Intersystemic Reorganization for
Apraxia of Speech

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Irregularly during the last three decades, reports have appeared describing creation and adaptation of manual communication systems for aphasic patients with primary expressive disorders (Goldstein and Cameron, 1952; Chen, 1968, 1971; Eagleson, Vaughn, and Knudson, 1970; and Skelly, Schinsky, Smith, and Fust, 1974). These systems were used first as alternative modes of communication. Almost without exception, however, clinicians noted, at very least, an increased drive to talk, and in some instances, increased talking. The usual explanation for the increased speaking was that manual communication facilitated oral communication, and Skelly et al. (1974), as a result of their successful experience in improving the speech of five apraxic patients by combining speech with American Indian Sign (AMERIND), urged continued systematic study of the facilitating effects of gestures on apraxic speech. Clinical study of the sort recommended by Skelly et al. (1974) is underway at the Madison Veterans Hospital. This paper outlines the conceptual framework and therapeutic methods for that work.

REORGANIZATION

Luria (1970) believes that apraxia of speech persisting into the chronic period, or period after spontaneous recovery, will improve only minimally and slowly, if at all, without treatment. Apraxic speech deficits, according to Luria, can be reduced "only by major reorganization of cortical processes." He identifies two types of such reorganization-- intrasystemic and intersystemic.

Intrasystemic Reorganization

Intrasystemic reorganization moves the performance of a behavior down or up within the central nervous system as a way of teaching the patient improved performances of that behavior. Luria (1970) describes the shifts one can impose on a motor performance as "down to a lower level, i.e., have it carried out at a more primitive, automatic level" and "up by giving it new meaning and transferring its execution to the level of higher cortical processes." For example, the speech pathologist is employing intrasystemic reorganization when he derives /p/ from blowing; and probably when he uses Melodic Intonation Therapy (Sparks, Helm, and Albert, 1974) to improve speech. In the first instance the behavior is reorganized by first moving it to a lower level. In the second, reorganization is accomplished by an upward movement, although that directional interpretation is open to debate, and Luria seems to consider that an upward movement is only possible for nonspeech acts, as speech represents the highest level of function.

Intersystemic Reorganization

Intersystemic reorganization introduces into the performance of an act a functional system or set of behaviors that was not previously integral to that performance. As Luria says, "with this type of reorganization the major factor on which reorganization is based comes from an entirely different functional system." He provides the example of teaching a patient with Parkinsonism to blink each time he squeezes a ball. Luria demonstrates that the patient's squeezing in the "blink-squeeze" condition is more regular than in the "squeeze-only" condition. He concludes that the squeezing was being reorganized because blinking was introduced into the performance of an act with which it had not previously been associated.

Speech is primarily an auditory-tactile-vocal behavior. The two major intersystemic reorganizers are vision and manual gesturing. If we teach an apraxic patient to speak better by pairing visual information (watching the clinician, looking in a mirror, reading) or manual gestures (AMERIND) with auditory or tactile information and oral gestures, we can hypothesize that the patient's speech has been reorganized. One unfortunate implication of this statement is that we seem to be ignoring the importance of vision and gesturing in normal speech. Because both have at least a casual significance to speech (in the case of gesturing the significance is more than casual) we have modified Luria's definition of intersystemic reorganization as it applies to speech reeducation. Intersystemic reorganization is the rebuilding of speech by the introduction into the act of speaking a system or sets of responses in a unique form or with a unique regularity.

This discussion will focus only on intersystemic reorganization accomplished by manual gestures. Our hypothesis is that speech may be improved by pairing it with manual gestures not only because the gestures somehow facilitate speech as Skelly et al. (1974) maintain, but also because gestures can be made to aid speech reorganization.

TREATMENT METHODOLOGY

Types of Gestures

Most of the gestures we use in speech reorganization are borrowed from existing systems such as AMERIND (Skelly et al., 1974) and from manual systems for the deaf supplemented by a limited number of gestures we or our patients have created. The exact gestures a clinician employs are probably less important than that the gestures be simple and meaningful. An easy gesture is one requiring only one normal hand, and no digital gymnastics. Meaningful gestures, called emblems by Ekman and Friesen (1972), are those having a verbal equivalent which is recognized by members of a group, culture, subculture, or class. Pinching one's nose between thumb and forefinger while grimacing horribly means "something stinks," cupping one's hand behind one's ear means "hear" or "listen." These are emblems. As reorganizers they are to be preferred over arbitrary gestures such as making a fist to show "hungry" as was used by Goldstein and Cameron (1952). It appears that in apraxia of speech, meaningful gestures, like meaningful speech stimuli, are accompanied by a higher proportion of intelligible, successful responses.

Reorganization can also be accomplished by simple, less meaningful gestures called illustrators[1] by Ekman and Friesen (1972). They describe illustrators as "acts which are intimately related on a moment-to-moment basis with speech, with phrasing, content, voice contour, loudness, etc." They define eight types of illustrators, three of which we have used in reorganization--simple pointing gestures to show self and others (deictic movements), gestures emphasizing the stress and rhythm of speech (batons), and directional gestures of the hands, arms, or body that correspond to the direction of jaw or lip movements during production of a sound or sound segment (kinetographs). Pointing to one's self to indicate "I" is an example of a deictic gesture. The rhythmical tapping accompanying word and phrase utterances popularized by MIT (Sparks, Helm, and Albert, 1974) is a baton. Moving one's hands laterally from the "prayer" position to suggest the sound /i/ and then bringing them back together to suggest /u/ are kinetographs. The names are inconsequential. We introduced them only to highlight the variety and orderliness of usable gestures. Patient need and clinician creativity will no doubt generate many more if intersystemic reorganization survives as a treatment approach.

Stimuli

The variety and number of gestures make it possible to reorganize an equally various and extensive number of utterances. We have used the meaningful gestures or emblems primarily with words--mostly verbs--and phrases. For example, rubbing the back of one's hand with the other hand more frequently accompanies "wash" than it does "soap" or "water," and a writing gesture more frequently means "write" than "pencil." Nothing precludes pairing gestures with nouns. Our experience has been that verbs are more feeble than nouns in the speech of patients with whom this method has been tried.

Pointing gestures to show persons and things can be used to reorganize single words or portions of phrases. The batons or gestures to indicate prosodic features can be used with either words or phrases. Only the kinetographs or directional gestures are limited to sounds, syllables, and a few words.

With all but the most severe patients, and occasionally even with these, we introduce meaningful words and phrases as soon as possible. By combining intact gestures of various types, it is often possible to create reorganized phrases such as "I want to eat," "No, thank you," and "I know it," almost from day one.

Procedures

Reorganization requires that the system or set of behaviors which is to form the basis for reorganizing the disturbed function must itself be intact. Since gestures are often involved[2] after brain-damage (Goldstein, 1948; Goodglass and Kaplan, 1963) they must be strengthened prior to being paired

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[1]We lack the time to describe the differences between emblems and illustrators but the interested reader may wish to study Ekman and Friesen's article.

[2]Whether this disturbance is apraxic, aphasic, both, or neither need not concern us now, although a retrospective evaluation of successful and unsuccessful reorganization will have to consider each patient's gestural ability and reasons for deficits in that ability.

with speech. Such strengthening requires traditional behavioral methods. The clinician provides a model and an immediate knowledge of results. The clinician will need to be especially assiduous in supplying feedback on gestural performance because patients generally have less stable criteria for judging gestural adequacy. If simple imitation is inadequate, the clinician can mold the patient's hand or provide him with real objects to aid the gesturing. For example, the patient can learn the "eat" gesture by first practicing with a spoon. We have not used a mirror or pictures but do rely heavily on verbal description and visualization of the occasion when the gesture would be appropriate. Discrete, correct gestures must be encouraged. Both patient and clinician must resist the temptation to rush pell-mell toward speech. Feckless gestures can only interfere with reorganization.

When the concept of gesturing and a few gestures are stable, these few can be paired with speech. Previously, speech has been allowed only if consistently correct. Like the learning of gestures, the actual reorganization relies on a traditional behavioral approach. At first, the clinician can encourage simultaneous gesturing and speaking. If the patient appears overwhelmed by the dual demand, and if the gestures are strong in isolation, speech can be aided by placement cues, diagrams, explanations, even mirror work. As long as the gestures remain strong, the clinician can reward progressive approximation of the correct speech. Systematic practice and knowledge of results should produce a stable set of reorganized speech responses in a few sessions. If correct responses fail to appear in a few sessions, gestural reorganization should be replaced by other methods. Gestures can be reintroduced as an alternative mode of communication at a later time.

As responses become more stable, the clinician can begin fading the gestures. Premature abandonment of gesturing, however, can doom the entire treatment program. As a criterion, we continue encouraging a gesture until the patient can evoke the appropriate sound, syllable, word, or phrase consistently and aptly both in and outside the clinic. Even when this criterion is met, we encourage the patient to continue using gestures for self-cueing and self-correction. We may also practice the gestures from time-to-time even though the corresponding verbal responses appear stable.

CONCLUSIONS

After sixteen months we have only a few tenuous conclusions. Reorganization of speech is possible in some patients. Reorganized speech will be limited because the variety of normal gestures is more restricted than is the variety of normal oral gestures. Reorganized speech sounds reorganized. While some gestures may fade, other vestigial ones will remain. Gestural reorganization can be only one part of a total treatment program.

Who fails and why? Predictably we are better able to identify who than to explain why. Thus far two kinds of patients have failed--those who were unable to learn at least a simple and limited set of gestures in five to ten sessions and those who were incapable of even limited, intelligible utterances after five to ten sessions of pairing intact gestures with speech. Interestingly, these two groups do not necessarily contain all the same patients. Even moderate limb apraxia does not guarantee failure, but it does require very extensive and intensive practice in gesturing. The most handicapping condition seems to be severe conceptual deficits making this

program as inadequate for the severe patient as are other programs.

Our program is ongoing. We hope that the concepts and methods add something of value to the apraxic patient's treatment.

NOTE: Videotapes demonstrated testing, treatment, successes and failures.

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Discussion

Q: Do you think the limb gestures are coded with the verbal and in that case the more natural the better, or are you imposing something on the verbal? What about the right hemisphere?

A: The more meaningful the gesture the better it works as a reorganizer. I am not sure why that is true, however. We have not spent much time speculating about what is happening cortically. We may be introducing a new system (the gestural) and presumably some additional cortical areas. If I understand Luria, that is what he would have us believe. We have no hypotheses about the right hemisphere's contribution.

Q: How long do you wait before pairing speech with gestures?

A: We strengthen gestures first. When one or several are strong we pair them with the appropriate verbal responses.

Q: Dr. Warren reported that the St. Louis VA Staff holds patients back from speaking until they become "fluent" in gesturing not only single words but sentences. Their rationale is that the gestural system must be trained, not just a few responses from that system.

A: Nice going.

Q: Can gestural reorganization be used with patients having limb apraxia?

A: Yes. These patients require more extensive gesturing practice.

Q: Can severe aphasia be helped by this method?

A: Perhaps. We cannot tell if gesturing alone is helping severe patients, however, because our therapeutic approach is an eclectic one directed against the entire language system. Besides teaching gestures we also treat auditory processing, reading and the rest.

Q: How are negatives indicated?

A: "Don't" is signaled by the wagging of an index finger. We continue to experiment with gestures to show tense. We need to expand the gestural system so that it allows for more than single word and present tense utterances.

Q: I realize Wisconsin has a higher incidence of apraxia than other parts of the country, but have you used this system with patients having posterior lesions?

A: We have not used the method with posterior lesion patients. We have few such patients in Wisconsin because the people up there have big frontal lobes.