Gestural Sign (Amer-Ind) as a Facilitator of Verbalization in Patients with Aphasia

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It is generally acknowledged that word retrieval difficulty is one of the most prevalent impairments of brain damaged patients with aphasia (Goodglass, Kaplan, and Weintraub, 1976). Accordingly, numerous studies have investigated cueing techniques which facilitate naming ability in aphasic patients. For example, word association (Wiig and Globus, 1971; Rochford and Williams, 1962), initial syllable, and sentence completion cues (Thompson and Kearns, 1981), have enhanced naming ability in these patients to some degree. In addition, gestural or pantomime training has also been reported to facilitate verbal responding in aphasic and apraxic individuals (Skelly, Schinsky, Smith and Fust, 1974; Skelly, 1979; Schlanger and Schlanger, 1975; Rosenbek, Collins and Wertz, 1976; Rao and Horner, 1978). American Indian sign language (Amer-Ind., Skelly, 1979) has played a prominent role in research in this area and it is frequently used in the clinical management of neurogenic communicative disorders. Yet, despite a veritable Amer-Ind mania, the relationship between gestural and verbal production remains elusive because previous investigators have utilized multimodaility training while attributing cross modality generalization to gestures alone. The seminal article by Skelly et al. (1974) is typical in this regard. The investigators presented auditory and gestural input, encouraged imitation of the experimenter's verbalizations and generously consequated verbal output. Needless to say, the role of a single therapeutic variable, such as gestural performance, can not be isolated from all other factors involved in such a complex, multimodality treatment package.

Therefore, the primary purpose of this study was to examine the effect of unimodal, visually based gestural training on the verbal performance of aphasic individuals. Specifically, the following questions were investigated:

> Will unimodal (visual) training of Amer-Ind signs result in an increase in verbal labelling of trained signs?

Or, if cross modality generalization does not occur...

> Will combined gestural/verbal training result in an increase in verbal labelling of trained signs?

METHOD

Subjects. Two aphasic individuals participated in this study. They had suffered single left sided cerebrovascular accidents, were at least six months post onset of aphasia and both exhibited right sided hemiparesis. In addition, the subjects exhibited minimal verbal or limb apraxia or

dysarthria on the Mayo Clinic motor speech examination (Wertz et al., 1978). Each also passed an air conduction audiometric screening at 25 dB across the speech frequencies and demonstrated comprehension of all experimental stimuli. The diagnosis of aphasia was confirmed on the Porch Index of Communicative Ability (Porch, 1971) and these test results are presented in Table 1. As is evident in the table, subject JC was more severely involved than JR. They were moderate to severely impaired individuals with significant verbal and gestural deficits.

Table 1. Subjects' performance on the Porch Index of Communicative Ability.

	JC		JR	
OA	9.38	34%	12.05	64%
AUDITORY	12.95	33	14.30	51
READING	9.50	18	11.25	41
VISUAL	15.00	-	15.00	-
PANTOMIME	9.70	33	11.30	60
VERBAL	8.40	38	10.33	47
WRITING	5.18	33	11.05	82
COPYING	12.15	52	13.85	98

Stimuli. Six Amer-Ind signs were chosen for training in this study. All signs could be gestured using one limb and were easily represented in black and white line drawings. In addition. three speech pathologists independently agreed on the most appropriate verb which described the picture stimuli.

Design. The experimental design used in this investigation was a multiple baseline across behaviors (McReynolds and Kearns, 1982). During the baseline phase pretreatment levels of performance were measured for each sign. In the treatment phase, training was sequentially applied to one sign while baseline measurements continued for untrained signs. The order in which the signs were trained was randomized for each subject. Procedural aspects of each phase of the investigation were as follows.

Baseline. Three baseline sessions were conducted for each subject within one week prior to the initiation of the training. Gestural and labeling ability was probed for all items during each baseline session and the order of presentation of the two types of probes was altered prior to each session. In addition, the stimuli were randomly presented three times for the gestural probe and three times for the labeling probe during each session. Baseline probes began with verbal or gestural demonstration items to ensure task comprehension. When probing each item the experimenter presented a line drawing and standard instructions which asked the subject either to describe the action being depicted or to provide an appropriate gesture for the action. Feedback was not provided and the experimenter did not name any of the target items during baseline. During baseline, and throughout the remainder of the investigation, gestural responses were scored as correct (+) or incorrect (-) according to definitions provided by Skelly (1979), and Porch's (1971) multidimensional scoring system was adopted for scoring verbal responses.

Training. Following baseline, training sessions were conducted three or more times weekly. Training began with random selection and training of

one item while maintaining gestural and verbal baselines for untrained signs. There were two levels of training. Signs were trained to an imitative criterion during the first level. The second level required spontaneous sign production to a picture stimulus. Experimenter feedback, including modeling and contingent verbal consequation and training, continued on a given sign until 90% spontaneous production (9/10 trials across two training sets) was achieved. Following completion of training on the first item, other signs were randomly selected and sequentially trained in the same manner. The experimenter never labelled the signs. and verbal responses were not consequated during this phase.

Probes. At the end of each training session a probe of the subjects' gestural and verbal responding was obtained using procedures outlined for the baseline phase. Performance on the probes provided the primary data for the study.

Alternate Procedures. If a subject reached criterion on all six signs but generalization to verbal labelling did not occur following unimodal training, another multiple baseline study was conducted to answer the second experimental question. Procedurally, this study was conducted in a manner identical to the first, except that baseline was obtained for simultaneous gestural and verbal production. During training, sign and label combinations were individually and sequentially trained to criterion while baselines were maintained for untrained combinations. Within training sessions the experimenter presented a visual stimulus and simultaneously modelled and labelled the items. Discrimination training procedures were also incorporated into training. During discrimination training all six signs were presented within a single training set, and contingent feedback and modelling were provided to facilitate discrimination and spontaneous verbal labelling.

Reliability. Two speech pathologists served as reliability judges during this investigation. A videotape of thirty Amer-Ind signs was used to train sign recognition before judges scored reliability tapes. All sessions were videotaped throughout the study and taped segments were randomly chosen from each experimental phase for each subject for reliability purposes. Tapes were randomized prior to independent viewing by the judges. Gestural information was not available during scoring of verbal responses and auditory information was unavailable during gestural scoring. A total of 24 taped segments were scored by the judges and the range of observer agreement was from 96 to 100%. Average interjudge agreement was 99% for each subject. This level was well above the 55% level of chance probability for both subjects using Hopkins and Hermann (1977) formula for overall reliability.

RESULTS

Unimodal Sign Training. The first experimental question asked if unimodal sign training would facilitate verbal labelling. The results of unimodal sign training for JC are presented in Figure 1. Spontaneous gestural (Δ) and verbal performance (●) on post session probes is depicted. The letter (T) indicates sessions in which training criterion was met for each sign. Examination of the figure reveals essentially 0% correct gestural or verbal responding across the baseline phase for five of six signs. In addition, the 90% correct training criteria was rapidly obtained

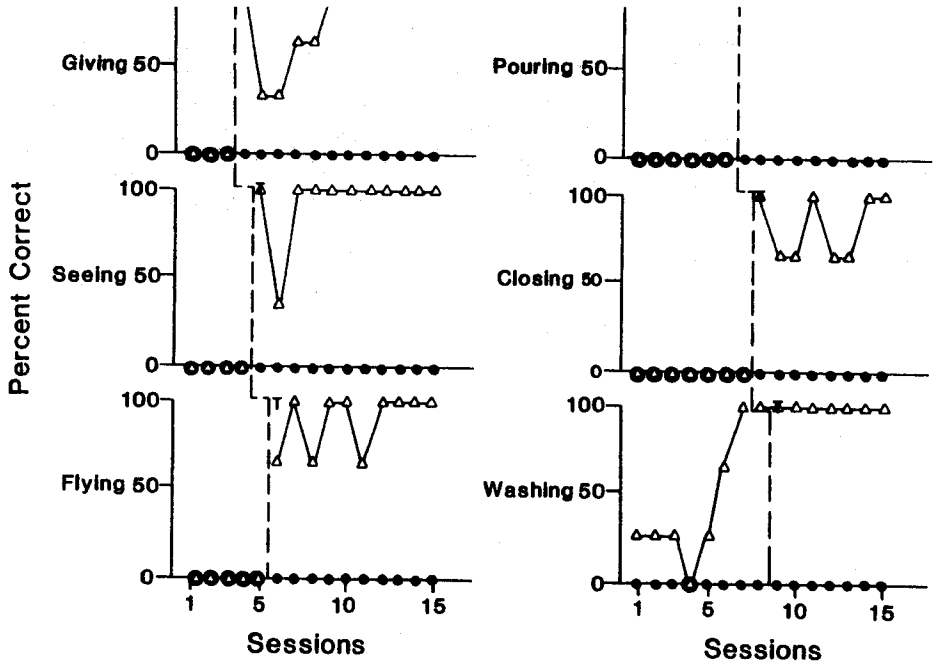

Figure 1. Subject JC. Spontaneous Gestural (▲) and Verbal (●) performance on Post-Session Probes. Baseline and Unimodal Training and Maintenance phases are depicted. (T) indicates criterion sessions.

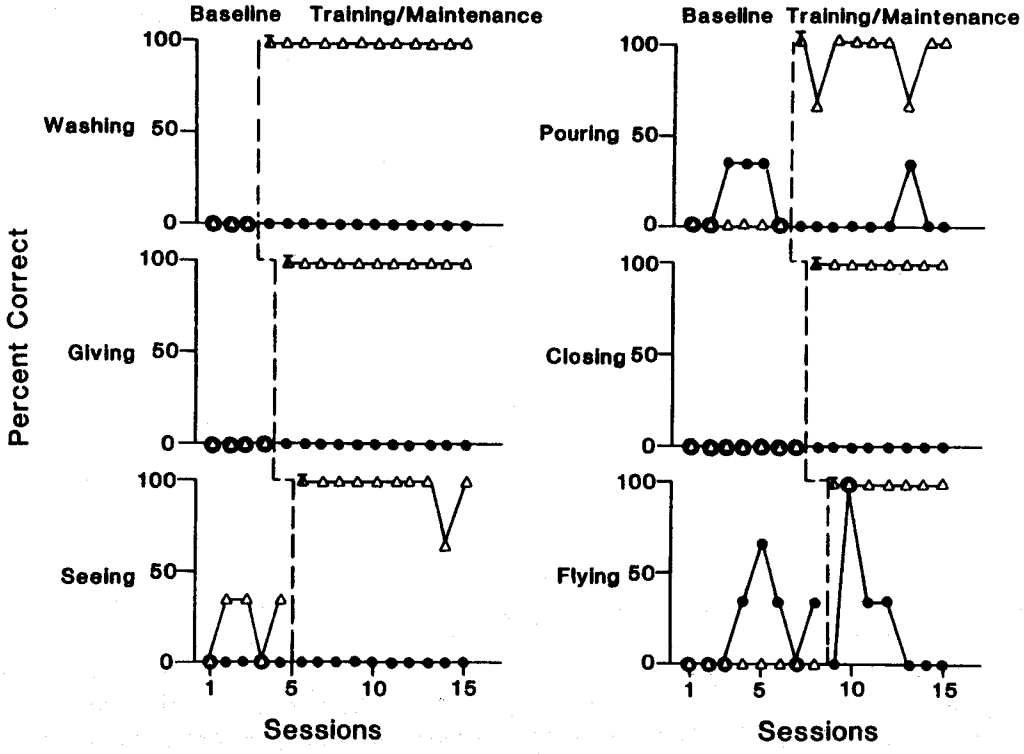

Figure 2. Subject JR. Spontaneous Gestural (▲) and Verbal (●) performance on Post-session probes. Baseline and Unimodal Training and Maintenance phases are depicted. (T) indicates criterion sessions.

for each sign as treatment was sequentially applied while performance on untreated signs remained stable. Once acquired, spontaneous sign production was maintained at or above the criterion level. Verbal labelling of trained signs was not affected by unimodal sign training. Correct verbal responses were never produced by JC during this phase of the investigation and there did not appear to be a functional relationship between unimodal sign training and verbal responding.

Figure 2 presents the cross modality generalization data for JR. Although slightly more variable than the Subject JS, low stable rates of gestural and verbal responding again were obtained during baseline. Zero percent correct responding was obtained across five of six signs on gestural and four of six verbal baselines. Similarly to Subject JC, unimodal training resulted in rapid acquisition and maintenance of trained signs. However, again there appeared to be minimal improvement in verbal responding as a result of unimodal gestural training. With the exception of one sign (flying), verbal responses remained at or below baseline levels, usually 0% correct following training.

Combined Gestural/Verbal Training. Given the lack of cross modality generalization following unimodal sign training, combined gestural/verbal training was initiated. Since both subjects continued correct production of the previously acquired signs during this phase, only data for verbal performance will be presented. JC's spontaneous verbal labelling performance on post session probes is shown in Figure 3. Although not shown in the figure, JC's baseline performance was 0% correct in each of three combined gestural/verbal baseline sessions. Once multimodality training was initiated, however, the 90% criterion (T) for simultaneous gestural/verbal production rapidly was met as each item was sequentially trained. However, this level of performance was not maintained on probes of spontaneous verbal performance. That is, there was a marked discrepancy between performance on individual items during criterion sessions and on spontaneous production of the same items when presented under probe conditions. Given this discrepancy, previously described discrimination training procedures were implemented. Figure 3 reveals that continuation of the combination gestural/verbal training with an emphasis on discrimination resulted in a gradual improvement of verbal performance. During the baseline condition, 5 responses predominated across signs, while at the completion of gestural/verbal training 10 to 13 responses were being produced.

Let us now consider JR's performance in the gestural/verbal study. During the baseline phase his range of responding was between 0 and 11% correct for simultaneous gestural/verbal production. Examination of Figure 4 reveals that, like the first subject, JR rapidly met criterion (T) after training was sequentially applied. However. there was also a considerable discrepancy between gestural/verbal performance during criterion session (T), when a single item was presented, and performance on post-session probes of all items. Extensive discrimination training was again necessary. During the baseline phase JR's verbal responses were scored as 5's and 7's using multidimensional scoring. However, a gradual improvement in verbal performance was evident, following continued discrimination training. This subject eventually produced 13 and 15 responses on the spontaneous verbal probes.

To summarize, the results of this investigation revealed that unimodal training resulted in the acquisition and maintenance of Amer-Ind gestures. However, this visually based approach did not facilitate verbal labelling

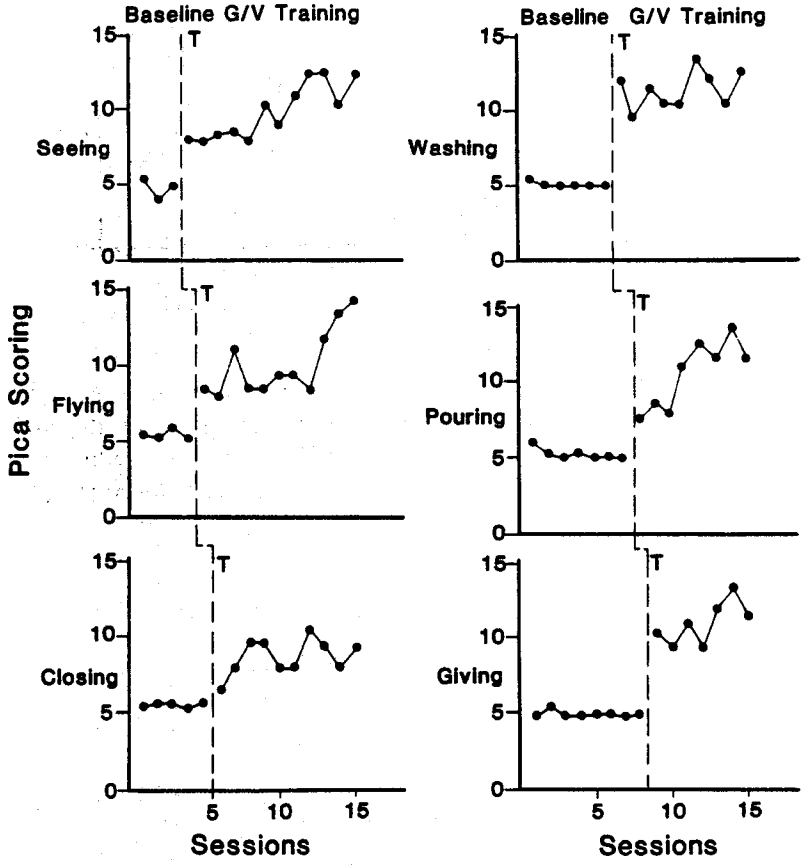

Figure 3. Subject JC. Spontaneous verbal labelling on Post-session probes. Baseline and combined Gestural and Verbal training phases are depicted. (T) indicates criterion sessions.

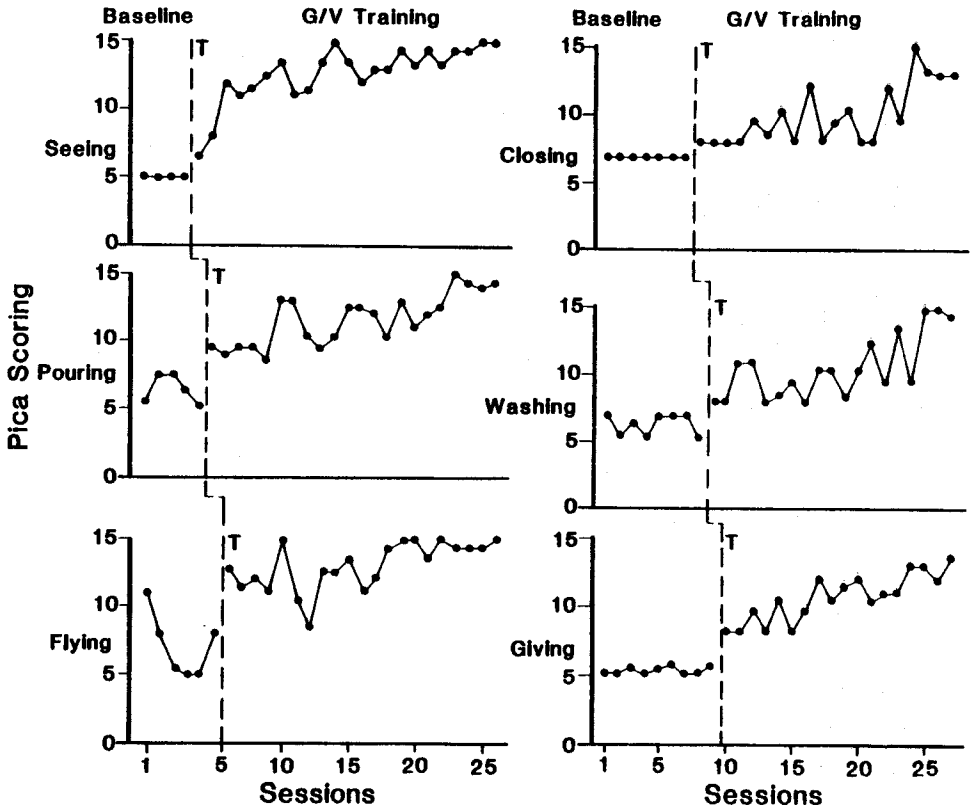

Figure 4. Subject JR. Spontaneous verbal labelling on Post-session probes. Baseline and combined Gestural and Verbal training phases are depicted. (T) indicates criterion sessions.

of trained signs. Rather, extensive multimodality training and discrimination procedures were required to facilitate spontaneous verbal responding in these subjects.

DISCUSSION

The results of this study provide preliminary information which indicates that gestural training per se may not be sufficient to facilitate verbal responding in some aphasic patients. This conclusion is, of course, not totally surprising. As Peterson and Kirshner (1981) point out, it is not firmly established which subtypes of patients would benefit most from gestural training. Subjects having other characteristics than the two in the present study might perform quite differently to unimodal training. It is noteworthy however, that, following visually based training, multimodality input was required prior to improvement in verbal performance. Thus, it would appear that complex interaction of multiple input and output modalities might, in part, account for previously reported results of improved verbal responding following "gestural" training. The question of whether multimodality training which includes gestures is any more efficacious than similar training which does not is an empirical one which awaits further research. However, as Warren (1979, pg. 152) reminds us, "The trouble begins when...The principles of therapy become so basic, and so fundamental that they begin to gather their own inertia, and after awhile it's the inertia itself that gives the principle credibility." The results of the present study indicate that the relationship between gestural training and verbal production needs clarification. Perhaps it is time to reexamine the clinical inertia which has reinforced our use of 'gestures' as a facilitator of verbalization in aphasia.

Finally, although not of primary concern in this study, the marked discrepancy between subjects' performance on training trials in which they met criteria during gestural/verbal training and their spontaneous verbal output on probes is also of interest. Extensive discrimination training was ultimately required to meet the terminal objective of spontaneous verbal production. Stokes and Baer (1977) suggest that making contingencies indiscriminable may facilitate generative responding. Our results support this notion and indicate that discrimination training procedures may prove to be a useful tool for building a "technology of generalization" in aphasia.

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DISCUSSION

Q: Can you really say that multimodality training would work without previous gestural and unimodal training?

A: I've thought about that and I think the answer is yes. Because, number one, training was never applied to verbal responses and verbal performance did not change throughout fifteen to twenty sessions. Essentially we had a twenty-session baseline for those behaviors. Even if you say that gestural training per se was a possible influence on verbal skills, you also have to consider that, because of the low baseline on verbal responding through the unimodal training phase, you essentially have a B=A condition in which, despite training, there was no change. You can't absolutely rule it out, though. I think the data indicate that unimodal training wasn't a big factor if it was there at all.

Q: In the second condition you trained verbal skills after the gestures had already been trained. In that condition, could you have used ten stimuli that were different from the first ten, and simultaneously trained gestures and verbal?

A: I think that would eliminate the possible confounding that was mentioned. However, we wanted to show that these were patients who could learn the verbal labels for trained items. Otherwise someone might claim that they simply could not learn verbal responding because they were fairly low-level patients.

Q: Does this argue for training imitative gestures as a foundation or prerequisite to anything else that one would be interested in training gestures for?

A: Possibly. Jay Rosenbek and his colleagues, in talking about intersystemic reorganization, indicate that if you have someone who is not being facilitated to respond verbally, you might drop back and just use gestural training first. This might "prime the pump," so to speak, but we really can't say.

Q: What was the reaction of patients to this kind of training?

A: Patients showed a lot of frustration initially but once they started to improve they really caught on. We would see the patients in the hallways trying to communicate with other patients and trying to use their signs. However, we can't honestly say that they verbalized any more than previously.

Q: I can relate to what has been said about how much time should be spent on the gestures. The clinical package for intersystemic reorganization, as you've mentioned, includes establishing the gesture, pairing it with a target item and, if it works, pulling it back out. Maybe what your data are saying is that perhaps we shouldn't be spending so much time trying to get the gestures established by themselves. Perhaps we should start pairing them with a target utterance right away.

A: That is possible. However, these subjects acquired the gestures with a minimum number of trials and once acquired, they were maintained. The verbal responses didn't come without the extra training.

Q: We had a rather severely involved patient recently and we had a great deal of difficulty training him to differentiate gestures. For example, "eating" and "drinking" would get confused. Did you see that as a problem with your patients?

A: My recollection is, yes we did. In fact, that was one of the reasons for emphasizing discrimination training. Post hoc we felt that perhaps we should have taken into account the similarities among gestures that were trained.

Q: Could you describe again what you did during the discrimination training?

A: The only difference between discrimination training and second phase training in the simultaneous gestural/verbal condition was that in the second phase a number of sets of training trials were presented in which a single item was worked on in each training set. The same item was repeatedly presented in that condition and training continued until a spontaneous criterion of 90% correct was met. During discrimination training, all items were randomly presented within each training set in an attempt to facilitate identification of differences between performance on each item.