Some 19 years ago, at the Veterans Administration Hospital in Cincinnati, Ohio, the music therapist, ward physician, and staff observed that stroke patients who were unable to speak could often sing or hum familiar songs. This sparked the development of a music therapy technique designed specifically to facilitate the return of speech in neurologically impaired patients.

Music has been used previously in speech therapy. Palmer (1952) described a child who suffered from severe encephalitis, but was able to sing a song learned prior to the illness. The child was intelligent when singing and appeared to comprehend the words. He continued to improve and redevelop language ability. Palmer observed that "...music served as an intervening wedge, or as a carrier of communication." He also observed "...an increase in propositional quantity" when melodic patterns were used with adult aphasics.

More recently, Gerstman (1964) reported similar findings in a 47-year-old woman with a cerebral vascular accident in whom again singing appeared to catalyze the return of speech.

Unlike other techniques involving music and speech therapy (Albert, 1973), the technique presented here has been developed by a music therapist and is based upon both musical and therapeutic principles. The therapeutic program — from its progressive levels of accomplishment and interaction with others to possible neurophysiological foundations for its success — is discussed below.

The Music Therapy Program

THE CARRIER MELODY

The first step in developing a therapeutic technique was to find an effective carrier melody for differing phrases — preferably one with an "overlearned" or "automatic-level" pattern that emphasized melody and rhythm.

Two criteria were established. First, the melody had to be familiar to a broad
population to take advantage of any "automatic" ability present. Second, the melody, rhythm, and interval needed to be as close to conversational speech as possible.

The melody of "Yankee Doodle" was selected. Its familiar melody and easily-remembered rhythm fulfilled the first requirement. Furthermore, since the largest interval in the melody is a third in the seven-note sequence with an optional eighth note, the second criterion was also met.

The program was then expanded in two ways. First, tongue exercises performed to the music — such as those used with apraxic patients who may be unable to perform oroperipheral movements either upon command or in imitation — were included. Second, a two-note pattern was used for introducing new words. This pattern utilized either an ascending or descending third interval, depending on the individual patient (see box at right).

THE THERAPEUTIC SESSIONS
As the program evolved, it became apparent that the patient's initial participation required careful structuring. For example, it is important that music therapy begin immediately on referral. Since patients in the acute stage are generally in private or semi-private rooms, sessions can be conveniently initiated at bedside. The initial session is diagnostic; the other early sessions are usually brief and are intended to help the patient realize the depth of speech involvement and the limitations to his or her comprehension. These sessions also provide support, and the awareness that professionals are available to help, and finally, a private and secure environment for the first groping — and often emotional — attempts at vocalization.

Once the patient is ambulatory or can be wheeled to other areas, he or she should be introduced gradually to other patients in the program. This can be facilitated by a course of therapy that progresses over three types of sessions:

Group sessions. The group setting revives self-esteem, encourages successful interaction with a peer group and stimulates awareness that others are concerned and ready to assist with recovery.

Private sessions with optional attendance and participation in group sessions. In a group session, the patient will feel inconspicuous if the pressure to speak is absent. However, it also pro-

THERAPEUTIC STEPS
The program developed by trial and error over a period of years until the following five steps evolved.

Step 1. Establishing the patient's ability to hum or sing the carrier melody.
Step 2. Adding phrases to the melody pattern.
Step 3. Expanding the patient's repertoire to expressing personal needs, greetings, and finally, family names.
Step 4. Increasing vocabulary, hopefully to 250 words, using a two-note pattern:
   - E C or C E
     Hello or Hello
   - E C or C E
     Water or Water

Step 5. Reducing and eliminating the carrier melody and two-note pattern and gradually substituting more complex phrases such as:
   - C C D E C E D
     "Give me (a) drink of water, please."
   - C C D E C E D (G)
     "Take me to the elevator"
   - C C D E C E D
     "Hello Emma, how are you?"
vides a protective environment if the patient desires to attempt new language skills and demonstrate progress.

**Group sessions with active participation.**
The patient sees and hears fellow patients at varying stages of progress and is provided with a further opportunity to test new skills in a safe atmosphere.

**FAMILY INVOLVEMENT**
The simplicity of the program lends itself to family participation and carry-over to practice in the home during weekend passes and after discharge. Family participation is advantageous, since it may help overcome the patient’s initial discomfort with the therapeutic techniques.

It also provides family members with both a sense of “doing something” for the patient as well as practical experience and training that will hopefully enhance their own ability to understand the patient.

Before the patient is discharged, then, the speech and music therapists meet with the family. The therapists explain the elements of aphasia that are applicable to the patient and if appropriate, provide basic booklets about aphasia.

**Case Report**

A 53-year-old white man suffered a left cerebral vascular accident and was treated by both the music therapist and speech therapist for approximately four months between November, 1974 and March, 1975.

The two therapists agreed initially to proceed independently with their own approaches; however, joint sessions were held periodically to videotape and compare the patient’s overall progress as well as his specific progress in each of the two therapies.

On initial examination, the patient exhibited severe oral apraxia when asked to imitate the examiner’s oror peripheral movements, verbal apraxia for words and nonsense syllables, and visual agnosia for matching pictures to objects. All verbal responses were the iterative stereotype jargon as described by Alajouanine (1956). However, the patient was able to imitate tonal patterns with appropriate rate and rhythm patterns and approximate some words in music therapy.

As therapy progressed, automatic speech for counting and naming days of the week and names of objects returned in music therapy before it did in speech therapy. On one occasion, when a new word was introduced in speech therapy, the patient used the two-note pattern taught in the music therapy sessions. Furthermore, by the 43rd day of therapy, the patient produced vowels and performed tongue exercises to music, although unable to do so in speech therapy, where standard techniques were used.

Further in the treatment period, various stages of jargon occurred, followed by the return of elements of automatic speech and perseveration. Finally, 106 days after initiation of therapy, the patient exhibited appropriate verbal response to confrontation questions. Again, each of these stages first appeared in the music therapy sessions.

**The Neurophysiological Basis for Music Therapy**

Why is music therapy effective in speech rehabilitation? While the answer is not yet known, studies over the past two decades point to a neurophysiological link between music and speech.

**THE BILATERAL BRAIN**

It was demonstrated (Kimura, 1961) that under conditions of stimulus competition, the contralateral auditory neural pathways are stronger than the
ipsilateral pathways. This established the left ear-right hemisphere, right ear-left hemisphere relationships. Kimura also hypothesized "... that the right cerebral hemisphere may play an analogous role in perception of complex nonverbal sounds."

This foreshadowed investigations one year later (Milner, 1962). Using the Seashore Test of Musical Abilities pre- and postsurgically in patients undergoing right and left temporal lobectomy, Milner observed that a selective deficit in the discrimination of tonal patterns and timbre occurred when the right temporal lobe was excised, but not when the left temporal lobe was removed.

CEREBRAL DOMINANCE
Shankweiler (1966) confirmed the asymmetry of the two hemispheres. This then led to studies of cerebral dominance for identifying consonants and vowels presented to left and right ears (Shankweiler, 1967 and Haggard, 1971). In the later study, the author notes a left ear advantage for emotional tones, in spite of an absence of a similar right ear advantage for sentences. This is particularly significant because rhythm and melody are integral parts of spoken language. Hence, the "emotional tones" perceived in the left ear are perceived in the right hemisphere because of the predominant decussation of the eighth cranial nerve in the brainstem. Since "emotional tones" are carried linguistically as rate, rhythm, and inflection, the intactness of the right hemisphere may provide a prelinguistic element of language and speech.

Wechsler (1973) added dimension to the relationship between emotional tone and speech. Essentially, he found that patients with right hemisphere lesions made more qualitative errors when recalling emotionally charged material than did patients with left hemisphere lesions. However, the patients with right hemisphere lesions made fewer quantitative errors than those with either bilateral or left hemisphere lesions.

This is of particular significance to the music therapist, since it means that a patient with a right hemisphere lesion has lost linguistic interpretation as manifest in rate, rhythm and inflection. It may also account for the desired flatness of affect and monotone in certain patients with brain injury.

A further study (Bartholomeus, 1974) used a combination of sung melodies and letter combinations presented dichotically and found that independent ear accuracy was equal when subjects were required to focus on a combined task involving voices or letter sequences. However, when required to focus on one specific element, subjects demonstrated left ear superiority for vocal melody recognition and right ear superiority for letter recognition. The author concluded that her findings supported those of the earlier investigators, indicating that left hemisphere dominance for speech may begin with phonetic rather than the more fundamental auditory processing. At the same time, the right hemisphere may be more efficient in processing the pre-linguistic stage of speech. These varying observations and research findings were succinctly agglutinated by Gates and Bradshaw (1977). Their paper reviews in detail the complex neurologic correlates between speech/language and music, and is an excellent primary reference.

Discussion
The technique presented in this paper capitalizes on residually intact melody and rhythm at some neurophysiologic level wherein correlates of speech/language share neural pathways with those elements of music salient to verbal communication, i.e., rhythm and melody.

These elements may exist at some common center of prelinguistic func-
tioning that has not previously been recognized or explored for its diagnostic and therapeutic potential. It is more likely, however, that both speech/language and music share a common antecedent, analogous to the relationship between chemical symbols and written English. While each is a system of communicating, not everyone able to read written English is able to comprehend chemical symbols. The common antecedent here would seem to be the ability to substitute in the correct sequence printed symbols for mental and/or verbal equivalents. Symbols are common to both systems; likewise, rhythm and melody are elements common to both music and spoken language.

Leonard Bernstein (1974) carried this concept further by demonstrating a correlation between the transformational grammar theory of language and the evolution of complex musical phrasing. Although this relationship is theoretical, the existence of unidentified common antecedents to both the evolution of language/speech and musical phrasing seems logical.

The Jacksonian “dissolution of functioning” theory may also explain in part the success of music therapy in speech rehabilitation. According to this theory, when the central nervous system is impaired, it retreats to more primitive levels of functioning. Thus the “music stage” of therapy may help the neurologically impaired patient to tap into and build on an intact, more primitive level of functioning — one that is common to both higher level speech/language functioning and higher level music functioning.

References


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