The literature concerning autism often includes references to the musical ability of autistic children (1, 3, 6, 10, 11). Instances are cited of phenomenal rote memory behavior in autistic children. These include many references to musical memory, with examples of children exhibiting perfect pitch; demonstrating the ability to play musical material by ear after hearing the melody only once; and accumulating a vast repertoire of songs and poems which they recognize, sing or recite (3, 11). These children often appear to be obsessed with musical stimuli. Researchers have noted, however, that self-stimulation seems to accompany certain environmental stimuli when these are presented to autistic children (4, 5, 7, 8). Music educators and therapists have reported that music seems to affect self-stimulation; however, these observations have been subjective descriptions rather than observations based on experimental data (2, 9, 10, 12, 13).

Formal observation in the teaching environment has supported the observations that unstructured listening to music appears to increase self-stimulative behavior. However, structuring activities in the

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music teaching situation has appeared to reduce frequency and duration of self-stimulative behaviors.

The purpose of this study was to systematically observe the effects of musical simuli on self-stimulation when these simuli are presented in structured and unstructured musical experiences. A less formal measure of cognitive musical growth was made also through use of a conceptual test for musical understanding.

METHOD

Trained observers recorded frequency and duration of self-stimulative behavior for six children during structured and unstructured base rate conditions, and during treatment conditions where structured and unstructured aural musical experiences were presented. Specific self-stimulative behaviors to be observed were defined for each child, and observers were trained to record the frequency and duration of these behaviors with reliability. Children were grouped and observed during all conditions. Efforts were made to randomize error sources by alternating treatments between groups.

All observations of self-stimulative behavior were recorded under carefully controlled experimental conditions using high fidelity recording equipment and quality data collection instrumentation. The recordings were analyzed for frequency and duration of self-stimulative behavior. All analyses were conducted utilizing a Speech, Pause, and Time Analyzer in conjunction with necessary computer instrumentation. Data for one child were removed because of absence during a major
treatment condition. Missing data were supplied by averaging data for the week (for the specific treatment conditions individually).

All measures were submitted to preliminary analysis utilizing a one-factor analysis of variance to determine possible differences between groups and between structured and unstructured conditions within each base rate.

No differences were found for these results, therefore, data were added between groups and between unstructured and structured activities within the base rates. The following conditions were considered for data analysis: base rate one (pre-treatment); base rate two (between treatments); base rate three (post-treatment); structured music; and unstructured music. Comparisons between conditions were made utilizing a one-factor analysis of variance regarding frequency and duration of behaviors separately. A Newman-Keuls procedure was employed for all measures to then test for significance of mean differences among conditions.

RESULTS

The results of the investigation may be summarized as follows:

1. A significant difference was noted between the unstructured music condition and all other conditions with unstructured music revealing an increase in the mean frequency and mean duration of self-stimulative behavior.

2. No differences were noted between the structured music condition and base rate conditions regarding mean frequency or mean duration of self-stimulative behavior.
3. No differences were noted between the base rate conditions between weeks, indicating that treatment conditions of structured and unstructured music had no significant effects on base rates.

4. For four children, an increased number of correct responses was noted on tests for conceptual learning in music following structured music experiences.

DISCUSSION

Unstructured and Structured Music

A significant increase in both frequency and duration of self-stimulative behaviors in autistic children was noted in unstructured music experiences. This supports observations of the investigator and those of many music educators and therapists. These findings suggest that in programs where a reduction in self-stimulation is desired, unstructured listening to music should not be a primary treatment. Structured music activities, emphasizing educational rather than therapeutic aspects, do appear to be compatible with programs which attempt to reduce self-stimulation.

Findings by researchers which support the hypothesis that self-stimulative behavior is incompatible with learning also seem to be supported by the present study (4, 5, 7, 8). Unstructured music appeared to produce an increase in self-stimulation, and a lower number of correct responses to musical concepts (as represented on the test for conceptual learning in music) followed this condition in four children. During structured music, however, a lower mean
frequency and smaller mean duration of self-stimulative behavior was noted. Results on the conceptual learning test revealed that four children exhibited a higher number of correct responses following this treatment condition.

Aversive stimuli for suppression of self-stimulation were not employed in this study. The observation by Koegel and Covert (4) that, even without the use of aversive stimuli, successful discrimination learning is associated with a reduction in self-stimulative behavior seems to be supported by this study.

Structured and Unstructured Base Rate

The study was designed to compare differences in frequency and duration of self-stimulative behavior during structured and unstructured music activities. In the basic design structured and unstructured base rate conditions had been included to allow for possible differences between structured and unstructured activities in general. Formal observation and discussion with the classroom teachers had indicated that an increase in self-stimulation might accompany and unstructured situation. This hypothesis was not supported by the study. No significant differences were found regarding frequency and duration of self-stimulative behavior observed during structured and unstructured base rate conditions. For this reason, it was possible to group data for structured and unstructured base rate conditions into a single base rate for pre-treatment, between treatment, and post-treatment conditions. This finding should be noted for future studies of this type.
A comparison of mean frequency and mean duration of self-stimulative behavior between base rates revealed that neither structured or unstructured music experiences affected behavior in the other conditions. Therefore, the study does not support the use of music as a therapeutic agent to modify behavior outside the music situation. However, a music education approach emphasizing conceptual learning might be supported since increased numbers of correct responses on the test for cognitive musical growth were noted during base rate weeks which followed the presentation of structured aural musical experiences.

CONCLUSIONS

The conclusions, drawn on the basis of the results of this investigation, must be interpreted with recognition of the procedures employed in data collection, measurement, reduction, and analysis. Most important is the degree to which the subjects were representative of the autistic population in general.

Within the limitations cited, it is concluded that an increase in self-stimulation, in both frequency and duration of behaviors, is associated with unstructured listening to music. This should not be interpreted to mean that musical activities should be avoided in the classroom setting. On the contrary, it suggests that self-stimulative behaviors may be more under control in a structured music situation which emphasizes musical concept categories. Also, it is hypothesized that this structuring would facilitate learning.

Treatments did not appear to have effects on behavior outside
the music situation (therapeutic effects); but, educational gains in the area of conceptual learning in music were noted as a result of structured music experiences. These results support a conceptual music education approach (using structured musical experiences) as the most appropriate program for autistic children.
REFERENCES


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The article is a quite condensed version of a master's thesis by the same title.

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