Coverbal Behavior and Aphasic Speakers

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By now most aphasiologists are aware of the ways individuals communicate during face-to-face conversation. By defining the origins and destinations of these interdependent communicative behaviors, we can isolate their different channels (Table 1). Increasing our understanding of nonverbal

Table 1. Major Channels of Communication During Conversation (Markel, 1969)

Interlocutor A (Speaker) Source	Channel	Interlocutor B (Listener) Destination
sound from the mouth	speech	ear
skin	touch	skin
changes on skin surface	observation	eyes
movement of body	kinesics	eyes
placement of body	proxemics	eyes
(various)	odor	nose

channels of communication can aid us in the development of a better grasp of communication in the world. In recent years, much research in psychology, psychiatry and anthropology has been conducted on nonverbal communication. These efforts have attempted to identify the most significant nonverbal behaviors, to reliably measure the occurrence of those behaviors, and to identify the communicative significance of the behaviors.

Some current aphasia research has emphasized the study of nonverbal behavior to increase our understanding of the role gestures play with respect to verbal language and language recovery. This body of knowledge led to development of treatment programs for both verbal stimulation and for compensatory word-retrieval strategies.

However, preoccupation with gestural abilities in the aphasic patient has dominated the investigation of nonverbal communication in aphasia to the exclusion of those nonverbal communicative behaviors which occur in association with or accompany words, but by themselves, do not stand alone. These are the nonverbal behaviors that communicate information such as emotional states, attitudes, relative status, turn-taking during conversation and other affective and regulatory information fundamental to dyadic interaction.

These nonverbal communicative behaviors are collectively called coverbal behavior, and we define them as the behaviors of interlocutors which occur in association with or accompanying words, but which are not essential for the articulatory or grammatical functioning of those words (Markel, 1975). The study of coverbal behavior, therefore, is the investigation of all observable nonlinguistic communicative behaviors elicited by individuals engaged in conversation.

In this study we asked the question, if aphasia adversely affects verbal behavior as well as aspects of nonverbal behavior, then how does it affect coverbal behavior? Why, as suggested by authors such as Holland (1975), do aphasic speakers appear to be better communicators than talkers? Or, in fact, do aphasic speakers possess a significantly different coverbal communicative structure, and exist in yet another kind of "communicational isolation" from the rest of society? With these problems in mind, we formulated the following questions:

1. Do aphasic speakers as a group differ significantly from a group of non-brain damaged, normal speaking adults in their use of coverbal behavior?
2. Does use of coverbal behavior by aphasic speakers vary predictably with language abilities?

Subjects. Ten aphasic adults, evaluated in the Audiology and Speech Pathology Service at the Gainesville Veterans Administration Hospital, served as subjects in the experimental group, and met the criteria displayed in Table 2.

Table 2. Subject Criteria: Experimental Group.

Left hemispheric cerebrovascular accident (thrombosis or embolism).
At least 3 months post onset.
Score below the 85th percentile overall on the PICA.
PICA profile and judgment of a certified speech pathologist consistent with diagnosis of aphasia.
Premorbid right handedness.
No premorbid history of mental disorder.
Outpatient status (living at home).

Aphasic subjects were between the 47th and the 81st percentile overall, and the 33rd and the 91st percentile verbally on the PICA. Aphasic subjects also were required to perform the experimental task; that is, to be able to participate in a conversation. Therefore, patients who were unable to speak at all or were unable to understand the task were not used in this study. Ten normal speaking, non-brain damaged adults served as subjects in the control group, and were matched with aphasic subjects on sex, age, race, educational level, and occupational level. All were living at home. Table 3 compares the two groups of subjects by age and educational level and illustrates the time post onset for the experimental group.

Table 3. Description of Age and Education for Aphasic and Control Groups of Subjects and Months Post Onset for Aphasic Group of Subjects.

Groups of subjects	Age in years			Education in years			Months post onset		
	X	Range	SD	X	Range	SD	X	Range	SD
Aphasic	57.6	42-72	9.0	8.5	3-12	3.7	21.2	3-90	25.9
Control	55.8	40-75	9.6	10.9	8-16	2.6	----	----	----

Choice of Coverbal Behavior. The specific coverbal behaviors investigated in this study were eye contact, eyebrow raise, smile, head nod, head shake and head tilt. These coverbal behaviors were selected because they reflect important social psychological dynamics of conversational interaction, they are easily observed in a socially acceptable manner (that is, by looking at the speaker's face and head), and they are easily and reliably recorded by a judge viewing a videotape recording of the interaction.

The Speaking Turn. Man is a social animal (Sullivan, 1953) and face-to-face conversation is one of our most common means of social interaction (Cherry, 1968). It therefore seems fitting that spontaneous conversational interaction serve as the appropriate setting for the study of coverbal behavior.

During conversation, speaking and listening roles are systematically rotated between or among interlocutors. That is to say, interlocutors always take turns speaking and listening. The speaking turn is a fundamental element of conversation and is generally accepted in dyadic research as the simplest and most reliable method of segmenting the behavioral stream of conversational interaction (Schegloff, 1968; Duncan, 1972; Markel, 1975). Turns were elicited in this study by asking each subject to tell what he "thinks" about a certain word (Table 4). Twenty of the 500 most commonly

Table 5. Stimulus Words Used to Elicit Speaking Turns.

"What do you think about __________?"

1.	Black	11.	Laughing
2.	Boy	12.	Life
3.	Crying	13.	Love
4.	Death	14.	Man
5.	Enemy	15.	Mother
6.	Father	16.	Play
7.	Friend	17.	Queen
8.	Girl	18.	White
9.	Hate	19.	Woman
10.	King	20.	Work

used words in the English language (Thordike and Lorge, 1963) were presented individually to each subject. Each turn began following presentation of a stimulus word and ended immediately following the subject's last utterance; that is, when he was no longer speaking. Therefore, for each subject, 20 separate turns were elicited.

Videotape Recording. Videotape recording equipment was required to accurately preserve the selection and utilization of coverbal behavior emitted by subjects. All measurements of coverbal behavior and reliability were made from the videotape recording.

A 10 x 12 foot room with a 3 x 3 foot table and two chairs were used. The videotape camera was situated behind and slightly to the left of the experimenter, in view of the subject, and focused on the subject's head and shoulders. This arrangement permitted a recorded image of the subject's facial expressions and head movements, as seen by the experimenter, to be preserved for later analysis.

Viewing of Videotape Recording. The experimenter and one trained assistant viewed the videotape recordings individually and together. Each recording was viewed at least eight times; once for each of the six coverbal behaviors studied, one time for measurement of the total speaking time for all 20 turns, and at least one time for measurement of reliability. The experimenter sat in front of a videotape television monitor to watch the recorded speaking turns. After determining the coverbal behavior to be monitored, the experimenter began the tape and pressed a switch each time the behavior was observed, maintaining switch pressure until that behavior ceased to occur. The switch activated both a counter and a timer each time it was pressed, and so, simultaneously, a cumulative record was obtained of the number of times the behavior occurred, that is, the frequency of occurrence, and the length of time in seconds the behavior occurred. The mean value for all 20 turns was then converted to the relative values of rate, duration and average length. Measurements of interjudge reliability for the different coverbal variables are displayed in Table 5.

Table 5. Measurement of Reliability for Each of the 13 Variables.

Variables	r_1
Time	0.98
Eye Contact Number	1.00
Eye Contact Time	1.00
Eyebrow Raise Number	1.00
Eyebrow Raise Time	1.00
Smile Number	1.00
Smile Time	1.00
Head Nod Number	0.84
Head Nod Time	1.00
Head Shake Number	1.00
Head Shake Time	1.00
Head Tilt Number	0.92
Head Tilt Time	1.00

Measurement. In order to maintain realistic, spontaneous behavior, subjects were allowed to speak for as long as they wished. Variations in the total speaking time among subjects was equalized when calculating the values of rate, duration and average length.

Rate of a behavior is obtained by dividing the frequency by the speaking time, then multiplying by 60 to yield number of behaviors per minute. For example, 15 eye contacts in 300 seconds equals a rate of 3 eye contacts per minute.

Duration of a behavior is obtained by dividing the cumulative time by the speaking time, then multiplying by 60 to yield seconds of behavior per minute. For example, 35 seconds of eye contact in the same 300 seconds equals a duration of 7 seconds of eye contact per minute.

Average length of a behavior is obtained by dividing the cumulative time by the frequency, yielding the number of seconds per single occurrence. For example, 35 seconds of eye contact divided by 15 eye contacts equals an average length of 2.3 seconds of eye contact per occurrence. A detailed description of the procedures used for calculating these values may be found in Table 6.

Table 6. Computations for Rate, Duration and Average Length.

$$\text{Rate} = \frac{\text{frequency of occurrence}}{\text{speaking time (seconds)}} \times 60 \text{ seconds}$$

$$= \text{number of occurrences per minute}$$

$$\text{Duration} = \frac{\text{cumulative time (seconds)}}{\text{speaking time (seconds)}} \times 60 \text{ seconds}$$

$$= \text{number of seconds per minute}$$

$$\text{Average Length} = \frac{\text{cumulative time (seconds)}}{\text{frequency of occurrence}}$$

$$= \text{number of seconds per occurrence}$$

In addition to coverbal measures, the language tests administered to all aphasic subjects included the Porch Index of Communicative Ability (Porch, 1967), a 40-item version of the Token Test (LaPointe, Andersen, Cutler, Horsfall, McCall and Ready, 1971) and another test of auditory comprehension developed at the Gainesville VA Hospital called the Functional Auditory Comprehension Task (FACT) (LaPointe, Horner, Lieberman and Riski, 1974). In addition to the more conventional mean scores of overall performance and performance by gestural, verbal and graphic modalities provided by the PICA, the mean scores of several related subtests were calculated, including subtests II and III (object manipulation/pantomime), subtests V and VII (reading comprehension) and subtests VI and X (auditory comprehension).

Results and Discussion. Hotelling's T^2 statistics (Morrison, 1968) were computed to test for differences between group means on all six coverbal behaviors simultaneously for rate, duration and average length. No significant differences existed between groups in overall mean rate, duration and average length of coverbal behavior.

When individual t-tests were applied to each of the 18 coverbal variables, all but 3 yielded p-values greater then 0.05. We found the greatest difference in terms of time. Durations of head shake (p - 0.045), average length of head shake (p = 0.011) and average length of head nod (p = 0.045) were significantly greater for the aphasic group than for the control group. It appears then that aphasic speakers as a group do not differ significantly from non-brain damaged, normal speakers in the rate of coverbal output. However, while aphasic speakers shook their heads during speech as often as normal speakers, the aphasic speakers tended to shake their heads for a longer period of time. As well as serving to reinforce the verbal channel, prolonged head shaking also appeared to be in response to concurrent verbal output difficulty. By shaking his head for a longer period of time, the aphasic speaker experiencing difficulty with speech was able to communicate his frustration to the listener as well as communicate his desire to continue speaking. It seems, then, that although coverbal behavior is integrated closely with speech, nevertheless, impairment of verbal output does not precipitate a disorder of coverbal behavior. Coverbally, aphasic and control speakers represented a single communicative population.

The second question related to the interaction between language ability and coverbal behavior. Using the Pearson Correlation Coefficient, the correlations in Table 7 were computed. All were found to be significantly below the 0.05 level. One-half of the coverbal variables correlated significantly with language performance.

Table 7. Correlation Coefficients for Coverbal Variables and Performance on Language Tests for 10 Aphasic Subjects (p = 0.05).

Coverbal Variables	Language Tests	Correlation Coefficients	Levels of Significance
Head Shake X Rate	OA	- 0.67	0.04
Head Shake X Duration	AC	- 0.75	0.01
Head Shake X Average Length	AC	- 0.72	0.02
Head Tilt X Duration	AC	- 0.68	0.03
Eye Contact X Duration	VRB	- 0.72	0.02
Eyebrow Raise X Average Length	VRB	+ 0.67	0.03
Smile X Rate	VRB	- 0.66	0.04
Smile X Duration	OMP	+ 0.66	0.04
Smile X Average Length	RD	- 0.67	0.04

OA = Overall Score; AC = Auditory Comprehension (PICA: VI & X); VRB - Verbal (PICA: I, IV, IX & XII); OMP = Object Manipulation/Pantomime (PICA: II & III); and RD = Reading (PICA: V & VII).

Next, we looked in more detail at three of the highest correlations. Two of these correlations were obtained by comparing performance on the auditory comprehension subtests of the PICA with duration and average length of head shake. However, a closer look at the mean scores for the auditory comprehension subtests revealed that subjects performed relatively well and with little variation, limiting the ability to interpret the interaction of the two variables. In addition, the lack of significant correlation between head shake and performance on the other two measurements of auditory comprehension is an indication that no strong relation probably existed between auditory comprehension and head shaking behavior <u>during speech</u>.

A third correlation of -0.72, significant at the 0.02 level, was found when comparing <u>duration of eye contact</u> and verbal performance on the PICA (Figure 1). Mean performance on the 4 verbal subtests is represented

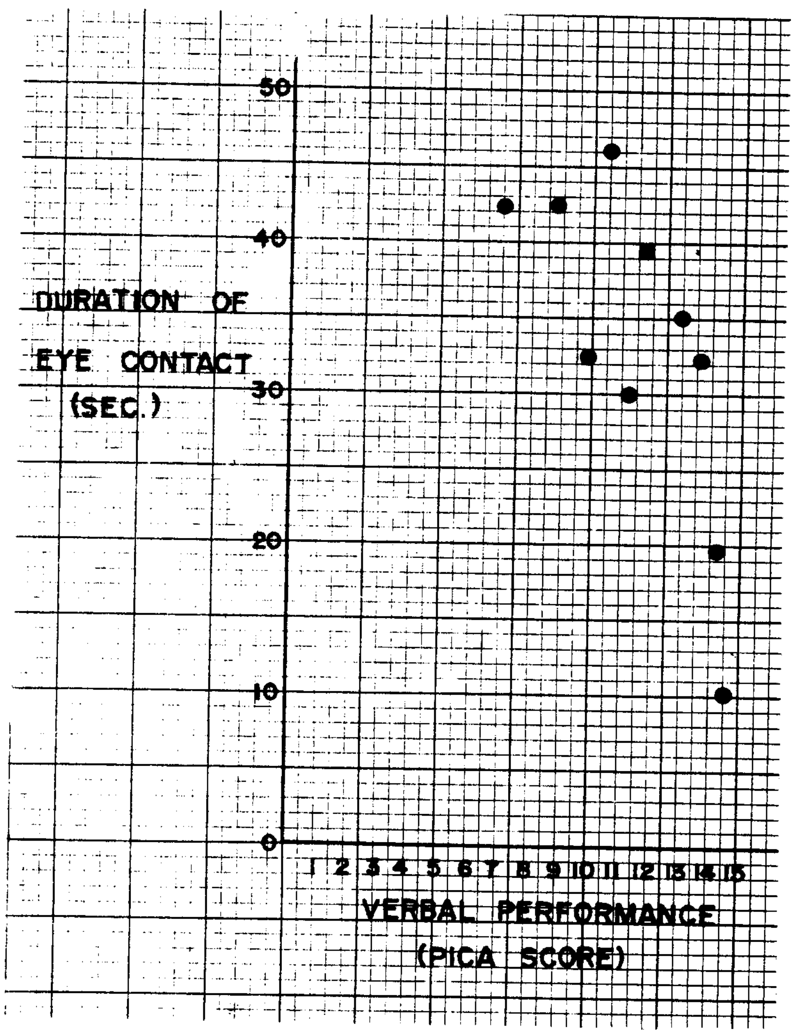

Figure 1. Duration of eye contact by verbal ability for ten aphasic speakers.

by well distributed scores ranging from 6.75 to 14.5. An aphasic speaker experiencing verbal difficulty could indicate his desire to continue speaking (and thus continue his speaking turn) by maintaining eye contact. As verbal performance improved, duration of eye contact was not as critical a cue for continuing the speaking turn. These results, showing an inverse relation between duration of eye contact and verbal ability, seem to indicate that eye contact is modified by aphasic speakers without training.

Summary and Implications. The results of this study indicate that, for the mildly and moderately impaired aphasic speaker, coverbal behavior is unimpaired and can function as a means of communication during speech and during unsuccessful speech attempts. Indeed, aphasic speakers are better communicators than they are language users. Perhaps it is because we know so little about this mode of communication that the contrast between speaker and communicator appears so great.

Since most of us are relatively unaware of our coverbal messages, all speakers, both aphasic and normal, inadvertently send inaccurate messages. For any communicator, maintaining eye contact, smiling and shaking his head will probably communicate something like "yes, I understand," or "I agree," when in fact he may not understand at all. This presents a special problem for the aphasic patient. Certainly, appropriate counseling of the aphasic patient and his family is important (Egolf and Chester, 1973, Chester and Egolf, 1974, Egolf, 1975). Also, attempts should be made to train aphasic patients to elicit selective coverbal behaviors on a more volitional, less automatic level.

In addition, a hierarchy of various types of gestures might be constructed to provide for the teaching of more difficult gestures to the aphasic patient. For example, patients could begin with coverbal gestures they produce spontaneously (such as head nods for "yes," head shakes for "no," and head tilts for "I don't understand") and progress through relatively more "automatic" gestures (such as licking the lips for "delicious") to a system that can support more complex linguistic structure such as Amerind signs (Shelly, Schinsky, Donaldson and Smith, 1973). The successful application of kinesics as a rehabilitative technique in clinical aphasiology may be limited only by our imaginations and our willingness to try.

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DISCUSSION

Q. Do you think the preservation of the coverbal movements you observed have anything to do with their lack of representation in the precentral gyrus?

A. First, we made no attempts in this study to localize coverbal behavior; otherwise, we would have included right CVA subjects. It is a safe assumption that coverbal behavior is not localized in the cortical areas attributed to speech and language. In addition, we have seen patients with diffuse damage, for example, secondary to anoxia, still maintaining these types of gestures. So it is difficult to say just where coverbal behavior is localized cortically.

Q. The coverbal behavior of any individual, normal or aphasic, depends very much on the behavior of the other individual. I'm just wondering if it might not be interesting to replicate the study, but simultaneously look at the person on the other side of the camera as well.

A. A very good point. If I nodded my head, the speaker would usually reciprocate by nodding his head. Simultaneous viewing using split screen is used when studying synchrony and other aspects of interaction, but we felt that we could more easily address our question by monitoring only the speaker and minimizing the experimenter's coverbal output.

Q. The fact that you are trying not to nod your head makes another behavior that affects their coverbal behavior. It's impossible in this situation not to interact. The whole idea of kinesics is it's an interaction.

A. Yes, it's not possible to say nothing. I was interacting coverbally, but kept it to a minimum. I was sitting, facing the speaker and maintaining eye contact, and so there were coverbal behaviors elicited by the listener to maintain the interaction.

Q. Did you look at the fluent/nonfluent dichotomy, or the anterior/posterior lesion?

A. We had six fluent and four nonfluent aphasic speakers and compared the means of these two groups for rate, duration and average length. We did not find any statistically significant differences except for duration of eyebrow raise ($p < 0.05$). This is interesting in that eyebrow raise can be used as a supra-segmental feature to denote stress, for example, along with vocal intensity and pitch changes. This is what the fluent speakers were doing, but the nonfluent speakers were not, and may be related to the prosody problems displayed in the speech of some patients suffering from apraxia of speech. Other than this, no other differences in coverbal behavior were found between fluent and nonfluent aphasic speakers.

Q. Did you control for the appropriateness of the subjects' coverbal behavior?

A. No, we did not. Our questions dealt only with the number of occurrences of each behavior and the amount of time each behavior occurred. At times, we would see aphasic speakers nod their heads while saying "no" or shake their heads while saying "yes," but we did not assess the appropriateness of these responses.

Q. Is there a relationship between an aphasic speaker's changing verbal ability and coverbal behavior? As his verbal ability improves, does his coverbal behavior also change?

A. That's difficult to answer and because this was not a longitudinal study I can only speculate. I feel that as his verbal ability improved, the aphasic speaker would rely less on his coverbal behavior to compensate for speech, and for the behaviors studied in this investigation, this change would be reflected by a decrease in the duration of eye contact.

Q. Was there a difference in response time between nouns and verbs?

A. We did not measure response time. Also, based upon the carrier phrase we used, "What do you think about__________?," we considered our verbs gerunds.

Q. With respect to the influences of social and cultural variables on interaction, did your role in the situation consist simply of asking what they thought about the stimuli?

A. Initially, for about two minutes, we chatted about different things to help create a relaxed atmosphere while the videotape equipment was being focused. Then I read the instructions, part of which was a comment stating that I was not allowed to answer any questions while they were responding.