of occurrence of that particular strategy. In addition, a one-way analysis of variance (Hays, 1973) was used to test the differences in success of strategy use by subtest. Another one-way ANOVA was used to test differences between strategy types. A Tukey Test for significant gap (Edwards, 1961) was used to determine the site of significance for significant ANOVA's. A Chi Square ($p.<.10$) was computed for each strategy with the expected frequency of 50% for chance level.

RESULTS AND DISCUSSION

The frequency of use of these strategies, disregarding effectiveness, have been reported elsewhere (McNeil and Prescott, 1978). There is a difference in the overall number of times strategies are employed on these tasks: Correct (no strategy) = 34%; Vocal-subvocal Rehearsal = 7%; Delays = 25%; Immediacy = 4%; Repeats = 6%; and Cues = 2%. However, the frequency of successful usage was found to vary considerably from these simple usage figures. Appendix A summarizes all of the data for this study, including the number of times a particular strategy was used, the percentage of successful usage, and percentage of difference between successful usage and the percentage of successful performance when no strategy was used (15), by subtest and overall.

In order to determine whether a positive relationship existed between frequency of usage and frequency of successful usage, a Pearson Product Moment Correlation Coefficient was computed. Table 1 lists these correlation coefficients. There were no significant correlations between the success of a strategy and the frequency with which it was employed. Only the baserate ("correct" = 15) correlated highly, positively, and significantly with the frequency of usage. This finding seems to suggest that these aphasic patients had control over what processes or strategies they used. In fact, when no strategy was implemented, they tended to perform less well than when strategies were employed. This seems to support the notion that the behaviors identified as strategies are indeed under control of the patient. This does not mean, however, that at any moment in time, a strategy will be successful. Varying amounts of inconsistency characterize strategy effectiveness as it does most aphasic behavior.

Table 1. Pearson Product Moment Correlation Coefficients for the percentage of successful strategy usage and the frequency of occurrence of that strategy.

STRATEGIES						
Correct	Vocal-Subvocal Rehearsal	Delay	Immediacy	Repeat	Cue	Overall
.73	.39	-.20	-.51	.21	-.33	-.31

In order to determine whether the effectiveness of strategy type was related to the nature of the task (length or sentence type), a one-way analysis of variance was used to test the differences in successful strategy use between subtests. Contrary to our expectations, no significant differences in success between subtests were found (F 1.57, $dF=9$, $P > .05$). This finding suggests that the strategy employed for any given type or difficulty of task was patient-specific. Higher level strategies were not more successful with easier tasks, and lower level strategies were not more successful with more difficult tasks.

In order to determine the effectiveness of each strategy, a Chi Square was computed for each strategy separately. The results suggested that four of the five strategies were utilized significantly better than chance level, and that use of delay resulted in performance significantly poorer than chance level (correct - $X^2$5.47, dF1, $P < .005$; Vocal/subvocal rehearsal - $X^2$8.2, dF1, $P < .005$; Delay - $X^2$72.8, dF1, $P < .001$; Immediacy - $X^2$2.25, dF1, $P < .10$; Repeat - $X^2$50.23, dF1, $P < .0005$; Cue - $X^2$5.47, dF1, $P < .005$).

To determine whether strategies might differ one from another in their success, a one-way ANOVA was employed. A statistically significant ($P < .001$) difference between successful strategy type use was found. Post hoc analyses using the Tukey Test revealed a significant ($P < .05$) difference between the successful use of delay and all other strategies. Given the results of the Chi Square, and this ANOVA, these findings are interpreted as evidence that all strategies are used with varying success, but all are used with better than chance success with the notable exception of delay. Self-imposed delay was significantly and substantially less successful than all other strategies. Indeed, delay was successful only 31% of the times it was employed. In contrast, vocal/subvocal rehearsal was successful 61% of the time, immediacy, 59% of the time, repeats 83% and cues 74% (all nonsignificantly different from one another). Overall, these four successful strategies were more successful than when no strategy was used. However, it should be noted that while the occurrence of these four strategies was successful beyond a chance level, they were unsuccessful a substantial number of times. That is, vocal/subvocal rehearsal was unsuccessful 39% of the time, immediacy, 41% of the time, repeat 17%, and cue 26%. The clinical implications of this seem to be that, although teaching or facilitating the use of strategies may be efficacious, they are probably not enough to support a damaged mechanism. That is, strengthening the mechanism seems necessary also. Likewise, it is not enough to teach a strategy. The patient must have skill with many strategies, which then can be recruited as task demands change.

The methods of this investigation are different in some respects from other studies where strategies have been investigated. All previous strategy studies have used clinician-imposed strategies rather than patient-generated ones. This difference may account for the fact that other studies such as Yorkston, Marshall, and Butler (1977) have found delay imposed between stimulus and response to be facilitative for auditory processing, even on tasks very similar to those used in this investigation. Arguing against this explanation is Toppin and Brookshires' (1978) finding on self-imposed delay, in which delay was found to be unsuccessful. Another possible explanation for the failure of delay to aid auditory processing might be that it really isn't a strategy at all. Rather, it might be an effect--the result of a processing inefficiency. It may be then, that these aphasic patients were not making use of the time during this delay to aid storage, make appropriate acoustic-linguistic associations, generate probabilities,

plan the response, or whatever it is they do to be successful. Similarly, it may be that they didn't give themselves time to aid processing because of the perceived pressure of the test situation. Another possibility might be that the judges were unreliable in scoring delay. This does not seem likely because the use of delay resulted in significantly less-than-chance success. At the moment however, the reasons why self-imposed delays were not facilitative is unclear. It is only clear that they were not facilitative.

Finally, strategy selection seems to depend on the internal state of the organism at any point in time, and not on the task difficulty. Indeed, the depth of the moment-to-moment fluctuations within the organism seems to determine which strategy will be employed at any moment in time. This seems to be another demonstration of the importance of the intermittency of processing capabilities in the brain damaged and aphasic populations.

In summary, the major findings and contributions of this investigation are:

1. Vocal/subvocal rehearsals and immediacy are two viable strategies which can be added to the list of strategies currently in use for aiding auditory comprehension in persons with aphasia.
2. The frequency with which an aphasic individual uses a particular strategy is not related to his/her success in using that strategy. In other words, patients didn't tend to always use that strategy which they found most effective. This implies that a variety of strategies must be made available to each patient.
3. The effectiveness of a strategy was not related to the type of task in which it was utilized.
4. The aphasic subjects in this study seemed to have some control over which strategies to use at particular times.
5. Self generated strategies appear ineffective for aiding auditory comprehension.
6. While vocal-subvocal rehearsal, immediacy, repeats, and cues are utilized significantly better than no strategy and better than chance, they are also unsuccessful a substantial amount of the time. This suggests that strategy use alone is not sufficient for treating the auditory disorders associated with aphasia and brain damage.

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APPENDIX A

Frequency, percentage of success and percentage of difference between successful strategy usage and success when no strategy was used (15) for each strategy type and by subtest.

Strategy / Subtest	Correct			Vocal-Subvocal Rehearsal			Delay			Immediacy			Repeat			Cue		
	Times Used	% Success	Δ From 15(%)	Times Used	% Success	ΔFrom 15(%)	Times Used	% Success	ΔFrom 15(%)	Times Used	% Success	ΔFrom 15(%)	Times Used	% Success	ΔFrom 15(%)	Times Used	% Success	ΔFrom 15(%)
I	203	85.2	-	37	89.2	4.0	52	40.4	-44.8	0	0*	-	5	40.0	-45.2	3	100.0	14.8
II	171	59.7	-	46	87.7	28.0	68	48.8	-10.9	0	0*	-	4	100.0	40.3	1	100.0	40.3
III	269	65.4	-	85	62.4	-3.0	162	35.2	-30.2	16	93.8	28.4	44	70.5	5.1	21	81.0	15.6
IV	285	50.5	-	39	64.1	13.6	140	24.3	-26.2	32	73.8	23.3	60	86.7	36.2	20	90.2	39.7
V	122	42.6	-	30	38.7	-3.9	92	24.7	-17.9	0	0*	-	11	81.8	39.2	8	40.0	-2.6
VI	86	38.4	-	26	30.8	-7.6	102	24.5	-13.9	16	31.3	-7.1	29	86.0	47.6	7	42.9	4.5
VII	118	36.4	-	19	32.1	-4.3	58	16.7	-19.7	35	51.4	15.0	15	66.4	30.0	8	50.0	13.6
VIII	74	20.3	-	22	13.6	-6.7	106	27.7	7.4	25	24.0	3.7	22	63.6	43.3	4	25.0	4.7
IX	115	67.0	-	20	80	13.0	112	38.4	-28.6	5	60.0	-7.0	21	81.0	14.0	8	100.0	33.0
X	120	59.0	-	19	52.6	-6.4	115	32.3	-26.7	10	60.0	-1.0	22	77.3	18.3	1	100.0	41.0
Overall	1563	56.6	-	343	61.0	4.4	1007	31.0	-25.6	139	58.5	1.9	233	83.0	26.4	81	74.0	17.4

*This strategy was never used.