

Treatment Can Facilitate Reacquisition  
of a Morphological Rule

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Plural morphemes occur in English to mark nominals that are nonsingular, utilizing three regular inflections, (i.e., /s/, /z/, and /əz/) that are phonologically determined, as well as a variety of irregular variants that are either holdovers from earlier stages in the history of the language (e.g., "feet," "oxen") or foreign borrowings, (e.g., "data," "octopi"; Quirk and Greenbaum, 1975). Rule-governed use of plurals emerges early during language development (deVilliers, 1978). Children begin to acquire plural morphemes at 4 to 5 years of age, although rule mastery remains incomplete even through first grade (Berko-Gleason, 1978).

In aphasia, the use of plurals and other grammatical morphemes becomes vulnerable to some degree of loss; however, there is considerable variability in the extent of morphological impairment across aphasic subjects (Goodglass and Berko, 1960). Interestingly, Goodglass and Berko determined that of the 10 morphological categories they studied, including forms such as possessives and third person singular verbs, aphasic persons demonstrated the least impairment in the use of regular plurals. Berko-Gleason (1978) used meaningful words in a test similar to the "Wug" test. She found that, on the average, aphasic persons produced regular plurals with approximately 79% accuracy. In spontaneous connected speech, the frequency of correct plural usage by aphasic subjects is even higher (deVilliers, 1978).

However, individual agrammatic patients may perform considerably more poorly than the data from group studies suggest. Goodglass, Gleason, Bernholtz and Hyde (1972) reported inflectional morpheme elicitation results for a single Broca's aphasic patient who was able to provide one of six nonsyllabic plurals and three of six syllabic plurals with an overall accuracy rate of about 33 percent. While individual case data remains scant, it is clear that many aphasic patients are capable of producing regular plural forms. Thus, the question becomes one of determining whether patients exhibiting particular difficulty in this area may be trained to provide the correct morphological inflection in the context of aphasia therapy, and if so, whether such training would then generalize to the production of plural endings in connected speech. Therefore, it was the purpose of this study to examine the efficacy of using a plural morpheme training protocol with an agrammatic aphasic patient. The following research questions were addressed.

1. Can an aphasic patient regain correct regular plural usage for nouns trained during a direct therapeutic intervention program?
2. Will correct plural usage generalize to untrained items?
3. Does training of regular plurals influence the utilization of the irregular plural form?
4. Do regular plural morphemes trained within a single-word picture elicitation format generalize to connected speech?

In addition, the relationship between plural morpheme reacquisition in aphasia therapy and the patient's overall pattern of recovery from aphasia was examined. While it was not a specific hypothesis, we were interested in observing whether the nature of the reacquisition process was suggestive of loss versus limited access to use of the plural rule.

#### METHOD

A multiple baseline single subject design was employed to determine the efficacy of treatment on the production of plurals. The subject was a 66-year-old right-handed male who had sustained a left middle cerebral artery infarction with resultant right hemiplegia and aphasia two months before participating in the study. Results of the Porch Index of Communicative Ability (PICA) (Porch, 1981) administered prior to participation indicated an overall percentile rank of 27 with severely impaired verbal output and moderately impaired auditory comprehension. An overall severity rating of 1 was assigned by three speech-language pathologists for the patient's performance on the Boston Diagnostic Aphasia Examination (Goodglass and Kaplan, 1972). Figure 1 shows the BDAE profile of speech characteristics. The subject exhibited agrammatism and a moderate-to-severe apraxia of speech. Yet his profile was not completely characteristic of a Broca's aphasia.

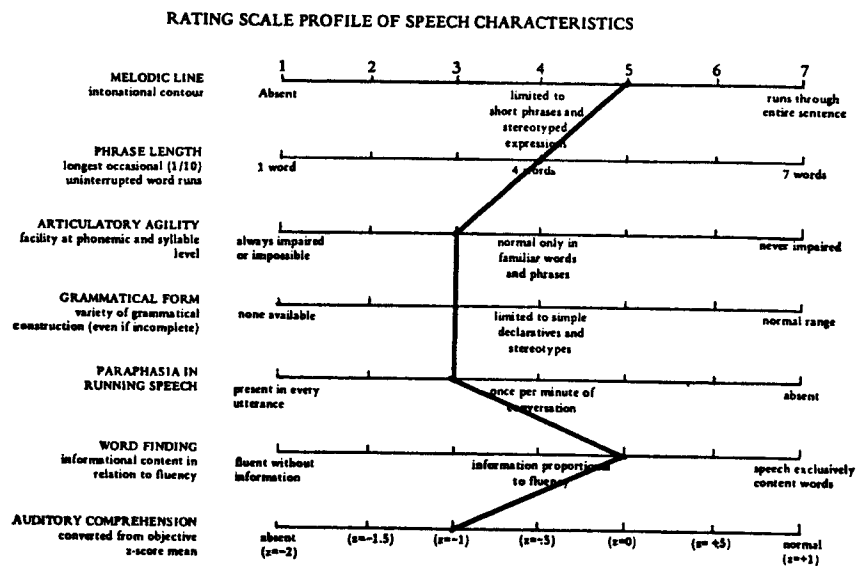


Figure 1. The aphasic subject's "Speech Characteristics Rating Profile" from the Boston Diagnostic Aphasia Examination (Goodglass and Kaplan, 1972).

**Materials.** Twenty cards from the Plurals and Possessives set of the Winitz Picture Cards for Language were used. These black and white drawings depicted referents for singular and regular plural nouns. The cards (Figure 2A) were divided into two 10-item sets, representing the treatment items and

non-treatment probes. Five cards depicting irregular plural nouns were employed as an additional probe of generalization (Figure 2B). Treatment and probe stimuli are given in the Appendix.

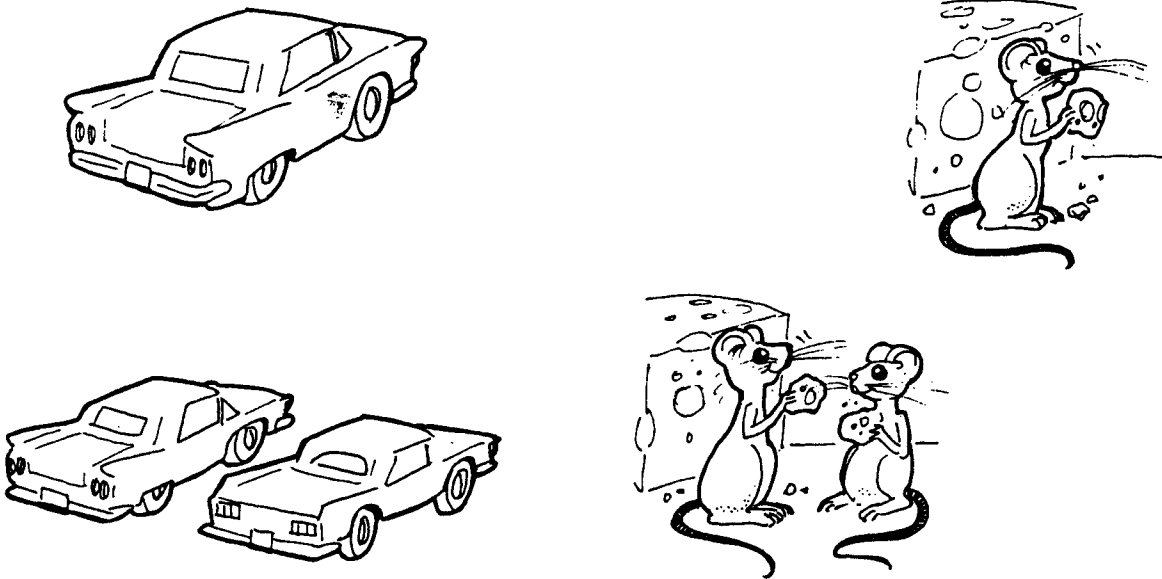


Figure 2. Examples of picture elicitation stimuli for the training task, including (a) regular and (b) irregular plural forms. From WINITZ PICTURE CARDS FOR LANGUAGE by Harris Winitz, Ph.D. Copyright 1982 by Communication Skill Builders, Inc. Reprinted by permission.

Pretesting. Pretesting revealed a score of 100% for discriminating singular from plural nouns of both regular and irregular plural forms during a point-to task. However, the subject scored only 10% correct for use of the plural form in a naming task and it was noted that he did not use the plural form in spontaneous conversation.

Baseline Sessions. Multiple baseline measures were obtained. During each of the four sessions of the baseline phase, the plural noun portion of each of the 25 cards was presented and the subject was instructed to "Tell me what you see." Correct responses were defined as those in which the plural form was used correctly, even if the remainder of the response was in error. All responses were audio tape recorded. Two speech-language pathologists listened to the tapes and indicated for each response whether or not the plural form was used. Agreement was 100%.

Treatment Sessions. Following the fourth baseline session, the treatment sessions were introduced. The subject participated in a closure task. The clinician pointed to the picture of the singular noun on the card and, for example, said "one car," then pointed to the picture of the plural noun and said, "two \_\_\_." The subject's task was to provide the pictured plural noun. Knowledge of results was provided after each response.

All treatment sessions were 20 minutes in length. Following these sessions, the subject was instructed to describe the plural noun portion of each training item. Procedures for probing were identical to those used during baseline.

A criterion level of 80% correct for four consecutive sessions was established. Nineteen daily sessions included 4 baseline, 12 treatment and

3 maintenance sessions. Probes for non-treatment items were presented following treatment sessions 4, 7 and 12. The PICA was readministered following completion of the treatment protocol.

## RESULTS

Performance across the 19 sessions is presented in Figure 3. Baseline measures for regular plurals ranged from 10-30% correct, while the measures for irregular plurals remained at zero. Scores for the training items (dark line) began at 40% correct on the first day, rose to 80% correct after the ninth treatment session, and continued at 80-90% correct until after the 12th day of treatment. This level of accuracy was maintained for subsequent sessions.

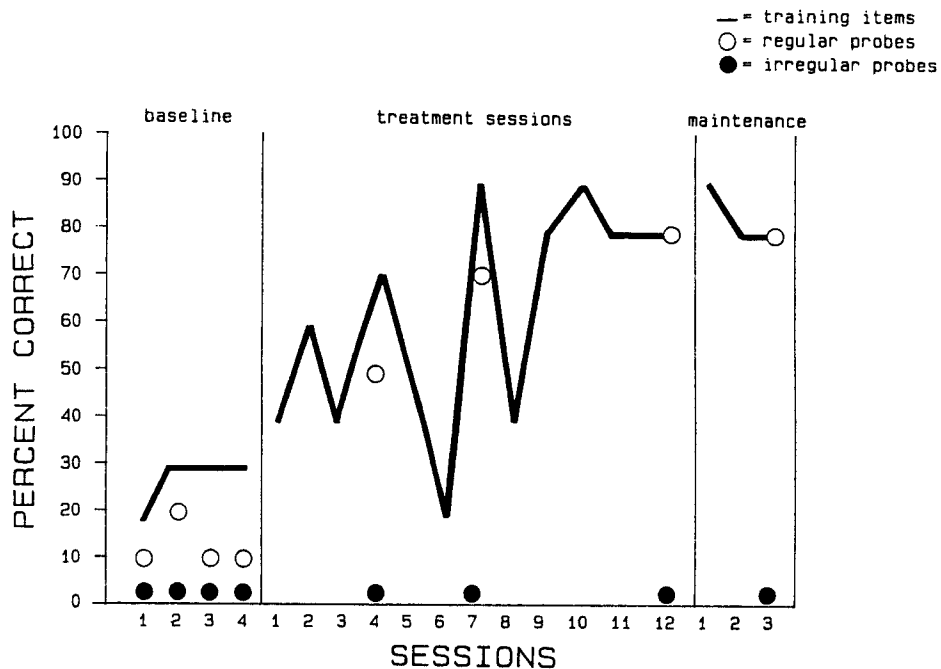


Figure 3. Time series representation of the subject's performance of the experimental task across multiple baseline, treatment and maintenance sessions.

Probe Sessions and Generalization. The patient's performance on the untrained probes also is presented in Figure 3. Percentage of correct responses for regular plurals (white circles) rose from 10-20% during baseline sessions to 50% correct following treatment session 4, and to 80% correct after the subject reached the treatment criteria subsequent to sessions 12 and 15. Generalization from regular to irregular plurals (black circles) did not occur, nor was over-regularization of irregular plurals (i.e., mouses for mice) observed. The subject avoided rule exceptions by means of circumlocution. For example, rather than saying "childs" for children, he said "one boy and one girl." In addition, he exhibited correct use of plurals in a contextualized picture description task (Figure 4) as well as in conversation.



Figure 4. Picture elicitation stimulus for contextualized speaking task in which the subject was instructed: "You are going to the zoo. As you walk through the zoo, you see many things. Tell me what you see." From DEVELOPMENTAL SYNTAX PROGRAM by L. Coughran and B. Liles. Copyright 1979 by the Harry Jersig Speech and Hearing Center. Reprinted by permission.

Recovery and Post Treatment Course. Pre- and post-treatment PICA results are provided in Table 1. Following completion of the protocol, the patient exhibited some limited recovery of auditory comprehension and verbal expression. However two weeks after completing session 19, he experienced an episode of multiple seizures with intervening unconsciousness. Results of the PICA administered 10 days post seizure indicated that communicative functions had deteriorated measureably; however, readministration of the regular plural probes across two post-seizure sessions indicated that plural production was maintained at the 86% accuracy level. Furthermore, a comparison of the accuracy of naming responses for these probes with those of the last two maintenance sessions revealed that naming accuracy had also deteriorated, despite sparing of the highly trained plural rule.

Table 1. Pre- and post-treatment PICA results for the subject.

Administration	Verbal Ability				Auditory Comprehension		Pantomime		Copy	
	I	IV	IX	XII	VI	X	II	III	E	F
PRETX*	5.7	5.9	5.7	7.9	10.2	11.7	6.7	8.6	7.5	11.6
POSTTX+	6.9	6.3	6.0	10.7	11.9	12.3	7.0	8.3	5.4	10.2
POST SEIZURE	5.5	5.2	5.7	7.8	12.3	10.6	7.4	8.9	-	11.4

\*overall percentile = 27th

+overall percentile = 29th

## CONCLUSIONS

The primary conclusion of this study is that treatment with a simple procedure can facilitate reacquisition of a morphological rule. No training time was spent teaching the plural rule or drilling on the appropriate inflectional forms for specific phonological contexts. The structure of the elicitation situation appears to have allowed the patient to demonstrate that the use of the plural rule was in fact not lost, but rather, as suggested by Schuell, Jenkins and Jiminez-Pabon (1964), that access to the rule was impaired. This simple treatment procedure appeared to facilitate access to the morphological form. A "general recovery" explanation of the observed effects (as measured by the PICA) is inadequate to account for the improvement. The subject's change was marginal. The difference of 2 seen in his overall percentile rank across PICA administrations is less than half of that exhibited by Porch's original standardization group (Porch, 1981) in which a stability coefficient of .98 was demonstrated. Nor could "articulatory improvement" explain these findings. The subjects' articulation of the root noun portion of the response did not appear to improve. Furthermore, the emergence of other morphological endings, such as past tense, was not observed. The validity of the treatment effect is indicated also by the disassociation of lexical and inflectional ability following seizure. That is, trained plural morpheme usage remained stable while naming ability deteriorated.

Although additional studies of this type are needed, these findings underscore the viability of linguistic retraining for aphasia management. In view of recent emphasis on pragmatics in aphasia therapy, the functional significance of morphologic rule recovery for the communicative process merits consideration. Admittedly, the correct inflection of plurals may be less important than a patient's ability to convey communicative intent. The decision to incorporate linguistic structures in the treatment plan should be based on an individual patient's needs and outcome expectancies.

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