

Communicative Use of Signs in Aphasia:
Is Acquisition Enough?

Carl A. Coelho
Gaylord Hospital, Wallingford, Connecticut

Robert J. Duffy
University of Connecticut, Storrs, Connecticut

There currently exists in the aphasia literature a variety of reports on sign acquisition by aphasic patients (Baratz, 1981; Bonvillian and Friedman, 1978; Chen, 1968, 1971; Eagleson, Vaughn and Knidson, 1970; Goldstein and Cameron, 1952; Guilford, Scheuerle and Shirek, 1982; Kirshner and Webb, 1981; Moody, 1982; Rao and Horner, 1978; Skelly, 1979). To date, it has been difficult to draw clear inferences regarding the capacity of such individuals to acquire signs because of limitations in the design or execution of these studies. A number of these studies have been clinical case reports of single subjects or small numbers of subjects, some of whom have not been truly aphasic -- that is, they have been apractic or dysarthric. In addition, almost all experimental training studies have used widely different criteria in reporting on aphasic subjects' ability to "acquire" signs. Finally, these studies usually fail to make an important distinction between acquiring signs as measured by a specific experimental task and using them communicatively.

This paper reports on a case study of an individual who was one of a group of 12 severely aphasic patients enrolled in a sign training program. Upon completion of the program, this individual had demonstrated the best response of any group member to the training by acquiring the greatest number of signs. He was then selected to be followed through home observations for an extended period of time to monitor his use of the acquired signs.

METHOD

Subject. LE was a 61-year-old male who was 18 months post onset of a single unilateral left CVA. He was a physician who had retired following his CVA. A PICA, administered prior to the initiation of the sign training program, yielded an overall score of 10.41, placing him at the 45th percentile (1981 norms). His aphasia was characterized as "nonfluent" as described by Goodglass and Kaplan (1983, p. 49). LE's verbal expression consisted of one- and two-word utterances, rarely appropriate to the topic, some profanity, and a few automatic phrases. Overall, LE's speech was extremely limited in terms of the range of information which could be expressed. On the four auditory comprehension subtests from the Boston Diagnostic Aphasia Exam (Goodglass and Kaplan, 1983), he scored at the 49th percentile. LE had previously received traditional management for his speech and language deficits but was not receiving regular therapy at the time of this study.

Sign Training Procedure. A variety of sign vocabulary items representing varying degrees of iconicity and motoric complexity as well as nouns, verbs, and adjectives, was presented for training. All items were performed as left-handed (one-handed) signs in order to eliminate the effects of LE's right-sided hemiplegia. Training of signs progressed through three successive levels: imitation, recognition, and production. A sign item was considered "acquired" when LE produced the target response at the production level (producing a sign when presented with a picture of the referent). LE acquired

73 of the 90 signs presented in training. Throughout the training program a portion of each session was devoted to practicing LE's acquired signs and demonstrating how single signs could be linked telegraphically to express broader concepts. This practice was provided to ensure that both he and his wife appreciated the signs' communicative value. LE was enthusiastic about the sign training and attended sessions faithfully.

Home Observations. Approximately one week following completion of the sign training program LE was observed in his home on 12 occasions over a period of four weeks totalling approximately 15 hours of observation. LE was observed interacting with his wife and with a neighbor who also was a retired physician. All observations were conducted by the first author.

Communicative Tasks. LE was observed in three types of communicative tasks, all of which were designed to tap his vocabulary of acquired signs and which could be successfully completed using signs. In the first task he was presented with contextually rich pictures, and he was required to formulate a message about each picture. The pictures used in Task 1 were different from those used for the sign training program (which were primarily pictures of objects or actions). In the second task he was presented with specific printed messages, such as "time for bed," which he was to communicate to his listener. All printed messages were within the realm of LE's reading comprehension abilities as determined by his scores from the Reading Comprehension Battery for Aphasia (LaPointe and Horner, 1979). LE's listener in the first two tasks was always his wife who was always unaware of the target stimulus item. The third task consisted of conversations in a natural, relaxed setting on a variety of topics derived from everyday occurrences considered to be of interest to LE (e.g., his daughters, his garden, sports). LE's listener in this task was his wife and, on five occasions, also his neighbor. The observer did not participate in any of the tasks in order to increase the naturalness of the communicative environment. LE was exposed to all three communicative tasks in each of the 12 sessions. He was presented with pictures and printed phrases 120 times each (approximately 10 of each randomly drawn from groups of 35 pictures and 35 printed phrases in each session) and was involved in a 15-30-minute conversation in each of the 12 sessions.

Additional data were also obtained from a fourth condition by LE's wife when the observer was out of their home. She kept a daily record of all of his attempts to interact with her throughout the day over the same four-week period he was being observed at home. Because LE's wife observed all of the sign training program and was able to produce and recognize all of the trained signs, she was considered to be a reliable and objective informant.

Data Analysis. Data from the four communicative tasks were analyzed in terms of three categories: the number of nonverbal message attempts, the signal type used, and message success.

Nonverbal Message Attempts. Nonverbal message attempts were all instances in which LE made an effort to formulate a manual signal during any of the four communicative tasks. On Tasks 1 and 2 LE was presented with pictures and printed messages 120 times each. However, there were instances in which he made no attempt to formulate a nonverbal message. Therefore, message attempts for these tasks were only 92 and 86, respectively.

Signal Type. Three categories of nonverbal signals were tallied during the four tasks. Trained signs were successfully acquired signs from the training program. Other signals were signs such as pointing, tracing a shape in the air, pantomiming, etc., none of which were trained. Signal combinations were when LE formulated messages using the trained signs in conjunction with other signals.

Message Success. Message success on the first two communicative tasks was determined by whether or not LE's listener was able to decode his message to the point of being able to describe key elements of the stimulus pictures or determine the main idea of the printed phrases. For example, in Task 1 LE might be presented with a picture of a man talking on a telephone and writing a note. A successful message might be his producing the appropriate signs for "man," "telephone," and "write" (signaling a representation for "man" and at least one of the other two key elements in the picture were the minimal necessary requirements for a successful message). In Task 2 LE might be presented with the printed phrase "time for bed," and a successful message would be his producing a representation for "time" and "bed." On the first two tasks message success was based on the total number of opportunities he had to formulate messages. Therefore, on Tasks 1 and 2, he was presented with 120 pictures and 120 printed phrases and thus had 120 opportunities in each task to formulate a nonverbal message. On Tasks 3 and 4 message success was based on those nonverbal messages attempted as no total number of message opportunities could be determined.

In the third communicative task (conversation) once a topic was introduced, a message was considered successful when LE initiated and formulated an appropriate contribution to the conversation, as opposed to simply responding to questions. In the fourth task (LE's interactions recorded by his wife) message success was determined by LE's wife and was based on her being able to determine what LE was signaling to her. In both the third and fourth tasks it was often necessary to rely on LE's positive or negative feedback as to whether or not a message he was sending was accurately received. This feedback generally took the form of facial expressions or head nodding, but it was always clear when the target message was or was not getting through. All judgments regarding message success were made by the observer, with the exception of those in Task 4.

Initially, tallies of LE's utterances during each of the four tasks were kept. However, his utterances were repetitive, non-propositional productions such as "I can't," "well," or "all right" and did not have any impact on his ultimate communicative success. Therefore, they were not summarized in this report.

RESULTS

Nonverbal Message Attempts. It is clear from Table 1 that the number of message attempts decreased substantially as the communicative situation became more spontaneous or less structured. LE attempted to formulate a comparable number of messages when presented with pictures or printed phrases, 92 and 86, respectively, of a possible 120 for each task. However, he attempted only 30 messages in nearly five hours of open-ended conversations and only 33 in four weeks of everyday activities with his wife.

Table 1. Data from home observations on LE's communicative use of acquired signs.

COMMUNICATIVE TASKS	NONVERBAL MESSAGE ATTEMPTS	SIGNAL TYPE			MESSAGE SUCCESS
		Trained Signs	Other	Combinations	
TASK 1 (Pictures)	92	191	75	13	59 (49%)
TASK 2 (Printed Phrases)	86	41	79	11	38 (37%)
TASK 3 (Conversations)	30	1	28	3	4 (13%)
TASK 4 (Everyday Inter- actions)	33	1	30	4	5 (15%)

Signal Type. The nature of the communicative task also appeared to influence how LE attempted to communicate nonverbally. From Table 1 it can be seen that in Task 1 LE used over twice as many trained signs, 191, than other signals, 75, to formulate messages about pictures. This was reversed in Task 2, when printed phrases were presented, where the number of trained signs was drastically reduced and nearly twice as many other signals were used, 79 versus 41. When LE was in conversational or everyday communicative situations (Tasks 3 and 4), he practically stopped using the trained signs. On Tasks 1 and 2 LE produced far fewer combinations than either the trained signs or other signals. Even fewer combinations were noted on Tasks 3 or 4, but they did outnumber the trained signs in these tasks.

Message Success. Table 1 illustrates the marked differences in LE's message success between the structured tasks (1 and 2 -- pictures and printed phrases), and the more spontaneous tasks (3 and 4 -- conversations and everyday interactions). There appears to be a relationship between the number of trained signs used and message success. In the two structured tasks, LE used more trained signs and was moderately successful. In the more spontaneous tasks, LE used significantly fewer trained signs and was less successful. Table 2 summarizes the data for message attempts and success over the four weeks of home observations. With the exception of Task 2 (printed phrases) no trends were noted over this period with regard to increases or decreases in the frequency of LE's message attempts or message success. On Task 2, the frequency of LE's message attempts was 17, 19, 26, and 24 (of 30 opportunities per week), while message success was 17%, 27%, 40%, and 43%. This suggests there may have been some learning which occurred over the four weeks on that task. Overall, however, the summary data presented in Table 1 is felt to be representative of the entire four-week period.

Table 2. LE's message attempts and message success summarized by week.

COMMUNICATIVE TASKS	MESSAGE ATTEMPTS (Weekly Means)				MESSAGE SUCCESS (Weekly Means)			
	1	2	3	4	1	2	3	4
TASK 1 (Pictures)	18	25	24	25	11 (37%)	15 (50%)	17 (57%)	16 (53%)
TASK 2 (Printed Phrases)	17	19	26	24	5 (17%)	8 (27%)	12 (40%)	13 (43%)
TASK 3 (Conversations)	6	10	7	7	0 (0%)	2 (20%)	1 (14%)	1 (14%)
TASK 4 (Everyday Interactions)	8	10	7	8	1 (12%)	2 (20%)	0 (0%)	2 (25%)

Table 3 illustrates message success by signal type on each of the four communicative tasks. On Tasks 1 and 2 (pictures and printed phrases) message success was higher when trained signs alone were used than when other signals or a combination of trained signs and other signals were used. On Tasks 3 and 4 (conversations and everyday interactions) greater message success was noted for other signals and combinations than for trained signs alone. On Tasks 3 and 4 message success for trained signs alone was zero.

Table 3. LE's message success by signal type.

COMMUNICATION TASK	TRAINED SIGNS		SIGNAL TYPE OTHER		COMBINATIONS	
	No. Produced	Message Success	No. Produced	Message Success	No. Produced	Message Success
TASK 1 (Pictures)	191	89 (47%)	75	11 (15%)	13	3 (23%)
TASK 2 (Printed Phrases)	41	14 (34%)	79	19 (24%)	11	2 (18%)
TASK 3 (Conversations)	1	0 (0%)	28	8 (28%)	3	1 (33%)
TASK 4 (Everyday Interactions)	1	0 (0%)	30	9 (30%)	4	1 (25%)

DISCUSSION

In this study LE acquired a sign vocabulary sufficient to have expressed many of his basic needs and wants. He functioned with a fair degree of success on tasks involving picture description and the signalling of simple printed phrases. However, when the structure of and cueing within the communicative tasks was reduced as in Tasks 3 and 4, he apparently was unable to use, in spontaneous communication, the signs he had acquired.

This case report illustrates the gap which exists between simply acquiring a vocabulary of signs and using those signs for functional communication. If signs are to be useful as an alternative communication system, it cannot be assumed that acquiring signs in an experimental situation will guarantee their communicative use. This distinction is often lost in discussion of sign training programs. For example, Guilford, et al. (1982) describe their aphasic subjects' abilities to produce appropriate signs when presented with pictures as sign "use." Moody (1982) and Bonvillian and Friedman (1978) also report on aphasic subjects acquiring various numbers of signs and infer that they were also capable of using these signs in spontaneous communication.

The results of the present study are in agreement with the reports on the training of Amer-Ind with several groups of aphasic patients summarized by Skelly (1979). From field reports on a total of 67 aphasic individuals, Skelly notes that clinicians expressed satisfaction with the number of signals imitated and replicated by their subjects, but nearly all expressed dissatisfaction regarding transfer from cued retrieval-replicative stage to self-initiated use. Skelly further states: "It is clear that these patients, although able to replicate numerous signals, either could not or would not use signals without the cues associated with acquisition and replication" (1979, p. 40-41).

At the present time the following statements can be made with reasonable confidence regarding the status of sign training with aphasic subjects.

- 1) When presented with a structured sign training program, chronically aphasic subjects can acquire a variety of signs (Bonvillian and Friedman, 1978; Coelho, 1982; Guilford, Scheuerle and Shirek, 1982; Kirshner and Webb, 1981; Moody, 1982; Skelly, 1979).
- 2) The total number of signs subjects can acquire is related to the severity of their aphasia (Coelho and Duffy, 1983).

- 3) The ease of acquisition of specific signs may be affected by degree of iconicity as well as motoric complexity and linguistic function (noun, verb, adjective) (Coelho, 1982; Daniloff, Lloyd and Fristoe, 1983; Fritelli and Daniloff, 1982; Skelly, 1979).
- 4) Success in sign acquisition has not been clearly distinguished from sign use for self-initiated, spontaneous communication.
- 5) Most studies conducted to date have dealt with the acquisition of single signs only. Additional research is needed to investigate the capacity of aphasic subjects to acquire grammars of increasing complexity using these signs.

CONCLUSION

Although it has been demonstrated that aphasic subjects can acquire basic sign vocabularies, there is little evidence that these individuals use signs to any significant degree for functional communication. Therefore, until further investigations are conducted, advocating sign training for the purpose of developing an alternative communication system with aphasic individuals appears premature.

REFERENCES

- Baratz, R. Manual communication training for a global aphasic: A case study. Aphasia-Apraxia-Agnosia, 3, 34-40, 1981.
- Bonvillian, J.D. and Friedman, R.J. Language development in another mode: The acquisition of signs by a brain damaged adult. Sign Language Studies, 19, 111-120, 1978.
- Chen, L. Talking hand of aphasia stroke patients. Geriatrics, 23, 145-148, 1968.
- Chen, L. Manual communication combined alphabet and gestures. Archives of Physical Medicine and Rehabilitation, 52, 381-384, 1971.
- Coelho, C.A. An investigation of sign acquisition and use by severe, chronic aphasic subjects. Ph.D. Dissertation, University of Connecticut, 1982.
- Coelho, C.A. and Duffy, R.J. Sign acquisition and severity of aphasia. Paper presented at the annual convention of the American Speech-Language-Hearing Association, Cincinnati, November, 1983.
- Daniloff, J.K., Lloyd, L.L., and Fristoe, M. Amer-Ind transparency. Journal of Speech and Hearing Disorders, 48, 103-110, 1983.
- Eagleson, H., Vaughn, G. and Knudson, A. Hand signals for dysphasia. Archives of Physical Medicine and Rehabilitation, 51, 111-113, 1970.
- Fritelli, G. and Daniloff, J.K. Amer-Ind versus ASL: Recognition and imitation in aphasic subjects. Paper presented at the annual convention of the American Speech-Language-Hearing Association, Toronto, November, 1982.
- Goldstein, H. and Cameron, H. New method of communication for aphasic patients. Arizona Medicine, 8, 17-21, 1952.
- Goodglass, H. and Kaplan, E. Boston Diagnostic Aphasia Examination. Philadelphia, PA: Lea and Febiger, 1983.
- Guilford, A.M., Scheuerle, J. and Shirek, P.G. Manual communication skills in aphasia. Archives of Physical Medicine and Rehabilitation, 63, 601-604, 1982.
- Kirshner, H.S. and Webb, W.G. Selective involvement of the auditory-verbal modality in an acquired communication disorder: Benefit from sign language therapy. Brain and Language, 13, 161-170, 1981.

- LaPointe, L.L. and Horner, J. Reading Comprehension Battery for Aphasia. Tigard, Oregon: C.C. Publications, 1979.
- Moody, E.J. Single case study: Sign acquisition by a global aphasic. Journal of Nervous and Mental Disease, 170, 113-116, 1982.
- Rao, P.R. and Horner, J. Gesture as deblocking modality in a severe aphasic patient. In R.H. Brookshire (Ed.), Clinical Aphasiology: Conference Proceedings, 1978. Minneapolis, MN: BRK Publishers, 1978.
- Skelly, M. American Indian Gestural Code. New York: Elsevier North Holland, 1979.

DISCUSSION

- Q: Did he use the other signals -- the things you didn't work on?
- A: It depended on the task. In Task 1, he used far more of the trained signs than other signals, but with the printed phrases, he switched over to using nearly twice as many of the other signals than the trained signs. It seemed to me that as the task became less structured, he began to ad lib more.
- Q: Have you thought about what you would do to induce generalization?
- A: Well, I have a little bit, but I feel training generalization is almost a contradiction. I guess what I would do if I pursued this would be to try working in groups. Once subjects had acquired a basic vocabulary, I would try putting two subjects together and working on interactions in a group setting. I know Skelly has done this and reported a fair amount of success. I guess it is more of a natural communicative situation than just working one on one.
- Q: I'm just curious; I know a lot of people we've observed using signs and gestures vocalize and use facial expressions. I'm curious how much that came into play as far as when they were not using the acquired gestures, especially when they were trying to use their own signs. Also, how much guessing was there as far as yes/no exchanges with the other person?
- A: He was verbalizing, but none of what he said or produced in those situations contributed to the overall message success. I didn't really note any increase in verbalizations over the course of the observations. With the 12 subjects I trained in the first study I mentioned, there were no differences between the pre- and post-PICAs after the month of sign training. Even when we analyzed the individual modalities there were no significant differences. As far as questions and answers, there wasn't a lot of that. His wife was tuned into the task and just let him go with the gestures. To a certain extent, I guess that was a little unnatural, but his responding to questions didn't really contribute to communicative success as measured by these tasks.