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The Effects of Music Assisted Relaxation on Preoperative Anxiety

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The purposes of this study were to determine: (a) if there was a significant decrease in physiological indicators of stress following Music Assisted Relaxation (MAR) interventions; (b) if there was a significant decrease in anxiety scores, as measured by the state portion of the State-Trait Anxiety Index for Children (STAIC), following MAR; and (c) to compile and analyze comments of patients and staff in response to interventions. Twenty pediatric burn patients, ranging in age from 8 to 20 years, participated in the study. All subjects were surgical patients on the reconstructive unit of a pediatric burns hospital. During the preoperative period, subjects in the experimental group received MAR interventions that included music listening, deep diaphragmatic breathing, progressive muscle relaxation, and imagery. Subjects in the control group received standard preoperative interventions. Results indicated a significant decrease in anxiety scores for the experimental group. The control group showed no significant change in anxiety. No significant change in physiologic measures was indicated for either group. Responses to the subject questionnaire were consistent with STAIC results with all subjects responding positively to interventions.

1 The authors wish to express appreciation to Shriners Burns Institute, Galveston, Texas, the nursing staff, and anesthesiology staff for support of this study. Appreciation is also expressed to Ms. Sharon Pyle, R.N., for her assistance in coordinating staff suggestions for implementation of this study, and Ms. Catharine Morgan, CCLS, for assistance with patient interviews.

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Preparing for surgery can be a stressful time for pediatric patients and their families. Patients with burn injuries often have multiple reconstructive surgeries throughout their lives. One might be inclined to think that, as children's experiences increased, their anxieties would decrease. However, each new surgical experience can bring emotional and physical distress that is unique to the present situation. With each new admission, the child arrives with differences in his/her developmental stage, family dynamics, outside stressors, and past hospital experiences. Prior experiences with surgery can lead to expectations that are good or bad. Therefore, it is important to assess the needs of the child and family during each admission (Bishop, Christenbury, Robb, & Rudenburg, in press; Thompson & Sanford, 1981).

Factors that may contribute to a person's level of anxiety include fear, environmental elements, and outside stressors. Children have various concerns about surgery that can create anxiety. Some fear disfigurement, exposure, pain, anesthesia induction, loss of control over their body, death, and the unknown. Strange equipment, unfamiliar sounds and smells, technical language, strangers, bright lights, and strange routines encompass the environmental elements that lead to increased anxiety. Finally, outside stressors such as familial stress, concerns at school, problems with friends, and plans for the future can all impact on the level of stress experienced during hospitalization (Bishop, Christenbury, Robb, & Rudenburg, in press; Chetta, 1981; Cowan, 1991; Moss, 1988; Moyer & Howe, 1991; Steelman, 1990; Thompson & Sanford, 1981; Zimmerman, Pearson, & Marker, 1988).

Both Spielberger (1972) and Lazarus (1966) define anxiety as having both emotional and physiological components. Anxiety, according to the psychological theory of stress developed by Lazarus, is characterized by subjective, consciously perceived feelings of apprehension and tension associated with autonomic nervous system arousal. Behavioral indicators of anxiety can include restlessness, trembling, shortness of breath,
fearful facial expressions, muscular tension, loss of appetite, and fatigue (Cowan, 1991). Physiological responses can include an increase in heart rate, blood pressure, respiration rate, metabolism, and peripheral vasoconstriction (Biley, 1992; Spintge, 1991; Steelman, 1990; Stevens, 1990; Zimmerman, Pierson, & Marker, 1988).

Many studies have been conducted that demonstrate the effects of music on a person’s physiological and emotional state in anxiety-producing situations. In the surgical arena, several studies have been carried out that examine the effects of music listening on patient anxiety. Kaempf and Amodei (1989) found that arthroscopic surgery patients experienced a significant decrease in respiration rate, systolic blood pressure, and anxiety scores. In a similar study, Moss (1988) found patients who received music listening interventions had a significant decrease in their anxiety scores. Surgical patients receiving local or regional anesthesia experienced a decrease in blood pressure when listening to music intraoperatively (Steelman, 1990). Similarly, patients undergoing a bronchoscopy experienced less of an increase in heart rate than those patients not receiving the music intervention (Metzler & Berman, 1991).

Ralph Spintge (1992) conducted a number of controlled, randomized clinical studies that have compared groups of patients receiving anxiolytic music with patients receiving traditional psychopharmacologic treatments. In each case, he found the differences in ACTH, cortisol, and beta-endorphin levels between music and nonmusic groups to be significant. Dr. Spintge concluded that music influenced all levels of the emotion “anxiety” by reducing the need for drugs such as sedatives, analgesics, and anesthetics by 50% of the usual dosage.

Outside of the surgical arena, music listening has also been researched for its effects on the physiologic and emotional status of patients undergoing critical care. Updike (1990) looked at the effects of taped music programs on the physical and emotional state of critically ill patients in an adult intensive care unit. The study showed significant decreases in systolic blood pressure, mean arterial pressure (MAP), and double product index (DPI) (product of heart rate and systolic blood pressure divided by 100) for patients receiving the music intervention. Emotional status assessments also indicated that patient moods
shifted to a more desirable state. White (1992) found that patients with acute myocardial infarction who listened to music tapes set at 60 beats per minute experienced a decrease in heart rate, respiration rate, and scores on the state portion of the State-Trait Anxiety Index.

Research on specific therapeutic music interventions that address preoperative or situational anxiety is limited. Guzzetta (1989) looked at the effects of relaxation and music therapy on stress reduction for myocardial infarction patients. Some patients received a relaxation intervention that verbally guided patients through a standardized head-to-toe relaxation script that emphasized the relaxation or “letting go” of major muscle groups. Other patients received this same relaxation treatment followed by music listening. Guzzetta found that apical heart rates were more effectively lowered and peripheral temperatures more effectively raised in the relaxation and music therapy groups versus the nontreatment group. Cumulative effects over time showed that apical heart rates were lower after the third session than in the first two sessions. These data support the theoretic knowledge that relaxation is an acquired skill. The more a person practices techniques, the more effective he or she becomes in producing therapeutic changes in their psychophysiology.

Chetta (1981) conducted a research study utilizing music therapy interventions in conjunction with preoperative teaching and prior to induction of preoperative medications. Behavioral data were collected via observational time sampling and questionnaires. Chetta found that the patients receiving music therapy interventions prior to induction of preoperative medication were consistently rated as indicating less anxiety before and during induction of medication. She also noted that the presence of the music therapist seemed invaluable in emotionally preparing the child for preoperative induction, because the music therapist’s role was purely for the support of the patient.

Cowan (1991), in a qualitative account of her preoperative interventions, stressed that the presence of the therapist is the driving force in comforting and providing the patient with controls. It is Cowan’s premise that it is not merely the music, but also the intervention by the therapist that is crucial during the surgical procedure.
These studies indicate the beneficial effects of music listening and relaxation interventions for anxiety management. It has long been known that music produces behavioral, emotional, and physiologic changes. Research is now focusing on why and what characteristics of music affect the mind and body in specified ways. In the literature, parameters for the characteristics of music to be used in evoking a relaxed response (i.e., lowered heart rate, regular deep breathing, muscular relaxation, etc.) are indicated. Several articles refer to the use of “sedative” versus “stimulative” music; however, they never specify the characteristics that define what exactly constitutes “sedative” music (Biley, 1992; Doody, Smith, & Webb, 1991; Steelman, 1990). Several articles do define their choice of music for relaxation in more detail. Summarized, these articles tend to refer to the characteristics of music including tempo, rhythm, pitch, melody, dynamics, harmony, and tone. Slow to moderate tempos are cited as most beneficial. Tempo should be at or below a resting heart rate; 60 beats per minute (bpm) is most commonly cited, with 72 bpm being cited as the upper limit. Rhythm should be regular, smooth, and flowing without sudden changes. Melodies that are slow, sustained, and progress by step are most desirable. Pitch, as determined by the frequency of sound waves, should be predominantly low to promote relaxation, as high pitched sounds tend to elicit tension. Dynamics are to remain in the soft to moderately loud range. Edwards, Eagle, Pennebaker, and Tunks (1991) found soft music (less than 65 dB) to be an element that resulted in decreased heart rate and conductance levels. As with rhythm and direction of melody, dynamic changes should be gradual and predictable.

There is some controversy on use of harmony. Updike (1990) and Edwards, Eagle, Pennebaker, and Tunks (1991) suggest benefits of harmonic consonance and use of harmonic cadences. McClelland (1988), however, suggests that harmony be used sparingly. Finally, the use of softer quality instruments, such as flutes, strings, and voice are suggested for the element of tone. Synthesizers can be used to produce such tones as those of the organ, acoustical wind instruments, and strings (Edwards, Eagle, Pennebaker, & Tunks, 1991; Eibl-Eibesfeld, 1984; Fried, 1990a, 1990b; McClelland, 1988; Moss, 1988; Spintge, 1991; White, 1992). Taking this research into account, music chosen
for this study was selected based on the following criteria: The music should have a tempo at or below a resting heart rate (72 bpm or less), predictable dynamics, fluid melodic movement (predominantly by step), pleasing harmonies, regular rhythm without sudden changes, and tonal qualities that include strings, flute, and/or piano.

Other therapeutic interventions that can positively impact on anxiety include breathing training, progressive muscle relaxation, and imagery. Deep breathing is often referred to as a component of relaxation training (Cowan, 1991; Fried, 1990a, 1990b; McCaffery, 1990). Fried (1990a, 1990b) states that breathing training has both mental and physical benefits. He points out that the purpose of training a person in deep breathing is to increase tidal volume without excessive loss of carbon dioxide. Therefore, an effective way to assure proper ventilation is to teach deep diaphragmatic breathing. Deep breathing is often used in conjunction with progressive muscle relaxation. Doody, Smith, and Webb (1991) describe progressive muscle relaxation as a technique directed towards contracting and relaxing muscle groups in a logical sequence in order to allow muscles to “let go” of tension. Often a relaxation script is used that incorporates deep diaphragmatic breathing with the tensing and releasing of muscle groups. In addition, imagery is often used to help individuals visualize the release of tension and focus on relaxing images. Imagery utilizes an individual’s imagination as a therapeutic modality by providing focus and organizing one’s energy in order to experience full relaxation and facilitate healing. To create vivid images, all sensory experiences are described/imagined including visual, auditory, tactile, taste, and olfactory experiences. The music serves to facilitate the images described and experienced during interventions. By talking with patients prior to interventions and allowing them to choose and describe imagery to be used, the patient gains a sense of control and takes on an active role in treatment (Cowan, 1991; Doody, Smith, & Webb, 1991; Fried, 1990a, 1990b).

This study was designed to examine the effects of a music assisted relaxation (MAR) program on the physiological and emotional status of pediatric burn patients undergoing a surgical procedure. The program used music listening, deep diaphrag-
matic breathing, progressive muscle relaxation, and imagery to facilitate relaxation. The music therapist played an important role in emotionally supporting patients both preoperatively and intraoperatively. The purposes of this study were: (a) to determine if there was a significant decrease in physiological indicators of stress following MAR interventions; (b) to determine whether there was a significant decrease in STAIC anxiety scores (state portion) following MAR interventions; and (c) to compile and analyze comments of patients and staff in response to MAR interventions.

Method

Subjects

Twenty pediatric burn patients, ranging in age from 8 to 20 years, participated in the study. All subjects were patients on the reconstructive unit who had been admitted for surgery. Patients were selected randomly for participation in the study and were randomly assigned to either the experimental or control group. Criteria for subject participation included: (a) subjects must be between the ages of 8–20 years, (b) subjects must be undergoing operative procedures on the reconstructive unit, (c) subject’s primary language must be English, and (d) subjects cannot have a significant hearing loss. Prior to participation in the study, patients and their parent(s) were informed of the study’s purposes and the interventions that would be provided. If the patient and his or her parent(s) agreed to participate, appropriate consent forms were reviewed and signed. The ten patients in the experimental group received MAR interventions in conjunction with regular preoperative interventions, whereas the ten patients in the control group received routine interventions only. This study was approved by The University of Texas Medical Branch Institutional Review Board.

Materials/Settings

A Sony CFS-W301 portable stereo was used to play music free field in the patient’s room during MAR interventions. Patients were given a Sony WM-FX38 Walkman with auto reverse, mega bass, and earphones for use during transport to the surgical suite, during induction, and in the recovery room. Four cassette tapes were used to provide patients with a choice of preselected
music. Selections included: Daniel Kobialka’s *Fragrances of a Dream and Timeless Motion*, Tanya Goodman’s *A Child’s Gift of Lullabies*, and *Cool Mountain Stream* by Platinum Disc Corporation’s Relaxation Series.

Interventions took place in three areas of the hospital. Relaxation training the evening prior to surgery and actual MAR interventions the morning of surgery took place in the patient’s room. Patient rooms are all private; therefore, persons other than the subject and family were not present. Interventions continued during transport via stretcher and in the surgical suite. Finally, music listening was again provided in the recovery room. The recovery room is an open and sterile area that can accommodate up to six patients at one time. Parents are encouraged and provided the opportunity to be with their child in the recovery room following surgery.

*Measurements*

Anxiety, for the purpose of this study, was defined using the definition given by Rudolph Lazarus in his psychological theory of stress. Anxiety, according to Lazarus (1966), is characterized by subjective, consciously perceived feelings of apprehension and tension associated with autonomic nervous system arousal. Therefore, it is necessary to have tools that can measure the impact of the emotion “anxiety” on a person, both physiologically and emotionally.

Ralph Spintge (1991) emphasizes the importance of measuring both the psychological and physiological responses of man to emotion. He describes four components of emotion and outlines a multimodal measuring system based on these areas. The four component areas include cognitive-verbal behavior, vegetative physiological behavior, nonverbal psychomotoric behavior, and situational subjective feelings. The cognitive-verbal behavioral component can be described and measured by using psychological tests such as the State-Trait Anxiety Inventory (STAI). In addition, verbal expressions and their content can be collected and analyzed. Component two, vegetative physiological behavior, can be quantified by monitoring peripheral and central nervous system parameters. Peripheral parameters include pulse rate, blood pressure (beat to beat), electrocardiogram (EKG), respiratory rate, skin temperature, EMG, etc.
Central nervous parameters include surface electroencephalograph (EEG) or deep brain EEG, EEG brain mapping, and blood levels of neurohormones (i.e., beta-endorphins, ACTH, etc.). Nonverbal psychomotoric behavior, component three, can be analyzed by observing facial expressions and such behaviors as nail biting, fidgeting, and/or fight-flight reactions. Finally, situational subjective feelings can be evaluated through pre, intra, and post treatment questionnaires and interviews.

In the studies previously reviewed, the most common measures utilized in analyzing physiological responses to anxiety included changes in heart rate, blood pressure, and respiratory rate (Chetta, 1981; Kaempf & Amodei, 1989; Metzler & Berman, 1991; Moss, 1988; Steelman, 1990; Updike, 1990; White, 1992; Zimmerman, Pierson, & Marker, 1988). In addition, some studies used such measures as digital skin temperature, MAP, DPI, electrocardiograms, and levels of required pain medication (Updike, 1990; Zimmerman, Pierson, & Marker, 1988). In these same studies, the most common psychological and/or behavioral measures included the State-Trait Anxiety Inventory, use of questionnaires, observed behavioral time sampling, use of behavioral checklists, and subjective reporting of subjects, parents, and staff.

Measures utilized in this study were chosen based on a review of measures used in previous studies, ease and accessibility of measures to the music therapist, and suggestions made by the medical staff involved in implementation of this study. Psychological responses to anxiety and interventions to decrease anxiety were measured through administration of the state portion of the State-Trait Anxiety Inventory for Children (STAIC), postoperative questionnaires, and documentation of observed behavior. For further subjective and observational information, the post anesthesia care unit (PACU) staff completed a questionnaire upon conclusion of the study. Physiological responses to anxiety and interventions to decrease anxiety were measured through changes in blood pressure, respiratory rate, heart rate, and temperature (oral).

Procedure

Experimental group. On the evening prior to surgery, music assisted relaxation (MAR) interventions and participation in the
study were presented to the subject and parent(s). Those subjects opting to participate in the study completed the appropriate consent forms, then received instruction in the music interventions that would be used the following day. The instruction period included subject selection of music to be used, practice of deep diaphragmatic breathing, introduction to progressive muscle relaxation, and a discussion of imagery to be used and how/when music would be used throughout their surgical experience. Patients were also given the opportunity to familiarize themselves with the stereo headphones and to ask questions regarding the study and their surgery.

The morning of surgery, the RMT arrived approximately 1 hour prior to administration of preoperative medication. At that time, physiologic assessments would be made by the nurse and the subject would complete the state portion of the State-Trait Anxiety Inventory for Children. MAR interventions began upon completion of the checklist. The lighting in the room was lowered, the subject instructed to get comfortably settled (either in a chair or the bed), and music was played free field at a subject selected volume. Parents were encouraged to participate with, or to be near, their child during these interventions. The RMT then began to lead the subject through deep diaphragmatic breathing, progressive muscle relaxation, and imagery. Imagery was used during breathing and muscle relaxation portions of the session, as well as ending with an imaginary trip that had been described by the subject the evening prior to interventions. MAR lasted for 30–50 minutes. Following MAR, the nurse again assessed the physiologic response and the STAIC was completed. Preoperative medications were then administered. The subject had the option of continuing with imagery and/or music listening while waiting for transport.

During transport of the patient from the room to the OR suite, subjects listened to their music through headphones. The RMT was available to the subject and parent(s) at this time for emotional support. Upon arrival to the OR suite, subjects separated from their parents and entered the operating room. At this time, the RMT served as a transitional figure. Emotional support was offered through explanation of environment, cues for deep breathing and imagery, and supportive touch. Subjects listened to their music during induction of anesthesia with the
RMT in close proximity to the patient, holding their hand, making eye contact, cuing deep breathing, and talking subjects through the induction procedure. Headphones were removed after the subject was fully anesthetized. Headphones were re-introduced by the nursing staff in the recovery room.

One day after surgery, the Child Life Specialist interviewed the subject regarding his or her experience with MAR. The RMT was not present during this interview so as not to influence subject response.

Control group. The morning of surgery, the RMT obtained consent from subjects and their parent(s) to participate in the study. Approximately 1 hour prior to administration of preoperative medication, physiologic assessments were made by the nurse and the subject completed the state portion of the State-Trait Anxiety Inventory for Children. Prior to administration of preoperative medication, approximately 30–50 minutes later, physiologic measures were again recorded and subjects completed the STAIC. Subjects in the control group received preoperative interventions normally given to all patients in the hospital. They did not receive MAR interventions or music listening during any portion of their surgical experience.

Results

To demonstrate the effectiveness of MAR interventions in decreasing anxiety, pre and posttest STAIC scores were compared and analyzed using the Mann-Whitney test. Analysis of STAIC scores revealed a significant decrease in anxiety from the pre to posttest period for the experimental group ($p = .0082$). No significant difference was found for the control group (Figure 1).

STAIC posttest scores for the experimental and control groups were compared using a one tailed $t$-test. Analysis revealed experimental group scores to be significantly lower than those of the control group ($p = .04$) (Figure 1).

Analysis of physiological measures showed no significant difference between the pre and posttest period for either group. In addition, a comparison of posttest measures between the experimental and control groups resulted in no significant difference (Table 1).
Responses from the postoperative questionnaire/interview are summarized in Table 2. Postoperative interviews were completed for eight of the ten patients in the experimental group. All respondents indicated that they found the MAR interven-
TABLE 1

Mean Physiological Measures

<table>
<thead>
<tr>
<th>Group</th>
<th>Heart Rate</th>
<th>Respiration</th>
<th>Temperature</th>
<th>Blood Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Pre: 75.3</td>
<td>20.4</td>
<td>36.62</td>
<td>111.5/68</td>
</tr>
<tr>
<td></td>
<td>Post: 74.6</td>
<td>18.8</td>
<td>36.82</td>
<td>111.5/65.2</td>
</tr>
<tr>
<td>Experimental</td>
<td>Pre: 78.0</td>
<td>19.8</td>
<td>36.64</td>
<td>107.4/67.4</td>
</tr>
<tr>
<td></td>
<td>Post: 74.8</td>
<td>19</td>
<td>36.81</td>
<td>107.0/70.4</td>
</tr>
</tbody>
</table>

Post study questionnaires were completed by PACU staff involved in the study. Frequency tallies were computed and are shown in Tables 3, 4, and 5. Responses indicated a significant decrease in the activity ($p < .05$) and anxiety levels ($p < .05$) of patients in the experimental group during the period of transport to the operating room. In addition, the overall transition from transport to the operating room suite was shown to be significantly easier for the experimental group ($p < .05$) (Table 3).

No significant changes during the induction period were reported by the PACU staff; however, they did feel that the interventions were beneficial to both the patient and medical staff (see Table 4).

In response to recovery room questions, no significant increase in agitation was observed during the postoperative period ($p < .05$). In terms of increased comfort level and speed of arousal, no significant difference was observed between experimental and control groups. Individual comments from the questionnaire are shown in Table 5.

Discussion

Results of the study show that subjects who received MAR interventions preoperatively experienced a significant decrease in anxiety, as measured by the state portion of the STAIC. When compared with subjects who had not received these interventions, MAR subjects revealed significantly lower anxiety scale scores. These results are consistent with the responses given during the postoperative interview. Subjects indicated that they
TABLE 2

Experimental Group Responses to the Postoperative Questionnaire/Interview

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think the music and relaxation was helpful?</td>
<td>Yes: 100% No: 0%</td>
</tr>
<tr>
<td>(If yes) In what way was it helpful?</td>
<td>• &quot;Went right to sleep, usually stay awake for a while.&quot;</td>
</tr>
<tr>
<td>(If no) Why?</td>
<td>• &quot;Glad I was able to do this.&quot;</td>
</tr>
<tr>
<td></td>
<td>• &quot;Not so nervous.&quot;</td>
</tr>
<tr>
<td></td>
<td>• &quot;Made me feel relaxed.&quot;</td>
</tr>
<tr>
<td></td>
<td>• &quot;It was relaxing.&quot;</td>
</tr>
<tr>
<td></td>
<td>• &quot;It relaxed me.&quot;</td>
</tr>
<tr>
<td></td>
<td>• &quot;Relaxed&quot; &quot;The tone of it&quot;</td>
</tr>
<tr>
<td></td>
<td>• &quot;It helped relax me.&quot;</td>
</tr>
</tbody>
</table>

If given the choice in future surgeries, would you choose to use music assisted relaxation? If so, why?

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes: 100% No: 0%</td>
</tr>
<tr>
<td></td>
<td>• &quot;It was a good experience.&quot; (10 yrs)</td>
</tr>
<tr>
<td></td>
<td>• &quot;Not nervous! Recommend it for other people.&quot; (18 yrs)</td>
</tr>
<tr>
<td></td>
<td>• &quot;Makes me feel sleepy &amp; happy&quot; (8 yrs)</td>
</tr>
<tr>
<td></td>
<td>• &quot;I usually fight the anesthesia. This time I didn’t. When I woke up I really realized how calm I had been.&quot; (17 yrs)</td>
</tr>
<tr>
<td></td>
<td>• &quot;Sure! Helped me to get to sleep better. Relaxing helped me to get to sleep and relax.&quot; &quot;In a way you’d have to be in the mood for it.&quot; (15 yrs)</td>
</tr>
<tr>
<td></td>
<td>• It helped relax me.&quot; (15 yrs)</td>
</tr>
<tr>
<td></td>
<td>• &quot;Relaxed you. Good music choices, kept the earphones on forever.&quot; (15 yrs)</td>
</tr>
</tbody>
</table>

experienced less anxiety, were better able to relax and, if given the option, would use MAR for future surgeries.

Physiological measures of heart rate, respiration rate, blood pressure, and temperature showed no significant change from the pre to post intervention period. A decrease in heart rate was seen for the experimental group; however, it was not found to be significant. Some individual subjects experienced significant decreases in their physiologic measures; had the sample size for this study been larger, significant changes may have been seen. In future studies, use of monitors would provide a record of physiological changes throughout interventions. Ad-
TABLE 3

**PACU Staff Responses to Post Study Questionnaire Period of Observation:**
**Transport from Pt. Room to OR Suite**

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
</table>
| Did you observe any change in the activity level of pts. (i.e., restless, talkative, fidgeting, etc.)? | Increase: 0  
Decrease: 6  
No Change: 1 |
| • Significant decrease in activity level ($p < 0.05$)                     |          |
| Did you observe a change in behaviors indicative of anxiety (i.e., crying, tearing of eyes, trembling, etc.)? | Increase: 0  
Decrease: 6  
No Change: 1 |
| • Significant decrease in anxiety level ($p < 0.05$)                      |          |
| Was the transition period when patients said good-bye to parents prior to entering the OR area easier for pts. and parents? | Easier: 5  
More Difficult: 0  
No change: 1 |
| • Significantly easier during transition period ($p < 0.05$)              |          |

Please note any general observations of pt. interactions between the music therapist, patient, and family.

- "Music appeared to soothe and offer distraction during separation of parents and patients."
- "Supportive, calming"
- "The setting was more peaceful and quiet."
- "Pts. seem to be able to remain focused on the music rather than having multiple external foci of stimulus."
- "Having the pts. focus on music seems to be a positive distraction."
- "I think this is very beneficial for child and parents."
- "Children were into the music...had less time to think about surgery."
- "Appeared beneficial, possibly because of the rapport established between the therapist and patient."

In addition, please note your observations in regard to the benefits of these interventions during the period of transport to the OR.
TABLE 4
PACU Staff Responses to Post Study Questionnaire Period of Observation: Induction

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you observe a change in the ease of induction (i.e., did pt. resist induction)?</td>
<td>Easier: 3</td>
</tr>
<tr>
<td></td>
<td>More Difficult: 0</td>
</tr>
<tr>
<td></td>
<td>Same: 4</td>
</tr>
<tr>
<td>• No significant change</td>
<td></td>
</tr>
<tr>
<td>Did you observe a change in the patient’s ability to cope with induction procedures (i.e., focusing on RMT, cooperative, verbalizing concerns, able to listen to supportive information offered, less resistive)?</td>
<td>Better able to cope: 3</td>
</tr>
<tr>
<td></td>
<td>Less able to cope: 0</td>
</tr>
<tr>
<td></td>
<td>Same: 4</td>
</tr>
<tr>
<td>• No significant change</td>
<td></td>
</tr>
<tr>
<td>Comment: “Not so much verbalizing concerns but acceptance of situation greater and less resistance.”</td>
<td></td>
</tr>
<tr>
<td>Were these interventions helpful to you as a staff person? If so, please explain.</td>
<td>Yes: 3</td>
</tr>
<tr>
<td></td>
<td>No: 0</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
</tr>
<tr>
<td>• “Yes, pt. is more cooperative and receptive.”</td>
<td></td>
</tr>
<tr>
<td>• “Yes, we like to see pts. be anesthetized as untraumatic as possible because I feel they do remember this from OR to OR and it heightens their anxiety on each occasion.”</td>
<td></td>
</tr>
<tr>
<td>• “Yes, the child was less anxious because the music distracted them from thinking solely on the impending surgery.”</td>
<td></td>
</tr>
<tr>
<td>• “I did not notice any particular change in pt. anxiety level except when the therapist was present.”</td>
<td></td>
</tr>
</tbody>
</table>

Additional measures such as skin temperature, EEG, and neurohormone levels would be beneficial and would provide more comprehensive assessment.

Responses of the PACU staff to the post study questionnaire indicated an overall favorable reaction to interventions. During the transport period, subjects were observed to have decreased anxiety as defined by observable behaviors. Subjects and their families were also observed to handle separation more easily upon arrival to the OR suite. The importance of the RMT’s role as a transitional figure between the family and subject during this period of transition was noted by several respondents. There were conflicting reports on the benefits of music interventions during the periods of induction and recovery. Responses to the
<table>
<thead>
<tr>
<th>Question</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>When were headphones generally applied?</td>
<td>“Immediately upon arrival in PACU”</td>
</tr>
<tr>
<td></td>
<td>“If pt. wanted them”</td>
</tr>
<tr>
<td></td>
<td>“When pt. awake enough to decide whether or not they wanted them”</td>
</tr>
<tr>
<td></td>
<td>“After airway stable and pt. emerged from stage II anesthesia”</td>
</tr>
<tr>
<td></td>
<td>“After child passed stage II anesthesia phase”</td>
</tr>
<tr>
<td></td>
<td>“After stage II”</td>
</tr>
<tr>
<td>When were headphones generally removed?</td>
<td>“When pt. became extremely agitated, thrashing”</td>
</tr>
<tr>
<td></td>
<td>“When pt. asked that they be removed”</td>
</tr>
<tr>
<td></td>
<td>“Some were not—other times pt. removed them”</td>
</tr>
<tr>
<td></td>
<td>“Left on unless child requested them off”</td>
</tr>
<tr>
<td></td>
<td>“In pt. room”</td>
</tr>
<tr>
<td></td>
<td>“On discharge”</td>
</tr>
<tr>
<td>Did patients ever become increasingly agitated immediately after application of headphones?</td>
<td>Yes: 2</td>
</tr>
<tr>
<td></td>
<td>No: 2</td>
</tr>
<tr>
<td></td>
<td>Varied: 2</td>
</tr>
<tr>
<td>(No Significant Increase in Level of Agitation)</td>
<td></td>
</tr>
<tr>
<td>Comments</td>
<td>“Only 1 pt. out of 5 that I had viewed”</td>
</tr>
<tr>
<td></td>
<td>“Only if placed on too early in recovery room; pt. had not passed through agitation phase”</td>
</tr>
<tr>
<td>Did patients appear to wake up more quickly with headphones?</td>
<td>Yes: 1</td>
</tr>
<tr>
<td></td>
<td>No: 4</td>
</tr>
<tr>
<td>(No significant difference in rate of wakefulness)</td>
<td></td>
</tr>
<tr>
<td>Did the patients appear to be more comfortable and less distressed than patients not receiving music?</td>
<td>Yes: 3</td>
</tr>
<tr>
<td></td>
<td>No: 1</td>
</tr>
<tr>
<td></td>
<td>Not Sure: 2</td>
</tr>
<tr>
<td>In your opinion, do you feel music listening was beneficial to patients in the recovery room? Please explain your response and note your observations.</td>
<td></td>
</tr>
<tr>
<td>Responses</td>
<td>“Yes, soothing—relaxing. Could possibly decrease pain meds”</td>
</tr>
<tr>
<td></td>
<td>“Yes, the music appears to comfort them and make them more relaxed”</td>
</tr>
<tr>
<td></td>
<td>“I found that most patients did not want to wear them”</td>
</tr>
</tbody>
</table>
Table 5

Continued

- "Not at all; perhaps the effects of the anesthesia interfere with... processing the music"

Question: Please list suggestions/ideas of how you would like to see music used in the recovery room.

Responses
- "Perhaps environmentally—a quiet, calm sound system in background"
- "If possible, to continue music during surgery and follow pt. to PACU prior to anesthesia emergence"
- "On more pts."

Recovery room portion of the questionnaire revealed that application and removal of music was being executed at varying times and based on differing criteria. As one respondent indicated, it would be beneficial to have subjects listen to music via headphones during induction, throughout the surgical procedure, and continue with music in the recovery room. This would ensure consistent application of music, and criteria for removal of headphones would need to be established. Future studies should measure levels of pain medication, rate of emergence, pain scale ratings, and behavioral indicators of distress during the recovery period.

In summary, this study shows the benefits and effectiveness of MAR interventions preoperatively to manage stress and anxiety. The effects proven here included decreased perceived anxiety, increased relaxation, increased coping strategies, and emotional support to the patient and family. Music Assisted Relaxation empowers patients by providing choices and teaching skills that enable them to be actively involved in their own care.

References


Differential Effects of Selected Classical Music on the Imagery of High Versus Low Imagers: Two Studies

Cathy H. McKinney
Frederick C. Tims
The University of Miami

Two studies are described, each of which examines effects of a different selection of classical music on imagery of high versus low imagers as determined by the Creative Imagination Scale (Wilson & Barber, 1978). In the first, 69 undergraduates imaged in music or silence following an induction. In the second, 41 undergraduates followed the same procedure with different music. The latter music increased the frequency of kinesthetic imagery for both high and low imagers. Low imagers were more likely to experience relaxation during music. In both studies, there were neither interaction nor main effects on percentage of time imaging or distracted. In both, high imagers reported more vivid imagery than low imagers during music, while high and low imagers showed no difference in vividness during silence. Both pieces of music increased the activity of imagery for high imagers, but not for low. These results suggest that music has both broad effects on imagery that vary with the musical selection and differential effects that are more consistent between selections.

The combined use of music and imagery in therapy is being reported with diverse populations and with increasing frequency in the literature. Methods which use music and imagery have been applied in the treatment of persons from a variety of populations, including the infirm elderly (Summer, 1981); a forensic psychiatric patient (Nolan, 1983; Zwerling, 1979); survivors of physical, emotional, and/or sexual abuse (Borling, 1983). The authors express appreciation to Kaja L. Jensen, M. M., RMT-BC, for her generous assistance in the execution of the second study.

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1992; Rinker, 1991; Tasney, 1993); pregnant women (Lindquist, 1985; Short, 1993; Winslow, 1986); a woman who had suffered brain damage (Goldberg, Hoss, & Chesna, 1988); and those in the final stages of terminal illness (Wylie & Blom, 1986). The literature reports treatment of persons with mental disorders including personality disorders (Bonny, 1978a); multiple personality disorder (Pickett, 1991b; Pickett & Sonnen, 1993); substance abuse (Bonny & Tansill, 1975, cited in Summer, 1985; Morgan, 1986; Summer & Roby, 1981, cited in Summer, 1985); and dual diagnosis (depression and substance abuse) (Pickett, 1991a). Medical diagnoses of persons reported to be treated with music and imagery methods include cancer (Frank, 1985; Hale, 1992); parasitic infections (McDonald, 1986); arthritis (Rider & Kibler, 1985, cited in Rider, 1987); ankylosing spondylitis (Merritt, 1993); chronic pain (Rider, 1985, 1987; Stokes, 1985, cited in Summer, 1988); systemic lupus erythematosis (Rider, 1987; Rider & Kibler, 1985, cited in Rider, 1987); partial diabetes (Rider, 1987); uterine fibroid tumors (Pickett, 1987); human immune deficiency virus infection (Bruscia, 1991; Jensen, 1989); and essential hypertension (McDonald, 1990). Although these reports describe a variety of types of imagery techniques and music, jointly they indicate a significant interest among music therapists and other health care and mental health professionals in the use of music and imagery within the therapeutic process. In addition, they provide preliminary clinical evidence that music and imagery may lead to positive treatment outcomes.

Such broad and diverse application of music and imagery indicates that empirical research on the effects of music on imagery is warranted. While efforts have begun to determine the types of music that are most effective (e.g., Rider, 1985) and what effect music has on the imagery (McKinney, 1990; Quittner, 1980), the published literature reflects little attempt to differentiate for whom music may be most appropriate and for whom, if anyone, it may be inappropriate.

Working with health imagery methods derived from those developed by Simonton, Matthews-Simonton, and Creighton (1978), Achterberg and Lawlis (1984) have reported that the quality of several aspects of a cancer patient’s imagery can predict that patient’s health status 2 months later. Music ther-
apists are now using music with health imagery in the treatment of persons with chronic illness (Jensen, 1989; Tims, 1987). Since the quality of health imagery may reflect prognosis, and since music is being used in conjunction with such imagery, an examination of possible differential effects of music on the imagery of persons with different levels of imaging ability seems indicated.

As early as 1909, it was reported that there were significant differences in imaging ability (Sheehan, Ashton, & White, 1984) and a number of approaches have been taken since toward the measurement of this ability (see Sheehan, Ashton, & White, 1984, for a review). Nevertheless, little is found in the clinical or experimental music imagery literature about the relationship between imaging ability and treatment outcome or research results.

Quittner (1980) investigated the effects of two selections by New Age composer Steve Halpern on visual imagery. She presented each of 90 undergraduate students with three treatment conditions: music imaging, progressive muscle relaxation followed by imagery suggestions, and silent imaging. The duration of each condition was 3 minutes, 15 seconds and the order of presentation was counterbalanced. Quittner found that imagery was both more easily evoked and more vivid and that the percentage of time imaging was higher during the music than during silence. Stratifying subjects into four groups according to scores on the Creative Imagination Scale (Wilson & Barber, 1978), she found that high imagers reported more vivid images and a greater percentage of time imaging than low imagers. However, she found no significant interaction between the condition and the level of imaging ability.

Rider (1985) observed the effects of no music, preferred music, or one of five types of music on several variables, including the vividness and activity of imagery, in spinal cord injury patients. Unlike Quittner (1980), he found no difference in the activity or vividness of the imagery regardless of the type of music or whether music was present.

McKinney (1990) explored the effects of one selection of classical music (an orchestral arrangement of Vaughan Williams' "Rhosymedre") on various dimensions of imagery in 81 undergraduate volunteers. While the music significantly in-
creased the intensity of emotions experienced in the imagery, it had no effect on types of imagery experienced, the number of senses involved, the vividness or activity of the imagery, or the percentage of time spent imaging or distracted. Using a multiple regression analysis, McKinney (1990) also found that imaging ability as measured by the Creative Imagination Scale (Wilson & Barber, 1978) was a significant predictor of several criteria including the intensity of emotions experienced, the percentage of time imaging and (negatively) of time distracted, both subjects' and raters' ratings of vividness, and subjects' ratings of activity.

Experiment 1

The purpose of the first experiment was to investigate the differential effects of a selection of classical music on the imagery of persons with high versus low imaging ability. Dimensions of imagery examined include the vividness and activity of the imagery, intensity of emotions experienced, percentage of time imaging, and percentage of time distracted. Subjects' ratings of vividness and activity of the imagery were used to measure these dimensions. Since imaging ability had been shown to be a significant predictor of these criteria (McKinney, 1990), this study was carried out to explore the possibility that an interaction between treatment condition and imaging ability obscured differential effects of the music on high and low imagers.

The following hypothesis was advanced:

Subjects will respond differently to the presence of music while imaging according to their imaging ability along the following dimensions:

1. Vividness of the imagery;
2. Activity of the imagery;
3. Intensity of emotion experienced;
4. Percentage of time imaging; and
5. Percentage of time distracted.

Method

This study analyzed data of McKinney (1990) using a $2 \times 2$ factorial design. With the exception of an exclusionary criterion,
the method is the same as that reported previously; however, it is again summarized below for the benefit of the reader.

Subjects. Eighty-one subjects were recruited from two undergraduate music appreciation classes at Appalachian State University. Two conditions, music imaging (MI) and silent imaging (SI), were randomly assigned to the two classes. Twelve subjects who had ingested recreational drugs, including alcoholic beverages, in the previous 24 hours were excluded from the present analysis. There were 32 music imaging and 37 silent imaging subjects. Subjects ranged from 18 to 28 years in age with a median age of 20; 44 were female and 25 were male.

In the present study, subjects were divided at the median into two groups according to imaging ability based on scores from Wilson and Barber's (1978) Creative Imagination Scale. Those with scores above 18.5 were designated high imagers; those with scores below 18.5 were designated low imagers. The two treatment conditions, MI and SI, were randomly assigned to two music appreciation classes from which volunteers were solicited. This resulted in four cells: high imagers in MI (n = 12), high imagers in SI (n = 17), low imagers in MI (n = 20), and low imagers in SI (n = 20).

Equipment and instruments. All instructions were presented via videotape using a Quasar 25-inch wide-screen television and an RCA videocassette player. The Creative Imagination Scale (CIS; Wilson & Barber, 1978) was employed as a measure of imaging ability. The music imaging group heard an orchestral recording of the hymn prelude, "Rhosymedre" by Ralph Vaughan Williams.

Procedure. Each group met in their usual classroom during a regular afternoon class time. The classroom is a recital hall with padded auditorium seating. After the consent statement was read and subjects completed the participant information questionnaires, lights were dimmed for the CIS exercises. Following the exercises, lights were raised as subjects scored their responses to the exercises.

When all subjects had completed rating their CIS experiences, an introduction was provided. This included an outline of the remainder of the session, a definition of imagery, and suggestions for engaging imagery. Comments to both groups were
identical with one exception: Where the script for the MI group referred to music, that for the SI group referred to silence.

Subjects in both groups then participated in a physical induction using a modification of Jacobsen's (1938) progressive muscle relaxation and an imagery induction which suggested that they see themselves in a meadow. The bridge to the music or silence suggested that the subject allow the music (in the MI group) or his/her imagination (in the SI group) to "take you where you need to go."

A recording of Ralph Vaughan Williams' "Rhosymedre" was played for the MI group. A period of silence of the same duration (3 minutes, 55 seconds) was experienced by the SI group.

Following the imaging period, suggestions were made to assist subjects in bringing their experiences to a close. They were asked to describe their experiences both in narrative form and in response to written questions.

**Results**

This study used a 2 x 2 factorial design to examine the differential effect of a selection of classical music on the imagery of high versus low imagers. Two treatment conditions, music imaging and silent imaging, were randomly assigned to two groups. Subjects were divided into high and low imagers by a median split using scores on the Creative Imagination Scale (Wilson & Barber, 1978). Dependent variables included the level of vividness of the imagery, the level of activity of the imagery, the intensity of emotions experienced, and the percentages of time imaging and time distracted. Means and standard deviations for dependent variables are presented in Table 1.

Analysis of variance (ANOVA) computed for age, year of music training, and hours of hypnosis or imagery indicated that the four cells were statistically equivalent on these variables (all p's > .10). A chi square analysis confirmed that there were no differences among cells in sex (p > .10).

ANOVA revealed that there were no significant interactions or main effects for time imaging or time distracted (p's > .10). ANOVA for the intensity of emotions experienced revealed that the interaction between imaging ability and treatment condition was not significant (p > .10).

ANOVA for the level of vividness of the imagery revealed
TABLE 1
Means and Standard Deviations for Continuous Dependent Variables (Experiment 1)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Silent Imaging</th>
<th>M (SD)</th>
<th>Music Imaging</th>
<th>M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vividness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Imagers</td>
<td>3.47</td>
<td>(0.94)</td>
<td>4.25*</td>
<td>(0.75)</td>
</tr>
<tr>
<td>Low Imagers</td>
<td>3.40</td>
<td>(0.82)</td>
<td>3.20</td>
<td>(1.06)</td>
</tr>
<tr>
<td>Activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Imagers</td>
<td>3.24</td>
<td>(0.83)</td>
<td>4.17*</td>
<td>(0.94)</td>
</tr>
<tr>
<td>Low Imagers</td>
<td>3.30</td>
<td>(0.92)</td>
<td>2.95</td>
<td>(1.05)</td>
</tr>
<tr>
<td>Intensity of Emotions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Imagers</td>
<td>2.00</td>
<td>(1.12)</td>
<td>2.83</td>
<td>(0.84)</td>
</tr>
<tr>
<td>Low Imagers</td>
<td>1.60</td>
<td>(1.05)</td>
<td>2.00</td>
<td>(0.97)</td>
</tr>
<tr>
<td>Percent Time Imaging</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Imagers</td>
<td>65.00</td>
<td>(17.68)</td>
<td>66.25</td>
<td>(23.37)</td>
</tr>
<tr>
<td>Low Imagers</td>
<td>57.63</td>
<td>(26.11)</td>
<td>54.25</td>
<td>(27.97)</td>
</tr>
<tr>
<td>Percent Time Distracted</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Imagers</td>
<td>35.29</td>
<td>(17.81)</td>
<td>31.25</td>
<td>(24.13)</td>
</tr>
<tr>
<td>Low Imagers</td>
<td>30.74</td>
<td>(29.18)</td>
<td>42.75</td>
<td>(23.25)</td>
</tr>
</tbody>
</table>

*Significantly higher than both high imagers in silence (p < .05) and low imagers in music (p < .01)

that the interaction between imaging ability and the treatment condition was significant (see Table 2). A review of cell means indicated that the interaction was ordinal (see Figure 1) and that, while the vividness of the imagery of low imagers remained relatively constant in both conditions, the vividness of the imagery of high imagers was greater in the music condition than in the silence condition. Omega squared indicated that imaging ability accounted for 6.6% of the variance in the level of viv-
Idness of the imagery, while the interaction between imaging ability and treatment condition accounted for 4.7% of the variance in the level of vividness of the imagery.

The ANOVA for the level of activity of the imagery revealed that the interaction between imaging ability and treatment condition was significant ($F_{1,65} < 7.62; p = .008$). A review of cell means indicated that the interaction was disordinal (see Figure 2). Follow-up ANOVA of simple effects revealed a significant difference between high and low imagers in the music condition, but not in the silence condition (Table 3). In addition, there was significant difference between conditions for high imagers but not for low imagers. Omega squared indicated that the music condition accounted for 6.3% of the variance in the level of activity of the imagery, while the interaction between imaging ability and treatment condition accounted for 10.0% of the variance in level of activity.

**Discussion**

The purpose of this study was to investigate the differential effects of a selection of classical music on the imagery of persons with high versus low imaging ability. It may be concluded that neither the presence or absence of music nor imaging ability affected the percentage of time imaging or the percentage of time distracted. The music used in this study significantly intensified the emotions experienced for both low and high imagers. While the music did not affect the vividness or activity of the imagery for low imagers, it significantly enhanced the vividness and activity for high imagers.
The fact that the music enhanced the vividness of the imagery for high but not low imagers in the present study may account partially for the conflicting findings of Quittner (1980), who found that the music enhanced the vividness, and McKinney (1990), who found that the music had no effect on the vividness of the imagery. As McKinney observed, the mean Creative Imagination Scale score of Quittner’s subjects was 22.0 ($SD = 6.8$) while that of McKinney’s was 18.1 ($SD = 7.3$). Although Quittner does not report the median CIS score, the CIS levels used to demarcate the four stratified groups, or the mean CIS scores for each of the four groups, it would appear that Quittner’s population may have included more high imagers while that of McKinney included more low imagers as defined in the present study.

The differential effect of music on the vividness of imagery could also account for Rider’s (1985) finding that music had no effect on the vividness of the imagery. As was the case in
Mean level of activity of imagery as a function of imaging ability and treatment condition (Experiment 1).

McKinney (1990), a disordinal interaction between the treatment condition and imaging ability could obscure any effects the music might have had.

The music used in this study significantly enhanced the intensity of emotions experienced regardless of the imaging ability

**TABLE 3**

*Simple Effects Analysis of Variance for Level of Activity of the Imagery (Experiment 1)*

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability @ Music</td>
<td>10.03</td>
<td>1</td>
<td>10.03</td>
<td>11.27</td>
<td>.001</td>
</tr>
<tr>
<td>Ability @ Silence</td>
<td>.02</td>
<td>1</td>
<td>.02</td>
<td>.02</td>
<td>.89</td>
</tr>
<tr>
<td>Condition @ Hi Imager</td>
<td>4.75</td>
<td>1</td>
<td>4.75</td>
<td>5.34</td>
<td>.02</td>
</tr>
<tr>
<td>Condition @ Lo Imager</td>
<td>1.22</td>
<td>1</td>
<td>1.22</td>
<td>1.38</td>
<td>.25</td>
</tr>
<tr>
<td>Within</td>
<td>57.88</td>
<td>65</td>
<td>.89</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(\alpha = .0375\).
of the subject while affecting the vividness and activity of only high imagers' imagery. This indicates that music may affect some dimensions of imagery (for this piece of music, emotional intensity) for all subjects while enhancing other dimensions (vividness and activity) only for those with high imaging ability.

In Quittner (1980), McKinney (1990), and the study described herein, the length of the treatment conditions was three to four minutes. McKinney (1990) notes that the lack of observed effect on some variables may be attributed partially to the brevity of the music.

**Experiment 2**

Experiment 2 was conducted to extend these findings and those of McKinney (1990) to a different and longer selection of classical music. The purpose of this study was to examine the effects of a selection of classical music on spontaneous imagery of high and low imagers. Imagery was examined by the types of imagery evoked, the vividness and activity of the imagery, the intensity and valence of emotions experienced, the percentage of time imaging, and the percentage of time distracted. In determining types of imagery, a modification of the categories developed by Clark (cited by McKinney, 1990) was used. In the present study, images were classified as kinesthetic, body, feelings associated with relaxation, emotions, and memories. Since sensory imagery is experienced by almost all imagers regardless of the presence or absence of music (McKinney, 1990), it was not included in this analysis. Due to their rare occurrence in the short duration of music used in this study (McKinney, 1988, 1990), healing and transpersonal imagery were not assessed.

Based on the findings of McKinney (1990) that self-ratings of vividness and activity correlate significantly with ratings by independent raters ($r = .53$, $p < .001$ and $r = .48$, $p < .001$, respectively), vividness and activity of the imagery were determined by self-rating alone. Activity and vividness ratings were made on a five-point scale used by Achterberg and Lawlis (1984) to assess specific variables of directed health imagery. Since Quitttner (1980) determined that time imaging as measured by an event recorder correlated highly with post-treatment self-reporting ($r = .757$, $p = .001$), self-report was used...
to measure percent of time imaging. The following hypotheses were made:

1. There will be no differences in the types of imagery experienced.
2. Emotions will be experienced more intensely in the music imaging condition than in the silent imaging condition.
3. There will be no differential effects of music on the percentage of time imaging or time distracted for high or low imagers.
4. High imaging ability subjects will report more vivid imagery with music than in silence while low imaging ability subjects will report no difference in the vividness of imagery with music than in silence.
5. High imaging ability subjects will report more active imagery with music than in silence while low imaging ability subjects will report no difference in the activity of imagery with music than in silence.

Method

Subjects. Forty-four non-smoking undergraduate student volunteers, ages 17–26, were recruited from the subject pool of the University of Miami Psychology Department. Subjects signed up for one of four consecutive Tuesdays and Thursdays. Two of these dates were then randomly assigned to two conditions designated as music imaging (MI; n = 20) and silent imaging (SI; n = 24).

Exclusion criteria. To reduce extraneous sources of variance in imagery experiences, potential subjects were excluded from the study on the following criteria:

1. Use of tranquilizers or recreational drugs within the past 2 weeks;
2. Psychiatric or other medical illness within the past 3 months;
3. History of chronic mental or physical illness;
4. Alcohol use within the preceding 24 hours or alcohol use exceeding 10 drinks per week.

Subjects were instructed not to engage in aerobic exercise within 2 hours preceding the experiment. Application of these criteria resulted in the exclusion of two subjects from the MI group and one from the SI group.
Remaining subjects were divided at the median based on scores on the CIS (Wilson & Barber, 1978). Those scoring above 18.5 were designated high imagers; those below, low imagers. This yielded four cells: high imagers in MI (n = 10), low imagers in MI (n = 8), high imagers in SI (n = 13), and low imagers in SI (n = 10).

Equipment and materials. Equipment employed included a cassette tape player; audiotaped instructions and procedures for each condition; the CIS (Wilson & Barber, 1978); the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1964); and a tape recording of “Introduction and Allegro” by Maurice Ravel. The music was selected for its demonstrated ability to evoke and encourage imagery (Bonny, 1978b).

Procedure. At the appointed time, each group convened in the assigned room. Subjects were introduced to the study and completed a questionnaire related to the exclusionary criteria. After signed consent was obtained, subjects completed a brief questionnaire concerning themselves and their experiences and the Marlowe-Crowne Social Desirability Scale. Following instructions for the CIS, the lights were dimmed and the subjects participated in the CIS exercises. After the exercises were completed, lights were raised to permit self-scoring of subjects’ experiences.

Next, an introduction to the remainder of the experiment was given to each group. Subjects in both groups were given a definition of imagery and suggestions for engaging imagery. Instructions for these two groups were identical with the exception that references to music for the MI subjects were replaced with references to silence for SI subjects.

Following the introduction, lights were faded again and participants were asked to close their eyes. Tape recorded instructions led them through a physical induction using a modification of Jacobsen’s (1938) progressive relaxation. This was followed by an imagery induction in which they were encouraged to see themselves in a meadow. The bridge from the induction to the music/silence suggested that the subject allow the music (for the MI group) or his/her imagination (for the SI group) “take you where you need to go.”

The MI group then heard a recording of Ravel’s “Introduction and Allegro.” The SI group heard a period of silence identical
in length (11 min.). No instructions were given during the music or silence. Following the music/silence, subjects in both groups were instructed to bring their experiences to a close and to return to awareness in the room. Lights were raised gradually.

Subjects in both groups then completed the remainder of their response packets which asked them to describe in as much detail as possible their imagery and then to answer follow-up questions about their experiences.

Results

A 2 x 2 factorial design was employed to examine the effects of a selection of classical music on spontaneous imagery in high and low imagers and a one-way design was used to examine the effect of the same selection on the types of imagery experienced with and without regard to imaging ability. Two treatment conditions, music imaging and silent imaging, were randomly assigned to groups. For the factorial design, subjects were divided into high and low imagers by a median split using scores on the CIS (Wilson & Barber, 1978). Dependent variables for the factorial design included the intensity and valence of emotions experienced, the percentage of time imaging, the percentage of time distracted, the level of vividness of imagery, and the level of activity of imagery. Types of imagery assessed were kinesthetic, body, feelings of relaxation, emotions, and memories. Means and standard deviations for continuous dependent variables in the four cells are given in Table 4. Frequencies for discrete dependent variables by group are given in Table 5 and for condition by CIS cells in Table 6.

An analysis of variance (ANOVA) for each continuous control variable was computed to assure that there were no significant differences among cells. This analysis indicated that the cells were statistically equivalent in age, caffeine intake, Marlowe-Crowne Social Desirability scores, music training, hypnosis or imagery training, and hours of sleep during the preceding three nights. In addition, chi square analysis confirmed that there were no cell differences in sex or use of medications (p’s > .10).

Chi square analysis for discrete dependent variables showed that there were no significant differences between treatment conditions or among conditions by CIS cells for the experience of body imagery, memories, or emotions. ANOVA for contin-
TABLE 4
Means and Standard Deviations for Continuous Dependent Variables (Experiment 2)

<table>
<thead>
<tr>
<th>Variable Imaging Ability</th>
<th>Silent Imaging M (SD)</th>
<th>Music Imaging M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vividness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Imagers</td>
<td>3.58 (0.67)</td>
<td>4.20* (0.42)</td>
</tr>
<tr>
<td>Low Imagers</td>
<td>3.80 (1.23)</td>
<td>3.14 (0.38)</td>
</tr>
<tr>
<td>Activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Imagers</td>
<td>3.08 (0.67)</td>
<td>4.10* (0.74)</td>
</tr>
<tr>
<td>Low Imagers</td>
<td>3.50 (1.27)</td>
<td>3.29 (0.76)</td>
</tr>
<tr>
<td>Intensity of Emotions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Imagers</td>
<td>2.31 (0.75)</td>
<td>2.50 (1.18)</td>
</tr>
<tr>
<td>Low Imagers</td>
<td>2.00 (1.12)</td>
<td>2.13 (0.85)</td>
</tr>
<tr>
<td>Emotion Valence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Imagers</td>
<td>3.00 (0.47)</td>
<td>3.20 (0.63)</td>
</tr>
<tr>
<td>Low Imagers</td>
<td>3.13 (0.99)</td>
<td>2.75 (0.71)</td>
</tr>
<tr>
<td>Percent Time Imaging</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Imagers</td>
<td>56.17 (21.47)</td>
<td>67.40 (16.67)</td>
</tr>
<tr>
<td>Low Imagers</td>
<td>52.50 (27.51)</td>
<td>64.27 (13.36)</td>
</tr>
<tr>
<td>Percent Time Distracted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Imagers</td>
<td>39.58 (22.51)</td>
<td>30.00 (19.72)</td>
</tr>
<tr>
<td>Low Imagers</td>
<td>47.40 (27.30)</td>
<td>39.29 (13.36)</td>
</tr>
</tbody>
</table>

* Significantly higher than low imagery in music (p < .01).

b Significantly higher than both high imagers in silence (p < .01) and low imagers in music (p < .05).
uous dependent variables showed that there were no significant interactions or main effects for the intensity or valence of emotions, the percentage of time imaging, and the percentage of time distracted (all $p$'s > .10).

The chi square analysis for kinesthetic imagery revealed a significant difference between treatment conditions. Those in the music imaging condition were more likely to experience kinesthetic imagery than those in the silent imaging condition (see Table 5). The chi square analysis for feelings of relaxation showed that although there was no difference between treatment conditions, there was a significant difference among condition × CIS cells (see Table 6). An examination of cell frequencies revealed that the only subjects who did not report experiencing feelings of relaxation were low imagers in the silent imaging condition.

The ANOVA for the level of vividness of the imagery is summarized in Table 7. It demonstrated a significant treatment condition by imaging ability interaction on the level of vividness of imagery. As shown in Figure 3, this interaction was disordinal. Follow-up analysis of simple effects revealed that there was a significant ($\alpha < .0375$) difference in the level of vividness of

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**Table 5**

*Frequencies for Kinds of Imagery By Group (Experiment 2)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Music Imaging</th>
<th>Silent Imaging</th>
<th>$df^* = 1$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency (%)</td>
<td>Frequency (%)</td>
<td></td>
</tr>
<tr>
<td>Kinesthetic</td>
<td>19 (95.0)</td>
<td>15 (62.5)</td>
<td>6.56*</td>
</tr>
<tr>
<td>Body Imagery</td>
<td>5 (25.0)</td>
<td>4 (16.7)</td>
<td>.47</td>
</tr>
<tr>
<td>Relaxation</td>
<td>20 (100.0)</td>
<td>21 (87.5)</td>
<td>2.68</td>
</tr>
<tr>
<td>Emotions</td>
<td>19 (95.0)</td>
<td>18 (78.8)</td>
<td>.11</td>
</tr>
<tr>
<td>Memories</td>
<td>6 (31.6)</td>
<td>13 (56.5)</td>
<td>2.61</td>
</tr>
</tbody>
</table>

* $p \leq .01.$
TABLE 6
Frequencies of Kinds of Imagery for Condition by Imaging Ability Cell (Experiment 2)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Music Imaging</th>
<th>Silent imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hi CIS</td>
<td>Lo CIS</td>
</tr>
<tr>
<td></td>
<td>Freq (%)</td>
<td>Freq. (%)</td>
</tr>
<tr>
<td>Kinesthetic</td>
<td>10 (100.0)</td>
<td>7 (87.5)</td>
</tr>
<tr>
<td>Body Imagery</td>
<td>3 (30.0)</td>
<td>1 (12.5)</td>
</tr>
<tr>
<td>Relaxation</td>
<td>10 (100.0)</td>
<td>8 (100.0)</td>
</tr>
<tr>
<td>Emotions</td>
<td>9 (90.0)</td>
<td>8 (100.0)</td>
</tr>
<tr>
<td>Memories</td>
<td>4 (40.0)</td>
<td>2 (28.6)</td>
</tr>
</tbody>
</table>

Note. Hi CIS = high imaging ability; Lo CIS = low imaging ability; Freq. = frequency
* $p < .02$.

The imagery between high and low imagers only in the music condition (see Table 7). Omega squared computation showed that the interaction between imaging ability and the treatment condition accounted for 16.3% of the variance in the vividness of imagery.

The interaction between the treatment condition and imaging ability also significantly affected the level of activity of the imagery (see Table 8). Again, the interaction was disordinal

TABLE 7
Simple Effects Analysis of Variance for Level of Vividness (Experiment 2)

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability @ Music</td>
<td>4.65</td>
<td>1</td>
<td>4.65</td>
<td>7.76</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Ability @ Silence</td>
<td>0.25</td>
<td>1</td>
<td>0.25</td>
<td>0.42</td>
<td>52</td>
</tr>
<tr>
<td>Condition @ Lo Imager</td>
<td>1.37</td>
<td>1</td>
<td>1.37</td>
<td>2.29</td>
<td>.14</td>
</tr>
<tr>
<td>Condition @ Hi Imager</td>
<td>1.87</td>
<td>1</td>
<td>1.87</td>
<td>3.11</td>
<td>.09</td>
</tr>
<tr>
<td>Within</td>
<td>20.97</td>
<td>35</td>
<td>.60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$\alpha = .0375$. 
Table 8
Simple Effects Analysis of Variance for level of Activity (Experiment 2)

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability @ Music</td>
<td>3.36</td>
<td>1</td>
<td>3.36</td>
<td>4.24</td>
<td>.05</td>
</tr>
<tr>
<td>Ability @ Silence</td>
<td>1.10</td>
<td>1</td>
<td>1.10</td>
<td>1.39</td>
<td>.25</td>
</tr>
<tr>
<td>Condition @ Lo Imager</td>
<td>.13</td>
<td>1</td>
<td>.13</td>
<td>.16</td>
<td>.69</td>
</tr>
<tr>
<td>Condition @ Hi Imager</td>
<td>5.49</td>
<td>1</td>
<td>5.49</td>
<td>6.92</td>
<td>.01</td>
</tr>
<tr>
<td>Within</td>
<td>27.75</td>
<td>35</td>
<td>.79</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

α = .0375.

(see Figure 4). Follow-up analysis of simple effects showed that the presence or absence of music during imagery caused a significant (α < .0375) difference in the level of vividness of the imagery only for high imagers (see Table 8). Omega squared indicated that the interaction between imaging ability and the
FIGURE 4.
Mean level of activity of imagery as a function of imaging ability and treatment condition (Experiment 2).

treatment condition accounted for 12.8% of the variance in the level of activity of the imagery.

Discussion
The purpose of this study was to investigate differential effects of a selected piece of classical music on the imagery of persons with high versus low imaging ability. As indicated by these data, neither the music nor the subject's imaging ability affected the experience of body or memory imagery; the experience, intensity, or valence of emotions; or the percentage of time imaging or time distracted. The music used in this study significantly increased the frequency with which kinesthetic imagery was experienced by both high and low imagers, and low imagers were more likely to experience feelings of relaxation while imaging with music than while imaging in silence. High imagers experienced more vivid imagery in the music
imaging condition than low imagers and marginally more active imagery as well, although there were no significant differences between high and low imagers during silent imaging or between conditions for low imagers. The music also significantly enhanced the level of activity of imagery, but only for those with high imaging ability.

The finding that music did not affect the occurrence of body, memory, or emotional imagery supports the findings of McKinney (1990). The frequencies found in the present data suggest that emotions are experienced by most imagers regardless of imaging ability or the presence or absence of music. While memories are experienced less frequently, they are not significantly impacted upon by music or imaging ability.

Unlike the Vaughan Williams "Rhosymedre" used by McKinney (1990), the Ravel "Introduction and Allegro" used in this study had no effect on the intensity of emotions experienced, but instead significantly increased the likelihood that kinesthetic imagery would be experienced by both high and low imagers. This suggests that different pieces of classical music may enhance different aspects of imagery, an idea supported by Bonny Method of Guided Imagery and Music clinicians who observe, for example, more emotional expression with some music and more body imagery with other selections (L. Keiser and M. Clark, personal communications, 1985). This idea is also supported by the findings of Lewis (1986) and McKinney (1988), who found different rates of occurrences for transpersonal and healing imagery respectively with different music selections.

Low imagers were more likely to experience feelings of relaxation while imaging with music than in silence. (All high imagers experienced feelings of relaxation regardless of treatment condition.) This suggests that music may serve an important function for low imagers, especially in music and imagery methods where relaxation is a desired outcome. It may be fruitful in future research to examine both the frequency of the experience of relaxing feelings and the level of relaxing feelings while imaging. (Ideally, physiological measures of relaxation would also be taken.) This might be especially appropriate using new age or "sedative" music, the types of music most often reported to be used in music-mediated relaxation therapy (see Liebman, 1989 and Scartelli, 1989 for reviews).
General Discussion

In both experiments reported above, high and low imagers showed no difference in the reported levels of vividness while imaging in silence; however, high imagers reported significantly more vivid imagery than low imagers during music imaging. Also consistent in both studies is the finding that music increased the activity of imagery for high imagers, but not for low. This suggests that high imagers are able to use some classical music in a way that enhances vividness and activity of the imagery, while low imagers are not. Selected classical music may be particularly beneficial to high imagers during imagery approaches in which vividness and activity are important variables, such as in directed health imagery (Achterberg & Lawlis, 1984).

The findings of these studies suggest that music has both broad effects on the imagery of all persons regardless of imaging ability, and also differential effects according to the person's imaging ability. The nature of the broad effects appears to vary with the piece of music used, while some differential effects, particularly on the vividness and activity of imagery, may demonstrate a more consistent pattern from one selection to the next. Since different dimensions of imagery may be important in different music imagery methods, decisions about the use of music may be based in part on those aspects of imagery most important to the particular treatment method and goals.

Both of these studies indicate that music has neither a main effect nor a differential effect on the percentage of time imaging or time distracted. This conflicts with Quittner (1980), who found that the percentage of time imaging was higher during music. Further research is needed to determine the conditions and perhaps the types of music which most effectively increase the percentage of time imaging and decrease the time distracted. It would seem indicated, as well, that future studies examine health-related consequences of the use of music in directed health imagery, especially with high imagers. These pursuits would contribute not only to a broad understanding of the use of music with imagery, but also may serve to define some of the unique contributions which can be made by music therapists and other clinicians using music-mediated approaches to the
health and well-being of the persons they serve. Meanwhile, it may be worthwhile for both clinicians and researchers involved in music-mediated imagery approaches to consider the imaging ability of their clients/subjects when making treatment decisions or drawing conclusions about the effectiveness of music on imagery.

References


The Effect of Musical Cues on the Nonpurposive Speech of Persons with Aphasia

Nicki S. Cohen
Jean Ford
Texas Woman's University

The purpose of this study was to ascertain if the influence of musical cues could benefit individuals with aphasia in their ability to recall previously-learned song lyrics. The relationship between the subjects' speech production and their age, length of time since onset of injury, type of speech disorder, and severity of speech disorder was also examined. Twelve subjects who had been diagnosed with unilateral left hemisphere cerebrovascular accidents and aphasia participated in the study. A repeated-measures design was used to examine the difference in speech production between three experimental conditions: verbal production only, verbal production with rhythm, and verbal production with melody. The subjects' speech samples were analyzed according to the following variables: speech content, error types, and number of intelligible words per minute. An analysis of variance revealed no significant differences between conditions in the subjects' speech content or error types. However, a significant difference in verbal intelligibility was found between conditions, with the verbal condition having the highest intelligibility (p = .02). A significant relationship was discovered between the subjects' severity of speech disorder and meaningful speech content (p = .003), percentage of jargon (p = .008) and intelligibility (p = .005), as well as a significant relationship between the subjects' age and speech content (p = .01).

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Along with the physical ramifications of a cerebrovascular accident (CVA), there are accompanying social, emotional, and cognitive consequences. Because speech involves complex cortical processing, recovery of its full functions may be impaired following brain damage (Tobis & Lowenthal, 1960). One type of speech disorder resulting from a CVA is aphasia, which is a general language impairment that crosses all language modalities: speaking, listening, reading, and writing (Benton & Joynt, 1960; Schuell, Jenkins, & Jimenez-Pabon, 1964).

A variety of treatment approaches have been used with aphasic individuals. These include traditional language-based methods such as the stimulation approach (Schuell, Jenkins, & Jimenez-Pabon, 1964); pragmatic approaches such as PACE: Promoting Aphasic’s Communication Effectiveness (Davis & Wilcox, 1981); and other type-specific treatments such as HELPSS: Helm Elicited Program for Syntax Stimulation (Helm-Estabrooks, 1981); TAP: Treatment of Aphasic Perseveration (Helm-Estabrooks, Emery, & Albert, 1987); TWA: Treatment for Wernicke’s Aphasia (Helm-Estabrooks & Albert, 1991); and VCIU: Voluntary Control of Involuntary Utterances (Helm & Barresi, 1980). In addition, there are several type-specific interventions for motor speech disorders associated with aphasia (Darley, Aronson, & Brown, 1975; Square-Stover, 1989; Vogel & Miller, 1991; Wertz, LaPointe, & Rosenbek, 1991). The treatment of aphasia also may include the development of alternative communication methods such as Amerind (Skelly, Schinsky, Smith, & Fust, 1974); gestural (Helm-Estabrooks, Fitzpatrick, & Barresi, 1982); and drawing (Lyon & Helm-Estabrooks, 1987).

The production of speech is usually attributed to the left hemisphere. However, it is hypothesized that an interhemispheric relationship exists for the coding and production of purposive (conversational) language, with the right hemisphere mediating prosody, or the musical characteristics of speech (Blumstein & Cooper, 1974). The right hemisphere also is believed to regulate the production of nonpurposive speech, such as automatized material or previously-learned song lyrics (Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology, 1994).

Due to its popular appeal and similarities to speech, music may be a valuable tool in speech rehabilitation. Music lacks the
specific sound-concept association of speech, which makes an exchange of information less precise. However, verbal language has not replaced musical communication to date. Music is intrinsic to all cultures, probably because certain thoughts and emotions are expressed more effectively by direct musical intuition than by verbal language (Borchgrevink, 1993).

Musical perception and production are thought to be regulated by both cerebral hemispheres. Certain theorists attest to the role of the right hemisphere in melodic aspects such as the perception of individual pitches, intervals, and directionality of pitches (Damasio & Damasio, 1977; Kinsella, Prior, & Murray, 1988; Polk & Kertesz, 1993). Rhythmic aspects, conversely, are thought to be processed either in the left hemisphere (Borchgrevink, 1993; Polk & Kertesz, 1993), or are bihemispherically located (Kinsella, Prior, & Murray, 1988).

Research indicates that persons with localized brain lesions may experience certain deficits in musical processing. Samson and Zatorre (1992) found that patients with right anterior brain lesions tended to sing words but lost the melodies, while those with left anterior lesions maintained the melodies but lost the words. Polk and Kertesz (1993) conducted a case study with a professional musician who had experienced a left CVA. The subject was asked to perform a number of musical tasks, including sight reading, melodic recognition, melodic completion, note identification, rhythmic imitation, and musical notation. Results showed that the subject performed well on singing melodies and melodic completion items. However, he could not sightread, name melodies or notes, imitate rhythmic patterns, or write or copy music.

In a similar study by Kinsella, Prior, and Murray (1988), three groups of 15 subjects were asked to sing Happy Birthday: a left CVA group, a right CVA group, and a control group. Each subject's performance was judged according to melodic accuracy, rhythmic accuracy, and overall quality. The results indicated that the control group performed significantly better than both experimental groups, and that the right CVA group performed more poorly on melodic accuracy tasks than the left CVA group. The least amount of difference between groups was found in the area of rhythmic accuracy. In a follow-up study, Prior, Kinsella, and Giese (1990) asked left CVA, right
CVA, and control subjects to perform various musical tasks. This time, the left CVA subjects demonstrated an impaired perception of rhythmic changes and inaccurate singing of unfamiliar melodies, and both CVA groups were poorer than the controls in the singing of familiar melodies and rhythmic imitation. In fact, the left CVA group was considerably more impaired than the other two groups overall.

Because of its strong association with the right hemisphere, singing has been recommended as a therapeutic approach for persons with neurogenic speech disorders resulting from injuries to the left hemisphere (Borchgrevink, 1982; Gardner, 1982; Hurwitz, 1971; Lucia, 1987; Mesalam, 1988). More specifically, persons with lesions on the Broca's area of the left cerebral hemisphere have been shown to possess a remarkable preservation of singing ability (Benton, 1977; Gardner, 1983; Gleason & Goodglass, 1984; Keenan, 1987; Sparks, Helm, & Albert, 1974). Yamadori, Osumi, Masuhari, and Okubo (1977) conducted a study with 24 patients with Broca's aphasia. The results indicated that most of the subjects were able to produce a good melody, and more than half produced good words while singing. However, their research contained no account on how the goodness of the melody was defined, or judged (Kinsella, Prior, & Murray, 1988).

Melodic intonation therapy (MIT) utilizes singing, rhythmic patterns, and points of stress to facilitate and stimulate purposive speech in persons with communication disorders (Sparks, Helm, & Albert, 1974; Sparks & Holland, 1976). During MIT training, the clinician taps the patient's left hand once for each syllable. The Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology (1994) describes the MIT process as targeted phrases or sentences which are intoned slowly with continuous voicing, using simple high/low note patterns that exaggerate the normal melodic prosody of each phrase.

Research indicates improvements in speech following melodic intonation therapy intervention (Albert, Sparks, & Helm, 1973; Krauss & Galloway, 1982; Laughlin, Naeser, & Gordon, 1979; Popovici & Mihailescu, 1992; Sparks, Helm, & Albert, 1974). However, findings from MIT research with aphasic individuals reveal that pairing a familiar melodic phrase with
purposive utterances proved to be confounding, because the melody elicited the familiar words of the song lyric, or nonpurposive speech, rather than the targeted sentence. Because of these results, the use of melodic patterns that resemble familiar songs is not recommended when attempting to work on functional speech (Sparks & Deck, 1986).

Rhythm is an essential element to both speech and music. Rhythmic training also has been a successful treatment for individuals with neurogenic communication disorders (Cohen, 1988; Cohen & Masse, 1993; Dworkin, Abkarian, & Johns, 1988; McNeil, Rosenbek, & Aronson, 1984; Miller, 1982; Yorkston & Beukelman, 1981).

Most of the research cited above has dealt with the effects of music on purposive, or conversational, speech. More studies need to be done on the effects of singing or rhythm on the production of nonpurposive speech, such as familiar song lyrics, in persons with aphasia.

Research Objectives

The purpose of the study was to examine the difference in the nonpurposive speech of neurologically impaired persons with aphasia when asked to perform verbally-assisted, rhythmically-assisted and melodically-assisted tasks. The following research questions were asked:

1. What is the difference in the speech content of neurologically impaired persons with aphasia when asked to perform verbally-cued, rhythmically-cued and melodically-cued tasks?

2. What is the difference in the types of speech errors of neurologically impaired persons with aphasia when asked to perform verbally-cued, rhythmically-cued and melodically-cued tasks?

3. What is the difference in the verbal intelligibility of neurologically impaired persons with aphasia when asked to perform verbally-cued, rhythmically-cued and melodically-cued tasks?

4. What is the relationship between the nonpurposive speech production of neurologically impaired persons with aphasia and their age, length of time since onset of injury and type and severity of speech disorder?
Methodology

Subject Selection

Twelve aphasic subjects were recruited from the Aphasia Center of the Department of Communication Sciences and Disorders at Texas Woman's University. The subjects met the following selection criteria: (a) all subjects had unilateral left hemisphere cerebrovascular accidents; (b) all subjects had been diagnosed with aphasia by speech-language pathologists using the Boston Diagnostic Aphasia Examination (Goodglass & Kaplan, 1983); and (c) all subjects were native speakers of English.

Procedure

A repeated-measures design was used to examine the differences in speech production between three experimental conditions. The content of the repeated-measures task consisted of lyrics from the choruses of three familiar songs (e.g., "You Are My Sunshine"). Each client indicated which songs were familiar by choosing three from a list of eight titles; the eight songs had been sung over the past 3 months in their weekly music therapy sessions. All eight choruses were performed at the same tempo (m.m. = 72–80) and were approximately the same length.

There were three conditions for each song chorus: (a) verbal production only, (b) verbal production with rhythm, and (c) verbal production with melody. A Latin-square formula was used to insure that all three conditions were presented in random order across subjects. Prior to the administration of each task, the subjects were allowed one practice task in unison with the researcher. Following the practice task, the subjects produced the initial phrase of the chorus together with the researcher, and then completed the remainder of the chorus without the researcher. The words of the initial feeder phrases were eliminated from the final data analysis. In the verbal condition, the subjects were asked to say the words of the chorus. In the verbal with rhythm condition, the subjects were asked to say the words of the chorus to a steady, rhythmic beat of a hand drum. In the verbal with melody condition, the subjects were asked to sing the words of the chorus to the melody, which was played on an electric keyboard. Each condition was recorded on videotape and audiotaped for future analysis.
**TABLE 1**

*Mean Values of Speech Variables Across Experimental Conditions*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Verbal</th>
<th>Rhythm</th>
<th>Melody</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meaningful Speech Content</td>
<td>20%</td>
<td>21%</td>
<td>19%</td>
</tr>
<tr>
<td>Total Speech Content</td>
<td>50%</td>
<td>48%</td>
<td>46%</td>
</tr>
<tr>
<td>Paraphasia</td>
<td>03%</td>
<td>03%</td>
<td>03%</td>
</tr>
<tr>
<td>Jargon</td>
<td>34%</td>
<td>41%</td>
<td>40%</td>
</tr>
<tr>
<td>Intelligible Words/Minute*</td>
<td>33</td>
<td>24</td>
<td>14</td>
</tr>
</tbody>
</table>

* Significant at .02 level.

**Data Collection and Analysis**

The subjects' speech samples were analyzed according to the following speech variables: content, error types, and number of intelligible words per minute. Speech content was measured by the average number of words produced and the type of words produced (e.g., nouns, verbs, articles, prepositions). The percentage of errors was calculated and categorized as follows: paraphasias and jargon. The duration of speech performance, which was factored into the intelligibility score, was determined by the average number of seconds it took each subject to complete the task. In order to determine the number of intelligible words per minute, three graduate students in speech-language pathology were asked to listen to and transcribe a random presentation of the subjects' recorded speech samples from each of the three conditions (intrarater reliability = .97). The average number of intelligible words was then divided by the average duration of each condition to determine the average number of intelligible words per minute. A repeated measures analysis of variance revealed no significant differences between conditions for the subjects' speech content or error type. However, there was a significant difference in verbal intelligibility between conditions (p = .02), with the verbal condition showing the largest average number of intelligible words per minute. A canonical correlation indicated a significant relationship between the subjects' severity of speech disorder and the following speech variables: meaningful speech content (p = .003), total speech content (p = .002), percentage of jargon (p = .008), and verbal intelligibility (p = .005). A significant relationship also existed between the subjects' age and percentage of meaningful
speech content ($p = .01$), with the older subjects producing less speech with meaningful content.

Discussion

This study was undertaken to examine if the influence of musical cues could benefit individuals with aphasia in their ability to recall previously-learned song lyrics. The results indicate that no significant differences were found between the verbal, rhythm and melodic conditions for the subjects’ speech content or types of errors. In fact, the subjects’ verbal intelligibility was significantly better when they were allowed to speak the song lyrics’ words without any musical assistance.

Several factors may have contributed to the outcome of this research. One concerns the severity of the subjects’ speech deficits. Individuals were not excluded from the study if they exhibited apraxia of speech, and the severity level of the apraxia varied among the subjects. Apraxia of speech is characterized by impaired volitional production of articulation and prosody. In this study, the most severely apraxic subjects produced the fewest words. This, in turn, influenced their ability to produce words with rhythmic and melodic assistance. The apraxia of speech was so severe in one of the subjects that he was unable to even hum a melody. Producing a connected string of words,
such as song lyrics, would be extremely unlikely for this individual. Excluding those individuals with severe apraxia would have undoubtedly changed the results of this study in terms of the number of words produced.

A second factor that may have affected the outcome of the study relates to the intelligibility ratings. The subjects' intelligibility may have been compromised in the rhythm and melody conditions simply because the judges had to listen to the recorded speech in conjunction with a drumbeat or electric keyboard accompaniment. The overlay of either of these two conditions made it difficult for the judges to reliably judge intelligibility. Recording the drumbeat or melodic accompaniment on a separate track from the speech sample may have eliminated this problem, and would be recommended if this study were to be reproduced.

A third factor that may have affected the results of the study was the size of the subject sample. Because only 12 volunteers participated in this study, the number may have been too small to accurately predict trends. However, it did provide a means of more carefully analyzing the interaction of verbal performance and music.

The difficulty of the speech task may, as well, have affected the outcome of the study. Once the study began, it became apparent to the researchers that the act of producing connected strings of words in song lyrics was very difficult for the subjects. The task may have been so difficult that the addition of rhythm or melody proved to be distracting rather than beneficial.

This study was descriptive in nature and intended to examine aphasic subjects who had regularly participated in a music therapy program without constraint of severity or impairment. It is important to note that even those individuals with co-existing apraxia of speech expressed their enjoyment of the music therapy program. The music therapy sessions provided them with a comfortable environment in which they were able to produce some words and apparently feel successful. Music therapy was valuable for them because it fostered participation and provided a means of expression, both verbal and nonverbal.

The findings of this study indicate the need for further research on the role of music in the rehabilitation of purposive and nonpurposive speech. In previous studies (Cohen, 1991;
Cohen & Masse, 1993), the application of rhythm and singing helped to improve the purposive, or conversational, speech of persons with neurological impairments. It is possible that rhythm and singing may not be as beneficial in the production of non-purposive speech as it is for purposive speech. In addition, the studies cited above used long-term treatment conditions, whereas the present study was based upon a single administration of a task. Perhaps rhythmic and melodic accompaniment are only beneficial when used over time as a therapeutic intervention. It is recommended that this study should be repeated, but excluding those individuals with severe apraxia, and using a long-term treatment condition.

References


Call For Papers

Sixteenth International Seminar on Research in
Music Education
Frascati, Italy
July 13–19, 1996
and
XXII ISME International Conference
Amsterdam, Holland
July 21–27, 1996

The Research Commission of the International Society for Music Education invites (a) reports of recent research in music education for the Sixteenth International Seminar to be held from July 13–19, 1996 in Frascati, Italy, and (b) research posters for the XXII International Conference of ISME to be held from July 21–27, 1996 in Amsterdam, Holland.

The purpose of these meetings is to provide discussion of the results and implications of recently completed research as well as its methodology. Papers selected will normally reflect an experimental, observational, descriptive, ethnographic, philosophical, or historical research design. Papers selected will focus upon a clearly articulated research question or hypothesis.

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3. The paper must be complete, but must not exceed 2,000 words excluding references. No more than one table and one figure shall be included.

4. Three copies of an abstract (of no more than 200 words) must accompany the paper.

5. If a multiple-author paper is selected, only one author will be invited.

6. Papers and abstracts must be typed and double spaced.

7. At the top of the first page of the paper and of the abstract, the following information should be included:

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8. Submit a one-page curriculum vitae, including the highest academic degree held, current teaching (or other) position, a bibliography of research articles published since January 1992 and principal area(s) of research interest.

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10. Decisions concerning the acceptance of papers rests solely with the Research Commission as communicated by the Chair of the Research Commission.

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be considered by the Research Commission. Manuscripts submitted will not be returned. The Commission reserves the right to publish invited papers and abstracts.

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