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A CROSS-CULTURAL STUDY ON THE EFFECTS OF MUSICAL STIMULI ON THE FREQUENCIES OF STEREOTYPED BEHAVIORS OF AUTISTIC CHILDREN

by

Regina Chan

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ABSTRACT

A CROSS-CULTURAL STUDY ON THE
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This study examines the effects of musical stimuli on the frequencies of stereotyped behaviors in autistic children. Experiments were done both in Hong Kong and America. Chinese light music and American Bluegrass music were used as the stimuli.

In each experiment, three treatment conditions were presented to 10 subjects aged between 4 and 15. The three conditions were the Chinese-music condition, the American-Bluegrass condition and the no-music condition which established subjects' baseline levels.

A one-way analysis of variance was used in both experiments to test the effects of the independent variable, music condition. However, no statistically significant differences were found in subjects' frequencies of stereotyped behaviors in the three conditions. A two-way analysis of variance was used to compare the frequencies of stereotyped behaviors of the Chinese subjects and those of American subjects. No significant differences were found.

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CHAPTER I

THE PROBLEM

Introduction

Stereotyped behavior has been a major issue in research. These repetitive behavior patterns are found in autistic children, the severely mentally retarded, blind individuals and animals such as chimpanzees. Many stereotyped behaviors are harmful to the individual. Berkson and Davenport (1962) divided the set of behaviors into three categories: self-manipulations, manipulation of the environment and stereotyped movements. Among the three categories, self-manipulatory acts are the most harmful. These include such behaviors as sucking, biting, licking, smelling, poking, scratching and picking. The pathological nature of these behaviors warrants clinical research interest.

Many research studies have been conducted on the stereotyped behaviors of the mentally retarded. A wide range of stereotypy studies has also been conducted on blind individuals and animals. Questions concerning stereotyped behaviors raised are: What is their genesis; what variables control their frequency; what variables control their intensity; can these behaviors be eliminated? The literature indicates that various types of auditory stimulation have been used to test their effects on the frequency of

stereotyped behaviors. They range from noise to classical music. The major interest of the present study is to test the effects of music on the frequencies of stereotyped behaviors in autistic children.

Purpose of the Study

The purpose of this study was to test the effect of musical stimuli on stereotyped behaviors in autistic children. This study focused on autistic children as research on this population was still scant compared to other populations. The main questions pursued were the frequencies of those behaviors and how they could be reduced. Musical stimuli were chosen because previous research has shown that autistic children are receptive to music. This study also compared the performance of autistic children in America and their counterpart in Hong Kong. It is hoped that through such a design, further investigation can be made on the similarities and differences of autism in both cultures and also the relative effects of the music of the two cultures on the frequencies of stereotyped behavior. If the research hypotheses are supported in both populations, the effects of music on reducing stereotyped behaviors can be widely appreciated. Comparisons made on various aspects of the musical stimuli and the attributes of the populations of the two different cultures will reveal more interesting findings on the relationship between the independent variables and the dependent variables.

Need of the Study

The concept that music is therapeutic can be found in both Western and Chinese philosophies. Aristotle discussed how music serves as "cartharsis" and how its melodies serve for both education and purgation. For him, music functioned to produce virtue or intellectual entertainment.

On the other hand, the Chinese character for music, "Yo", being the same written word for happiness, signifies the association between music and mood. Confucius considered propriety "Li" and music "Yo" as the two major binding forces in society.

These different philosophies indicate a common belief in the functions of music. Despite the cultural differences in personality, similar stereotyped behaviors are shown in both American and Chinese autistic children. Stereotyped behaviors can be a reliable variable to reflect the effects of music among autistic children in both cultures. This study will entail consideration of differences between Western and Chinese personality. Also, with data collected from two cultures, the applications and effects of musical stimuli can be further investigated.

Research Questions

The study was designed to test two research questions:

1. Is there a statistically significant difference in the frequencies of stereotyped behaviors of subjects under the three conditions: Chinese music, American music and no-music?

2. Will subjects exhibit less stereotyped behaviors in the presence of their own cultural music than they will in the presence of foreign music?

Assumptions

Subjects were exposed to two different musical conditions and one no-music condition. Chinese light music was presented in one condition and American Bluegrass music was presented in another. The two musical stimuli are comparable in terms of instrumentation, tempo, orchestration and melodic repetition. In Chinese light music, Western instruments such as banjo, mandolin, piano, flute and oboe are used. It has the characteristics of Chinese dance music which includes syncopation and melodic repetition. In American Bluegrass music, banjo and mandolin are also the chief instruments, the rhythm is more varied and the tempo is slightly faster than the Chinese counterpart. These differences were assumed to be minimal in affecting subjects' behavior patterns.

Stereotyped behaviors are internally generated by the individuals, providing a source of reinforcing stimuli. The frequency of the stereotyped behaviors is an index of the activity level of the subjects, the higher the frequency, the more active.

Definitions

A. Stereotyped Behaviors:

It has been noted in abnormal psychology that mental

retardates, blind people and autistic children exhibit a number of repetitive behaviors. Berkson (1967) pointed out that the stereotyped acts can be differentiated on one hand, from disorders of motor organization which have a specific neuropathology and on the other hand, from certain tics and ritualistic compulsive acts where origin and form are specific to an individual. He concluded that stereotyped acts are voluntary, and that they represent a certain level of behavioral complexity. However, if stereotyped acts are merely repetitive behaviors, then behaviors such as rocking and digit sucking which are observed in human infants can also be a form of stereotypy. Also, nail biting and hair twirling are other behaviors that can be observed frequently among normal persons. Classification of behaviors as abnormal and normal can be a problem in psychology.

In terms of clinical utility, Schroeder (1970) defined stereotyped behaviors as repetitive motor behaviors or action sequences in which reinforcement is noncontingent and the performance of which is pathological. In the context of this study, behaviors that are classified as stereotyped acts are excessive and maladaptive. Behaviors as such are not meaningful to the individual or acceptable socially. Along with other research effort, this study is in the interest of eliminating stereotyped acts.

B. Autism:

According to the manual of the International Classification of Diseases, infantile autism is a syndrome present from birth or beginning almost invariably in the first 30 months. Responses to auditory and sometimes to visual stimuli are abnormal and there are usually severe problems in the understanding of spoken language. Speech is delayed, and, if develops, is characterized by echolalia, the reversal of pronouns, immature grammatical structure and inability to use abstract terms. Problems in social relationships are most severe before the age of five years. Ritualistic behavior is usual, and may include abnormal routines, resistance of change, attachment to odd objects and stereotyped patterns of play. Performance is usually better on tasks involving rote memory or visuospatial skills.

This diagnostic concept of autism coincides with Rutter's (1978) concept which is adopted in America.

1. Onset before the age of 30 months
2. Impaired social development
3. Delayed and deviant language development
4. Insistence on sameness

C. Culture:

Cross-cultural research has been prominent in psychology and anthropology. Kroeber & Kluckhoh (1952) defined culture as a set of "patterns, explicit and implicit, of and for behaviors acquired and transimitted

by symbols, constituting the distinctive achievements of human groups....[and] ideas and their attached values." (p. 181). This seems to imply that culture is solely related to behavior. Triandis (1980) distinguished between physical and subjective culture. The former includes man-made objects such as houses and tools, and the latter includes responses to those objects in the form of values, roles and attitudes. Gertz (1973) defined culture as "historically transmitted patterns of meanings embodied in symbols, a system of inherited conceptions expressed in symbolic forms by means of which men communicate, perpetuate, and develop their knowledge about and attitudes toward life." [sic] (p. 89). On the whole, psychologists and anthropologists all seem to agree that each culture has its own set of symbols and rules governing its behavior patterns. In this case, how can researchers generalize their research findings from one culture in support of their research model and theory? One feature of cross-cultural research is the use of universals. Functional universals in cross-cultural research are behaviors which have the same consequences when cultures are compared. Many examples are found in pathological behaviors. Stereotyped acts, the functional universal studied in this research, were behaviors universally seen in the research population. The goal of cross-cultural study lies in comparing identifiable events which happen to members of various cultural groups, and, as a result, lead to predictable

and theoretically important similarities and differences in behavior. In this particular study, the events are musical stimuli whereas the consequent behaviors are the frequencies of stereotyped behaviors of autistic children.

Limitations

Some of the methodological problems that accompany cross cultural research cannot be precluded here. The available population of autistic children itself is small. This created difficulties in recruiting matched samples. Instead of matching subject by subject in terms of age and mental capacity, the two groups of subjects had the same range of age, from 4 to 15. They were randomly selected from the categories of mildly, moderately or severely retarded autistic children. The sample size (n=20) might also pose a problem as far as generalization of the experimental results is concerned.

Because the study was conducted in two different countries, it was impossible to locate two experimental settings that were identical in size and interior design. It was possible to locate two rooms of comparable size and noise control that were considered acceptable for this experiment.

This study was intended to measure the effects of musical stimuli on the frequencies of stereotyped behaviors. No attempts were made to evaluate the effects of visual stimuli. The presence of furniture was minimal in the setting to enhance the influence of auditory stimuli which were

musical tunes in this context.

In order to ensure interscorer reliability, a particular set of stereotyped behaviors (Appendix B) was observed instead of each single repetitive act performed by the subjects. This particular set of stereotyped behaviors constituted the most typical ones exhibited by autistic children.

CHAPTER II

REVIEW OF LITERATURE

Part I: Theories of stereotyped behaviors

There are different theories accounting for the occurrences and mannerisms of stereotyped behaviors. They offer many approaches to explain the phenomenon. A review of these different viewpoints is presented below.

One general notion is that stereotyped behavior is an expression of tension, discomfort, or unsatisfied needs (Brody, 1960; Gerard, 1957; Ilg & Ames, 1955; Kaufman & Levitt, 1965). Other researchers have related stereotyped behaviors to release for anxiety, ungratified demands (Mahler, 1945; Kubie, 1941). Another related construct, arousal, has been proposed by Berkson & Mason (1964) to explain the repetitive behaviors in lower functioning animals.

In their three experiments conducted on chimpanzees, Berkson and Mason (1964) showed that body rocking is positively related to white noise level and to food deprivation. The authors suggested that intensity of sound influenced the degree of responsiveness of autonomic and somatic systems and differentiated arousal effects. Organismic variables were also tested by controlling drive level with food deprivation.

In another experiment, Berkson and Mason (1964)

demonstrated that rocking also decreased during habituation to a novel situation and returned to a high level following administration of amphetamine, a stimulant drug. A decrement in rocking was also produced in the third experiment in which alternative activities were presented. The presence of social stimuli affected the animal's arousal level and consequently, stereotyped movements decreased. These stereotyped behaviors were believed to be a source of kinesthetic self-stimulation that accounts for their development and maintenance.

According to behaviorists, stereotypy is a learned instrumental behavior related to frustration. When subjects experience non-reinforcement in situations where rewards are expected or where rewards are programmed on an irregular basis, subjects will exhibit high probability of instrumental behavior.

Forehand and Baumeister (1971a) worked with three groups of severe retardates to test the effect of frustration on rocking. One group (G3) served as the control while the other two groups were shaped to press a lever for candy reinforcement. After the shaping procedures were completed, one experimental group (G1) received 24 reinforcements on each of four days followed by four sessions in which the goal-directed response, lever pressing, was blocked by removal of the lever. The other experimental group (G2) was simply exposed, for four days, to the situation in which the lever was removed. Relative to the pre-experimental measure, the rate of rocking was significantly higher following interference

with goal-directed behavior. Group 1 exhibited the highest rate of rocking when the lever was removed. It seems that the increase in stereotypy was directly related to the number of reinforcements prior to the blocking of the goal-directed behavior.

Forehand and Baumeister (1971b) in another experiment showed that extinction of a goal-directed response led to increased rocking behaviors. Frustration was operationally defined here as non-reward of a previously rewarded behavior.

These experiments seem to indicate that the operations typically employed to induce experimental frustration do significantly affect stereotyped rocking behavior. Another notion discussed below proposes that stereotyped behaviors are compensatory behaviors for organisms when stimulation is inadequate.

Leuba (1955) suggested that tension reduction might only be one aspect of a general principle of learning theory. This principle is actually one of optimal stimulation: the organism tends to learn those reactions which will produce an optimal level of total stimulation. Actions which increase stimulation and produce excitement are strongly reinforced. By optimal stimulation, Leuba means that "the organism tends to acquire those reactions which, when overall stimulation is low, are accompanied by increasing stimulation; and when overall stimulation is high, those which are accompanied by decreasing stimulation." (p. 29). In other words, the organism will engage in compensatory behaviors when the homoeostatic condition is altered. Researchers have considered

stereotyped behaviors as serving self-stimulation functions.

Guess (1966) investigated the influence of blindness and nonambulation on stereotyped behaviors with the use of 32 severely retarded males. Subjects were divided into blind ambulatory, blind nonambulatory, sighted ambulatory and sighted nonambulatory groups. Results indicated a significantly higher rate of stereotyping among blind when compared to sighted subjects. Blindness and nonambulation both were found to significantly increase self-stimulatory activities. According to Guess, inadequate response repertoires encourage primitive self-stimulatory activities when subjects cannot respond to their environment in an effective way. Their low intellectual capacity does not allow release of motor tension in an organized, purposeful manner, and consequently, subjects resort to these more primary self-stimulatory activities as ways of consuming energy.

Berkson and Mason (1963) studied the effects of situational variables on stereotyped behaviors of profoundly retarded male patients. The results showed an increment of stereotyped behaviors in a novel restricted environment and a decrement in a familiar situation in which there were opportunities for alternative activities such as locomotion and manipulation of the environment. They suggested that stereotyped behavior is maintained because it provides self-stimulation through vestibular and kinesthetic functions.

Similarly, Cleland & Clark (1966) related stereotyped movements to impaired neural mechanisms which result in diminished quantity and quality of sensory imput. Levy (1944)

explained stereotypy as the result of either restraint or monotony. These researchers considered stereotyped behaviors as serving self-stimulatory, stimuli-induction function.

An alternative theory is that stereotyped acts serve as a stimulation reduction function. Hutt & Hutt (1965) observed six autistic children in four environments of increasing complexity. These environments were:

(a) empty room

(b) empty room + box of blocks

(c) room + blocks + passive adult

(d) room + blocks + active adult

It was found that stereotypies increased with environmental complexity, except where there was intervention from the adult. It seems that increasing environmental complexity and, thereby, sensory input would raise the level of arousal and hence "stereotyped behaviors originate in high-drive states as displacement activities, and in effect block further sensory input relating to the arousing situation" (p. 3).

In a different vein, Stone (1964) proposed that the functional significance of stereotyped behaviors is that they decrease arousal. In other words, stereotypy may serve as a form of sensory stimulation which produces alteration in the states of consciousness and leads to sleep.

All these theories emphasize that, functionally, stereotyped behaviors are reflexive activities regulated within the central nervous system. They all seem to share an organismic view that these behaviors are controlled internally by the organism. The variables that influence those behaviors

seem more likely to lie within the organism than with the external environment.

Berkson (1967) has the opinion that for the most part, the stimuli which initiate, guide, and reward stereotyped behaviors have their origin within the organism performing the act. While normal behaviors ordinarily involve some aspect of the environment, the basic organization of most stereotyped acts is only partially dependent on external stimulation. Many of stereotyped behaviors occur in the presence of stimuli changes that take place in the environment, these events are mediated within the sensory system of the organisms and thus responses are emitted.

In the above view, environmental variables assume a secondary role to organismic factors in the production of stereotyped behaviors. In addition to the studies conducted by Forehand and Baumeister discussed above, Hollis (1971) demonstrated that stereotyped rocking movements in retardates function as operants and can be brought under control of their consequences. However, from the review of the above studies, it is clear that environmental factors do influence the development and maintenance of stereotyped activity. At the same time, these events must obviously be mediated within the central nervous system. A cognitive-behaviorist viewpoint, to the present writer, seems to be a plausible explanation.

Part II: Effects of sound on stereotyped behavior

Levitt and Kaufman (1965) conceived sound intensity as an activator, arouser, or energizer. An experiment was designed to study the relationship between stereotyped behaviors and drive states and sound was selected as the drive source. The stereotyped behavior chosen here was body rocking.

Four levels of continuous sound were presented to 32 mentally retarded children. Subjects were divided into high body rockers and low body rockers. The result supported a positive relationship of rate of body rocking and increased sound level. This suggested a correlation of stereotyped behaviors and tension states. Increased sound level induced higher tension or drive which resulted in higher rate of body rocking.

The researchers speculated that body stereotypy could be an adaptive or coping function in these low functioning children with limited intellectual abilities to protect against an unstimulatory environment. However, as the only sound stimulus used in the study was white noise, generalization of the research results is limited.

Reardon and Bell (1970) conducted an experiment, and the data collected did not support the drive theory. The goal of the experiment was to evaluate the effects of auditory stimuli on activity levels of retarded boys. Three different theories were tested. The first theory suggests that external stimulation reduces stereotyped behaviors which are a source of self-stimulation. The second theory stresses that auditory stimulation is drive inducive. Activity levels increase

during music, expecially under stimulative music. The third theory predicts that sedative music should reduce activity while stimulative music should increase it. Subjects were observed under four conditions in which 14 behavioral categories were rated. The four conditions were respectively, sedative music, stimulative music, no music and spoken recording. On the whole, the result shows that subjects are less active during the more stimulating conditions. Hence, the data do not support the "drive" prediction which implies increases in activity with increases in stimulation, nor the hypothesis that sedative music calms while stimulative music activates. The general result agreed most closely with the first hypothesis which views stereotyped behavior as a source of stimulus. However, the results seem inconsistent over various experimental days. To explain the inconsistence, the authors suggested novelty as a significant factor reducing subjects' activity levels.

Forehand and Baumeister (1970) experimented both the effects of white noise and various sounds on the rate of body rocking. The varied sound conditions included music, human voices, door slamming and pots banging. The result indicated that both varied noise and white noise increased body rocking relative to the prior baseline condition. This seems to confirm Levitt and Kaufman's finding that high intensity sound increased stereotypy, and that intense sound is an arousing or drive-producing stimulus. However, both studies only investigated body rocking and many of the other typical stereotyped acts were neglected. The occurrence of

these acts could also reflect on the influence of the stimuli.

Smeets (1972) replicated the above studies to investigate further the noise, the level, the type and the duration of auditory stimuli on the rate of body rocking of blind retardates. The results do not support the drive hypothesis as confirmed by Levitt and Kaufman (1965) and Forehand and Baumeister (1970). The hypothesis rings true only if the level of arousal exceeds 60dB. However, no significant difference was observed under the variable of sound condition nor duration of stimuli. The sample size of only three subjects limits the generalization of this research finding.

A more advanced study was conducted by Stevens (1971) to test the effect of tempo changes on the speed and frequency of rocking. Subjects were divided into fast rockers, medium rockers and slow rockers. There were four treatment conditions, without music; music at average tempo; and at a tempo at 16 metronomic marking faster (+16 M.M.) and at a slower tempo at 16 metronomic marking slower (-16 M.M.). No significant differences occurred between music at the average tempo and music at +16 M.M. Yet the fast group tended to increase while that of the medium and slow groups tended to decrease. One possibility suggested by the author is that the slow rockers were halving the beat. Significant differences were observed for the fast group and the slow group between music at +16 M.M. and music at -16 M.M.

Music definitely controlled the rocking tempo of fast rockers toward the predicted tempo direction. The reversed direction of change in the slow group suggested that the

decreased tempo was more compatible with the speed of the slow rockers and thus caused an increase in their rockings. This study rendered more depth compared to the finding of Levitt and Kaufman which postulated that increased sound levels are directly related to an increase in rocking. Steven's result showed that increased noise at an antagonistic tempo did not increase rocking but, to the contrary, tended to extinguish the behavior as in the case of slow rockers.

Following Stevens' (1971) experiment, Soraci, Dechner, McDaniel and Blanton (1982) conducted an experiment to examine the effect of rhythm on five stereotypies. They hypothesised that rate of rhythmicity and behavioral stereotypies would positively covary to a point and then negatively covary due to a perceived loss of rhythmicity at the higher rates. This was based on the observation from Stevens' (1971) study that slow rockers tended to move at a tempo half as slow when the speed was increased. Subjects were 11 retarded children who showed high rates of stereotyped behaviors. An instrumental sound track entitled "Sound Sacrifice" by Santana was presented at four different speeds of 78, 45, 33 and 16 pm. The result confirmed the hypothesis that the rate of rhythmic auditory stimulation was positively related to general levels of stereotypies and beyond that rate a reversal of this effect occurs. The result suggests that subjects react up to a certain rate of rhythmicity, and beyond that point rhythmicity is effective in reducing stereotypies.

These studies show that intensity of sound and tempo both have certain effects on the frequencies of stereotyped behaviors. As the relationship between intensity and frequencies of stereotypy is a positive one, the relationship between tempo rates and frequencies, on the other hand, is an inverted U-curve relationship. Frequencies of behaviors will decrease beyond a certain point of tempo rate. This finding is theoretically interesting because the perception of tempo rate implies perception by the individual over time, a structured perceptual process of higher order. This leads to the following question which is of particular interest: How compatible are external stimuli with stereotyped behaviors which are assumed to be self-reinforcing in nature?

Lovaas, Litrownik & Mann (1971) tried to test if autistic children's responsivity could be increased when competitive stimuli were introduced. They found that the presence of self-stimulatory behavior was associated with increased response latencies for mute autistics. However, they failed to differentiate between the response latencies of the echolalic when they were engaged in self-stimulatory behavior against free from self-stimulatory behavior. The relationship between responsivity and competitive reinforcers warrants more empirical evidence. The experiment has, however, pinpointed an important issue which is relevant to the present study. Concurrent external stimulation must be competitive to a certain extent in order to intervene with the reinforcing stimuli generated by self-stimulatory behaviors.

Part III: Musical ability in autistic children

Nordoff and Robbins (1968) reported in their project that two severely autistic children who showed musical sensitivity improved in the musical rating scales with musical therapy treatment. They suggested that musical experience could be a non-threatening sphere of experience that avoids direct human contact.

According to Euper (1968), the frequency and ways in which reports are made reflect the interest or ability in music is an outstanding characteristic of early infantile autism. Such frequent mention of musical preoccupation is not found in the literature concerning other patients.

Based on the questionnaires returned from patients of autistic children, Rimland (1978) found that musical talent was the most often reported. One parent reported that her child could sing any note and tell what note (key) was being played as an infant. Another reported that her child could play melodies from a sonata that she heard her practising at four years old. Rimland believed that the various forms of autism represent severe disorders of the attentional mechanism. He also emphasized that the affective disorder is secondary to the cognitive defect. These children could zero in on whatever has attracted their attention but lacked the ability to zero out, to expand their focus and comprehend the context of whatever they are focusing on. However, most of these reports are basically anecdotal and lacked substantial empirical evidence.

Applebaum, et al. (1979) compared three normal children

with reported musical ability and three autistic children for the ability to imitate individual tones and a series of tones. The test was based on Gordon's test (1965, 1974) with 29 levels of increasing complexity, beginning with single pitches and ending with sets of four tones in an atonal configuration. The results demonstrated that the autistic children in this study tended to perform as well as or better than a group of age-matched normal children who had considerable musical experience.

Sherwin (1953) concluded that investigations on three autistic children indicated that musical reactions were intimately bound with psychopathology. He raised the possibility that the autistic child might use music as a form of real communication. Another possibility suggested by Sherwin is that musical talent may be associated with some degree of fixation on some infantile period. Autistic children may represent some extreme fixation on some early stage of infantile development. On the whole, there is sufficient evidence to show that the reaction to music of autistic children cannot be denied.

Other researchers demonstrated the therapeutic effect of music. Schmit, et al. (1976) used music as a context to shape and alter individual and social behaviors. In the first phase of the experiment, physical reinforcements were contingently given to shape behaviors appropriate to the context. In the second phase, physical reinforcements were not given until a complete sequence of shaped behavior occurred. In both phases, subjects were taught appropriate musical response

in addition to appropriate social behaviors. The result showed that appropriate behavior and responses to music increased while inappropriate responses decreased in all children. The authors suggested that music, as a possible reinforcement of higher "enjoyment" value, led to a reduction in the child's self-stimulatory action, and assisted in the extinction of disruptive behaviors.

Stevens & Clark (1969) found that music therapy techniques were significantly effective in improving some pro-social behaviors of autistic children. Three of the subjects improved sufficiently to enable them to attend regular kindergarten and first grade classes. Music activities included keeping a rhythmical beat on some percussive instrument or coordinating both hands while playing something like the autoharp or chord organ.

Saperston (1973) established some type of communication with an eight-year-old autistic child through the use of music. He used different tones and chords as accompaniments to the subject's particular movements. After a few months, subject began to understand that he could control the music. By changing the intensities of his movements, he varied the dynamic levels of the music. By the end of the eighteenth month, the therapist successfully established eye contact with subject for a duration of one minute by singing to him.

Mahlberg (1973) used rhythm instruments to communicate with a seven-year-old autistic boy. The tambourine was used to teach him a rhythmic pattern to communicate his name and some other simple speech. Action songs were used in the treatment

to increase his attention span. Finally, subject learned to march to music. He could dance in response to the change of tempi. The therapist thus managed to make him respond to a reality outside himself.

Many of these studies confirm that autistic children are responsive to music. In the present study, the writer attempted to identify the relationship between musical stimuli and the children's stereotyped behaviors.

Part IV: Culture and psychiatry

Is there any relationship between culture and the interpretation of psychological symptoms? Does culture affect psychiatric manifestations?

Every culture has its own value systems, conventions, family practices and religions. Psychological symptoms, as manifestated in different cultures, are universally the same. The specific mode of beliefs of each culture can be a factor precipitating certain mental illness. Cultural practices can also affect the perception and interpretation of psychological symptoms.

Family systems and cultural taboos can cause stresses to the individuals. Adolescents who are subject to social pressures, and yet do not know how to cope with them are under stress. Abrupt cultural changes can also be anxiety provoking, as people are not equipped with adequate facilities to adapt to them.

On the other hand, religions can provide resources for people to deal with stress and anxiety. Psychological symptoms

are treated differently in different cultures. Symptoms like hypochondriasis and enuresis are rarely reported among Chinese as compared to Westerners. Hypochondriasis and enuresis are not considered as disorders in Chinese culture.

In the Polynesian culture, hearing voices and experiencing supernatural influences were interpreted as callings from God. People having those symptoms, mostly psychotics, were chosen to be the high priests.

Le Whorf (1956) pointed out that the language of a culture often shapes and limits an individual's perception of what is normal and what is abnormal. His notion of linguistic-relativity suggests that our thought and perception of the world are relative to the language of our culture. Researchers have also agreed that there is a relationship between the structure of language and the conception of the physical world.

Psychiatric symptoms were divided into two categories. The primary symptoms are those that are universal, i.e., cognitive and affective dysfunctioning in schizophrenia, insomnia and lack of interest in depressive states. Secondary symptoms are the responses made by the patient and others to his basic symptoms. The primary symptoms do not vary. Secondary symptoms, however, can be modified by culture. In a research done by Witthower (1969), secondary symptoms such as emotional withdrawal and negativism are common in Orientals where passive aggressiveness or passive resistance to stresses are encouraged. On the other hand, Kiev (1972) showed that motor excitement and aggressiveness rank highest

among South Italians.

In a study carried out in Hong Kong, Wong (1979) asked subjects to write down all the words that they could think of in 30 minutes that described their physical discomforts and emotions. The result showed that there is a significant difference in the repertoire of expressions with more vocabularies describing physical than emotional discomforts. This seems to signify that Chinese people attribute discomfort more to a physical illness than emotional turmoils.

Cultural influences contribute to the modifications of psychiatric symptoms. In a cross-cultural study, culture itself is certainly a variable that requires consideration.

Part V: Comparative developmental psychology between Western personality and Chinese personality

Before presenting the present experiment, the writer would like to include a brief section on comparative developmental psychology between Western personality and Chinese personality. This is based on readings and also the writer's own experience as a foreign student in America.

Tseng (1974) delineated six developmental stages of Chinese personality. In the infant stage, babies are pampered and taken care of by the parents to the extent of indulgence. Parents are always concerned with feeding and satisfying the child's oral needs. The child is reared in a protective environment and becomes dependent on the parents.

In early childhood, children are reprimanded for being loud or being hyperactive. Children are expected to be

quiet and passive instead of being free-spirited. Toilet training is neglected. High values are placed on living in harmony and being agreeable with other people instead of taking initiative.

In late childhood, parents try to inculcate in the child's mind a sense of humility and almost a stoic sense of self-control. The topic of sex is hardly touched upon.

In puberty, parents begin to impose rigid discipline on their children, and train them to work hard. In teaching children how to socialize with other people, emphasis is still put on harmony and minimizing conflicts. Chinese people like to offer favours to friends, not as a token of mere giving, but as a means of paving for future returns.

In adolescence, sexual instincts are curbed. Adolescents spend more time with friends of the same sex than friends of the opposite sex. They begin to identify themselves with the concepts of modesty and forgiveness.

Finally, teenagers are expected to obey authority figures, respect tradition and heritage. Thus, Chinese people seldom achieve independence and autonomy at this stage.

On the whole, Chinese people develop a sense of self-identity and independence at a much later stage than people of the West. Following are summaries of the various dimensions of the Chinese personality and comparisons of child development as practised in Chinese and American cultures.

Chinese personality:

A. Self-concept

1. Humility and modesty

2. Circumstances preceed self-assurance and belief

B. Human relationship

1. Human relationship as a means of security, soliciting favours and help
2. Obey seniority
3. Close-knit family

C. Man and universe

1. Man is a small part of the universe
2. Man should learn how to live in harmony with the universe, instead of conquering it

D. Man and time

1. Nostalgic, respect tradition
2. Pursue continuity instead of change

E. Behavior

1. Always take the middle-of-the-road attitude instead of the extremes
2. Reserved, seldom express feelings, supress feelings

Child development in Chinese culture and American culture:

America	Hong Kong
1. goal of parenting:	1. goal of parenting:
-independence	-filial piety, obedience
-treat children as adults	-children need to be reprimanded and reminded
	-supreme reference to parents
2. social pressure:	2. social pressure:
-all-round development	-scholastic orientation
-individualistic	-gregarious
-aggressive and assertive	-humility

Children in Hong Kong are brought up in a warm, protective

environment with the father as the central authoritarian figure. They are expected to conform to rigid rules, observe absolute obedience and piety. On the other hand. under the influences of books, music and movies, they also recognize the values of independence, the ability to discriminate, to question, to be critical. These conflicts cause a great deal of stress and confusion to the children.

Part VI: Summary

Stereotyped behaviors are considered by many researchers as types of biological mechanisms generated by the individuals. These behaviors provide a source of reinforcing stimuli that are believed to serve different functions such as drive-reduction, stimuli-induction or stimuli-reduction. Whatever their real functions are, these behaviors are physically harmful to the individuals. They also inhibit learning experiences as individuals always tend to ignore external stimulation while they are engaged in these behaviors.

Researchers suggested that external stimulation can, however, be a means of combating these pathological behaviors. By introducing competitive external stimulation, the individual may be introduced to reinforcements that can compensate for the effects of stereotyped behaviors. A number of auditory stimuli have been used. They include intensity of noise, duration of sound and also varied sound conditions. The results are still inconsistent.

Stereotyped behaviors are typical among autistic children. Musical talents are believed to be prevalent among

them (Nordoff & Robbins, 1968; Rimland, 1978). Assuming that musical stimuli are a source of competitive external stimuli, the present study is an attempt to see the effects of musical stimuli on the frequency of stereotyped behaviors of autistic children.

CHAPTER III

DESIGN OF THE STUDY

Subjects

The subjects that participated in the study were 20 autistic children. Ten of them were American and the other ten were Chinese recruited in Hong Kong.

The Chinese subjects in Hong Kong were day-care patients of the Hong Kong Government Queen Mary's Hospital. Eight of them were male and two were female.

All the Chinese subjects were chosen on the basis of the recommendation made by the doctor in charge of the children's unit at the Hospital. They were selected because they demonstrated a certain level of stereotyped behaviors. The mean chronological age of the subjects was 7.3. Subjects were all attending school at the time of the study. They were brought to the day treatment center of the Hospital by either their parents or guardians.

Experimental sessions were scheduled both in the morning and in the afternoon. In order to minimize the time factor, subjects had equal chance to attend morning and afternoon experimental sessions.

The American subjects were students enrolled in the autistic program of Wellerwood School, Grand Rapids, Michigan. Six were male, and four were female.

Subjects were selected in close consultation with the teachers so that they all showed the same degree of stereotyped behaviors and previous musical experience. Subjects were also randomly assigned to the morning and afternoon experimental sessions so that subjects had the same chance to participate in the mornings and in the afternoons. They were escorted by the experimenter and the teacher aide to the experimental room which was located at the school. Their mean chronological age was 9.25.

Experimental data of both groups were compared to determine if the factor of nationality differentiated subjects' responses to musical stimuli in terms of frequencies of stereotyped behaviors.

Settings and experimental procedure

A total of eight experimental sessions were held on a every-other-day basis. Each session was about 12 minutes. Subjects were brought to a small room, cleared of toys and furniture. The only exceptions were a small chair for the subject to be seated, a tape-recorder for presenting musical stimuli and also video equipment for taping the session. The amount of outside noise within the room was random and minimal.

The experimenter sat in the corner of the room and counted the frequencies of each occurrence of the stereotyped behavior on a checklist throughout the 12 minutes. A blind scorer counted the stereotyped behavior from the video tape recording of the session.

Although the experimenter was seated in the corner of the same room, there was no communication between the experimenter and the subject so that social stimuli were minimized.

Three conditions were presented, each lasting about four minutes: Condition A was Chinese music with Western instruments; condition B was American Bluegrass music; and condition C with no music served as a control to assess baseline activity levels. The music conditions were prerecorded and presented on a portable tape-recorder at a constant volume setting as measured on a sound-level meter (approx. 70-80dB). In an attempt to counter a possible practice effect, the order of the presentation of the condition was varied from day to day as shown below:

Day 1	no music	Am music	Chin music	Tape 1
Day 2	no music	Chin music	Am music	Tape 1
Day 3	Am music	Chin music	no music	Tape 1
Day 4	no music	Am music	Chin music	Tape 2
Day 5	no music	Chin music	Am music	Tape 2
Day 6	Chin music	Am music	no music	Tape 2
Day 7	Chin music	no music	Am music	Tape 1
Day 8	Am music	no music	Chin music	Tape 2

Instrumentation

The instrumentation used in the experiment was, necessarily, not exact in manufacture; however, the similarity of technical quality associated with the instruments in both Hong Kong and America was considered acceptable for producing reliable measures. These include: one VHS video camera and video cassette recorder of PAL-625 system for the experiment in Hong Kong; one Betamax video camera and video cassette recorder of NTSC-525 system for the experiment in America; one National VHS video tape and one Maxell Betamax video tape; one Sanyo portable tape-recorder and two

cassette tapes, each with a different version of Chinese light music and American Bluegrass music, and scoring sheets.

Western instruments e.g., banjo and mandolin, piano, flute and oboe are used in the Chinese light music which has the characteristics of Chinese dance music typified by syncopation and melodic repetition. In American Bluegrass music, banjo and mandolin are also the chief instruments. The rhythm is generally more varied and the tempo is slightly faster than the Chinese counterpart. The tape-recordings of the musical stimuli were presented to a panel of experts to determine whether they are adequately similar in style. They were the Chairman of Music Therapy Department of Michigan State University, Professor of Music Therapy of the Music Department of Michigan State University, the Chairman of the Music Department of the Hong Kong University and the Chairman of the Chinese Music Department of the Hong Kong Performing Arts Center.

Scoring

There were two blind scorers in the study. The first one was a social worker trained in Canada working in an institute in Hong Kong at the time of the study. Another blind scorer was a speech pathologist trained in America working in a school for special education in the U.S. at the time of the study. Both of them had previous experience working with autistic children and were familiar with the concept of stereotyped behaviors. Neither had prior knowledge of the purpose and design of the study. When the video cassette tapes

were presented to them for counting the frequencies of subjects' stereotyped behaviors, the volume was turned off so that they had no idea of what treatment condition was going on. This was designed to minimize unnecessary bias from the scorer that might have contaminated the result of the study.

The following list of stereotyped behaviors was selected to be the criteria for the measurement of subjects' responses:

1. rocking
2 flapping of arms
3. staring at cupped hands
4. staring out of the corners of the eyes
5. pressing the finger into the same spot on the body
6. walking on toes or soles
7. self-spinning
8. spinning objects (e.g., the subject's chair)
9. rolling or crossing of eyes
10. flipping hands with fingers extended in front of the eyes
11. flinging or banging own head
12. crying without cause
13. other

Though there are likely other criteria not listed, this was considered adequate to describe the possible behaviors that are typical of autism, and were behaviors recorded by the experimenter and the blind scorers. In addition, the scorers were to note any other meaningless repetitive acts not listed but performed by the subjects during the experiment.

This was for the purpose of post-hoc comparison.

The total number of stereotyped behaviors of each subject on each treatment condition was counted. If the subject continuously performed one particular stereotyped behavior e.g., rocking, until this stopped or another set of stereotyped behavior was started, the whole sequence would be counted as once only.

Statistical Analysis

An average activity score was derived for each subject on every treatment condition. The scores constituted a set of interval data. A one-way analysis of variance was used to compare the average frequency score for each subject on the three conditions for each study.

A two-way analysis of variance was used to test significant differences in the scores of Chinese subjects and that of American subjects. This was used to see if there was any interaction effect between the two variables, musical condition and nationality.

A Pearson product-moment coefficient test was used to check interscorer reliability.

CHAPTER FOUR

RESULTS

Findings

This study assessed the effects of auditory musical stimuli on the frequencies of stereotyped behaviors in autistic children. Two similar experiments were performed in America and Hong Kong, respectively and, hence, data were collected from two culturally different places. A total of twenty subjects participated in the experiment, half of them were Chinese subjects native to Hong Kong and half were American subjects. Subjects were assigned to three conditions, the no-music, the American Bluegrass music condition and the Chinese light music condition.

An average frequency score was derived for each subject in every session on each condition. Raw data and demographic information of all subjects are shown in Appendix A.

Table 1 shows the number of sessions and the mean frequency scores for the Chinese subjects on each condition, Chinese music, American Bluegrass and no-music.

Table 2 shows the number of sessions and mean frequency scores for the American subjects on each condition, Chinese music, American Bluegrass and no-music.

TABLE 1

NUMBER OF SESSIONS AND MEAN FREQUENCY

SCORES OF CHINESE SUBJECTS ON EACH CONDITION

Chin Ss	No. of sessions	Chin M	Am M	No M
S 1	8	0	1	1
S 2	8	2.9	3.1	3.5
S 3	8	1.5	1	1
S 4	6	5.2	5.5	10
S 5	6	12	15	13
S 6	8	6.1	5.3	3.6
S 7	4	3.8	1.8	1.5
S 8	7	2.7	5.4	7.9
S 9	7	3	5.3	5.4
S 10	7	5.6	3.6	3.9
		42.8	47	50.8
		$\bar{x}$= 4.28	4.7	5.08

TABLE 2

NUMBER OF SESSIONS AND MEAN FREQUENCY

SCORES OF AMERICAN SUBJECTS ON EACH CONDITION

Chin Ss	No. of sessions	Chin M	Am M	No M
S 1	7	4.4	5.6	2.1
S 2	7	4.9	3.4	4.4
S 3	7	4	4.3	5.1
S 4	8	7.1	5.8	6.3
S 5	8	7.7	10.6	9.3
S 6	7	2.4	3.4	7.3
S 7	8	0.9	0.9	1.4
S 8	8	5	3.5	6.8
S 9	8	7.8	3	2.3
S 10	6	15.2	11.2	12.8
		59.4	51.7	57.8
		$\bar{x}$= 5.9	5.17	5.78

Review of research questions

1. Is there a statistically significant difference in the frequencies of stereotyped behaviors of subjects under

the three conditions: Chinese music; American music and no-music?

A one-way analysis of variance was used to determine if there was a statistically significant difference between the three mean frequency scores of Chinese subjects: 4.28 for Chinese music; 4.7 for American music and 5.08 for no-music.

Table 3 shows that the evaluated F value of 0.6724 with 2 and 18 degrees of freedom was less than the critical F value of 3.35 at .05α level. The main effect of the independent variable "musical condition" was not significant since the evaluated F value does not exceed the critical F value. There were no real differences in the frequency scores of the three conditions among Chinese subjects.

TABLE 3

ANALYSIS OF VARIANCE FOR CHINESE SUBJECTS

Source of variation	SS	DF	MS	F	P
Music cond.	3.2027	2	1.6014	0.6714	.05
Subject	349.6214	9	38.8468		
Interaction	42.8706	18	2.3817		
Total	395.6947	29			

Evaluated F value is less than the critical F value (3.35) at .05α level.

Another one-way analysis of variance was used to determine if there was a statistically significant difference between the three mean frequency scores of American subjects: 5.9 for Chinese music; 5.17 for American music and 5.78 for no-music.

Table 4 shows that the evaluated F value of 0.5405 with 2 and 18 degrees of freedom was less than the critical F

value of 3.35 at .05 α level. The main effect of the independent variable "music condition" was not significant since the evaluated F value does not exceed the critical F value. There were no real differences in the frequency scores of the three conditions among American subjects.

TABLE 4

ANALYSIS OF VARIANCE FOR AMERICAN SUBJECTS

Source of variation	SS	DF	MS	F	P
Music cond.	3.302	2	1.651	0.5405	.05
Subject	296.3763	9	32.9307		
Interaction	54.9847	18	3.0547		
Total	354.663	29			

Evaluated F value is less than the critical F value (3.35) at .05 α level.

2. Will the subjects exhibit less stereotyped behaviors in the presence of their own cultural music than they will in the presence of foreign music?

A two-way analysis of variance was done to determine whether there is any interaction effect between the two independent variables, nationality and musical condition. In other words, do the effects of musical conditions on subjects' performance depend on their nationality?

Table 5 shows again the mean frequency scores of Chinese subjects and American subjects on each of the three experimental conditions.

Table 6 shows that the evaluated F value of 0.138 with 2 and 54 degrees of freedom was less than the critical F value of 19.5 at .05 α level. There was no significant interaction effect between musical condition and nationality.

TABLE 5

SUBJECTS' MEAN FREQUENCY SCORES

		Chin Ss	Am Ss
Chin	M	4.28	5.9
Am	M	4.7	5.17
No	M	5.08	5.78

TABLE 6

TWO-WAY ANALYSIS OF VARIANCE

Source of variation	SS	DF	MS	F	P
Nationality	13.94	1	13.94		.05
Music cond.	2.2265	2	1.1133		
Interaction	3.8335	2	1.9168	0.138	
Error	749.91	54	13.887		

Evaluated F value is less than the critical F value (19.5) at 0.05 α level.

In addition, a Pearson product-moment coefficient test was done to test the interscorer reliability. Table 7 shows the r values derived by comparing the experimenter's score and the blind scorer's score in each experiment, showing a strong correlation between the two sets of scores in the Chinese study and a moderate correlation in the American study. Some American subjects showed a lot of rolling of eyes which were difficult to be noted by the blind scorer on the video-tape. This might account for the relative lower correlation in this part of the study.

TABLE 7

PEARSON PRODUCT-MOMENT COEFFICIENT (r) FOR INTERSCORER RELIABILITY

	Chin M	Am M	No M
American study	.68	.66	.8
Chinese study	.93	.99	.59

Summary

No statistically significant differences were obtained in the frequencies of subjects' stereotyped behaviors under the three experimental conditions (Chinese music; American music and no-music). Musical stimuli did not decrease the frequencies of stereotyped behaviors of autistic children.

Similarly, no interaction effect was demonstrated between the factor of musical condition and nationality. Subjects' peformances under the musical conditions are not influenced by their nationality.

CHAPTER FIVE

SUMMARY, DISCUSSIONS AND RECOMMENDATIONS

Summary

Stereotyped behaviors have been considered as pathological behaviors; yet, their etiology is still unknown. Many researchers have tried to identify the cause and means of extinguishing stereotyped behaviors. Different theories have postulated stereotypy as a form of internal mechanism generated by the individual. Stereotyped behaviors serve different biological functions such as drive-reduction, self-stimulation or stimuli-reduction. These theories all rely on the philosophy that stereotyped movements are self-reinforcing. However, many of these behaviors are actually harmful to the individual and their exclusive nature decreases the individual's chance to respond to other stimuli and hence inhibits learning.

Stereotyped behaviors can be seen in human beings and also lower functioning animals; e.g., chimpanzees. Berkson (1967) has pointed out the similarity of stereotyped movements in animal and human groups. He cited rocking and sucking as two common examples. Besides similarities, Berkson also reported that there is a difference in the variety of responses manifested. A greater variety of responses is seen as

one goes up the phylogenetic scale. The group of subjects chosen in the present study was autistic children.

Autistic children exhibit a great number of stereotyped movements. They usually show better skills on tasks involving rote memory than those requiring symbols or linguistic skills. However unresponsive they are to external stimuli, they demonstrate responsiveness to music (Rimland, 1978; Nordoff & Robbins, 1968). Musical talents are prevalent among autistic children. Hence, musical stimuli can be strong competitive reinforcers to intervene with the reinforcing stimuli generated by stereotyped behaviors. This study was an attempt to test the effect of musical stimuli on the performance of stereotyped behaviors in autistic children.

In the present study, experimental sessions were done in America and Hong Kong. It was hoped that through the comparison of the data collected in two different cultural societies, the effect of musical stimuli could be more firmly established.

A total of 20 subjects participated in the study. Ten of them were American subjects while the other ten were Chinese subjects recruited in Hong Kong. Subjects were presented with three condition: the no-music condition which was also the baseline condition; the American music condition and the Chinese music condition. In each music condition, the subjects were presented four minutes of each of the musical versions. The music was prerecorded. The frequencies of subjects' stereotyped behaviors were counted during each condition. There were, altogether, eight sessions.

Two one-way analyses of variance were used to test the statistically significant differences in the average scores of each group of subjects (Chinese and American) on the three conditions. Another two-way analysis of variance was used to test if there was a statistically significant difference in the scores between Chinese and American subjects.

Conclusion

Based on the statistical analysis of the data, the following conclusions were drawn:

1. There was no statistically significant difference in the frequencies of stereotyped behaviors in Chinese subjects between the no-music, American music and Chinese music conditions.
2. There was no statistically significant difference in the frequenices of stereotyped behaviors in American subjects between the no-music, American music and Chinese music conditions.
3. There was no statistically significant difference in the frequencies of stereotyped behaviors between Chinese subjects and American subjects under the three conditions.

Discussion

Experiment in Hong Kong

Except for one four-year old male subject, all the other nine subjects exhibited stereotyped behaviors. The four-year-old subject performed only one spinning-object behavior, one rocking behavior and one crying-without-cause behavior. He was very attached to his mother and needed to be coerced into the experimental room almost every session. Two subjects showed relatively high scores on the no-music condition on

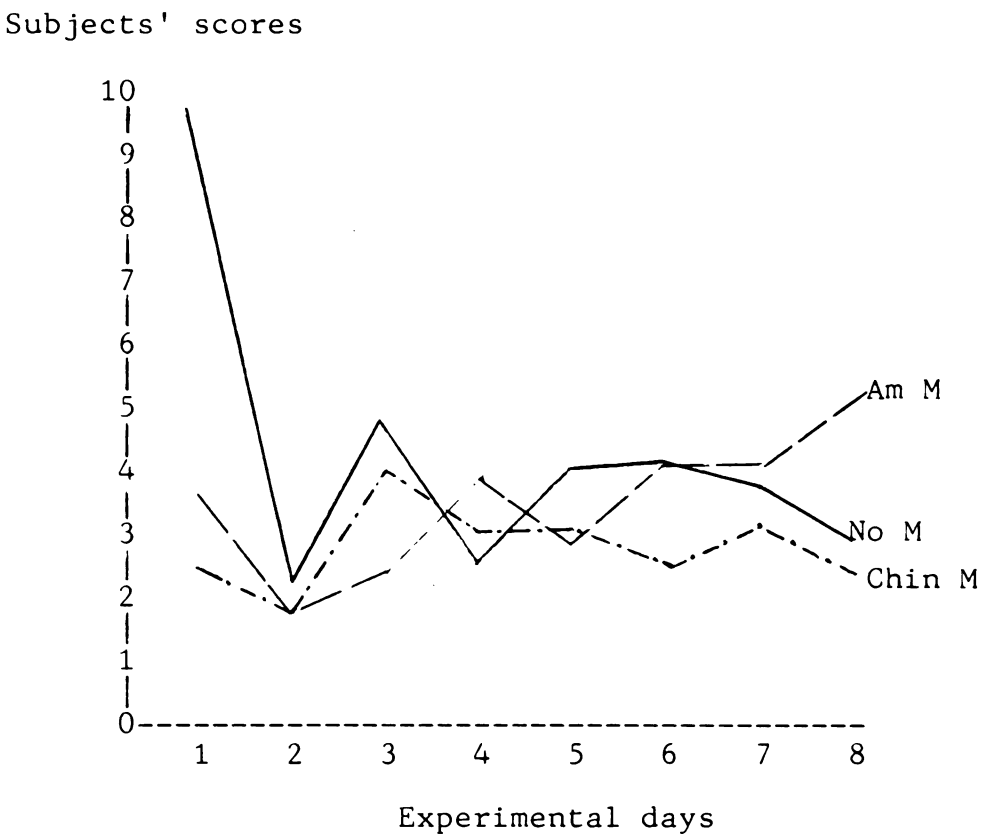
the first day (S6 & S8). Otherwise, each subject's scores were quite consistent over the eight sessions.

As shown in Figure 1, there are differences in the first three sessions. The no-music curve is above the other two. It is especially high on the first day. Afterwards, the curves are more or less overlapping or on the same level. The novelty factor may have some influence here. Reardon and Bell (1970) pointed out that the changes in activity level on the experimental day might be interpreted as due to a decrease in the novelty of the auditory stimulation over consecutive sessions. As the experiment progressed through the eight sessions, the novelty of the musical stimuli decreased, causing associated decrease in the frequencies of activity being measured. In the present study, the differences over the three conditions in the first three sessions may also have been due to the novelty factor. Chinese subjects were more responsive to the two musical conditions, and thus showed less stereotyped behaviors than they did under the no-music condition.

Among the subjects, S10 was known to have had previous musical experience. His father pointed out that he had a special interest in brass and percussion music. This subject did show special reaction to the musical stimuli by dancing to them on Day 1. Subject 5, on the other hand, reacted to the two musical conditions by covering his ears. Music seemed to be a rather obnoxious stimulus. According to his grandmother, he always reacted to noise in this way. These are some of the idiosyncratic behaviors shown by the subjects.

Figure 1

CHINESE SUBJECTS' AVERAGE DAILY SCORES UNDER THE THREE CONDITIONS



Self-spinning was the most noted behavior. Here the aspect of environment could have been involved. Subjects especially liked to revolve in one corner of the experimental room. There is a narrow wall of about 10 inches wide between the two big walls at the corner. This facilitated the spinning movements of the subjects. As Berkson (1967) suggested that environment can be an important variable accounting for moment-to-moment changes in the level of stereotypy. Stereotyped movements are internally generated behaviors which are self-reinforcing. They are yet often performed with reference to the environment. Berkson (1967) further pointed out the following:

> Animals tend to choose a single area of any situation in which to rock or sway, usually next to a wall or on a smooth floor, and it is not uncommon to see an animal go to his "favourite" place and then begin to rock. The situation with the severely deficient humans is more complicated. Those who frequently perform stereotyped movements also tend to be stereotyped with regard to the area of the room in which they stay. (p. 79)

Experiment in America

The subjects' attendance was consistent. Except for S7, all subjects demonstrated stereotyped movements to a certain extent. Subjects also exhibited other stereotyped behaviors that were not included in the observation sheet. Subject 5 and S10 were seen very often sucking their thumbs. Subject 2 and S3 were seen often grinding their hands and clapping ears respectively. Only one subject showed a temper tantrum (S1), and he missed one session as he was too hyperactive to participate in the experiment.

Two subjects showed response to the rhythm of the

musical stimuli. Subject 6 shook his foot in rhythm to American music on Day 1 and also tapped the chair with his fingers in rhythm to American music on Day 4. Subject 7, however unresponsive to the musical condition as she seemed, was seen tapping her knees in rhythm to Chinese music on Day 7. Their responsiveness to music could have been strongly supported if there were more experimental sessions.

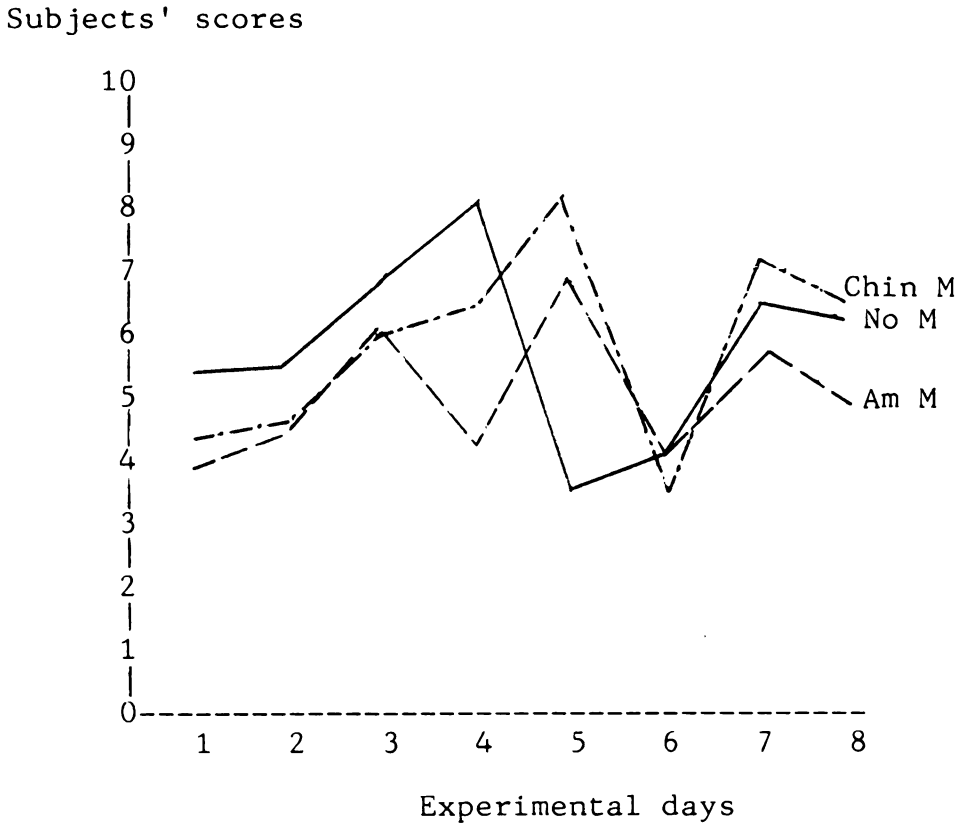
Although there was no significant difference in the frequency scores between the three conditions, some subjects were reported to stop momentarily their stereotyped movements when the music began. Subject 8 & S9 stopped making noises and shaking respectively when American music was presented.

Similar to the Chinese subjects, American subjects also demonstrated less stereotyped behaviors under the two musical conditions than they did under the no-music condition over the first part of the experiment. As Figure 2 shows, the no-music curve is above the other two curves over the first four experimental sessions. After Day 4, the curves became over-lapping.

There is also a sudden drop of stereotyped behaviors on Day 6, followed by a rise on the last two days. One reason could be the longer school break between Day 6 and Day 7, the subjects' mood became more elated.

Figure 2

AMERICAN SUBJECTS' AVERAGE DAILY SCORES UNDER THE THREE CONDITIONS



Comparison between the two experiments

On the whole, American subjects were more consistent in their participation, and their mood was more steady. The setting of the experiment might account for this difference. Chinese subjects were brought to the hospital for the experimental sessions by their parents. Many of them just came right after school and were already tired and hungry. On the other hand, American subjects took part in the experiments which were set up at their own school. They were sometimes warned by their teachers to behave themselves in the experiment or even escorted to the experimental room by their teachers. The setting was more structured relatively.

A comparison of Figure 1 and Figure 2 indicates some differences in the performances between American subjects and Chinese subjects under the Chinese music condition. American subjects showed a higher level of stereotyped behaviors when Chinese music was played. However, further research needs to be done before the present writer can empirically claim that Chinese music has less impact on American subjects than American music.

One Chinese subject (S3) and one American subject (S10), who are both echolalic, were heard producing the same syllable "ba". The morpheme actually does exist in both languages. In Chinese, it means "give". This morpheme being found in the echolalic speech of both Chinese subjects and American subjects might be only a coincidence. However, it might also indicate that the "b" phoneme could be a easier one for the autistic children to imitate or learn.

Recommendation for future research

In the course of analyzing the data and the results of the experiment, some of the underlying flaws in the experimental design were realized.

The measurement of the frequencies of subjects' stereotyped behaviors needs to be reconsidered. In the present study, the whole sequence of one category of stereotypy performed by the subjects was counted as once instead of breaking down the sequence into units and counted individually. For instance, if one subject was indulging in rocking behavior for three minutes, then the whole three-minute rocking behavior would be counted once. The subject could have actually rocked thirty times more in that three minutes. This measurement method seems to measure the number of occurrence of each type of stereotyped behavior instead of the total number of stereotyped behaviors exhibited by each subject. In addition to frequency counting, duration recording method, in which the elapsed time of a behavior is recorded, should have been employed in the experiment.

A much more controlled experiment could be rendered if the age and intelligence level of the two groups of subjects could be matched. Intelligence level could be a factor affecting subjects' responsiveness to the stimuli. If subjects were recruited from one category, e.g., moderately retarded or severely retarded, their baseline performance might be more comparable. Subjects' prior musical experience might also be another contaminating factor. Subjects who are previously exposed to music might be more receptive to the

musical stimuli.

The stimuli, American Bluegrass and Chinese light music were actually both unfamiliar even to the group to which it was indigenous. Are these musical selections aversive stimuli? In the Chinese population in Hong Kong, Chinese light music is not widely accepted by the population, expecially the younger generation, which is more exposed to popular Chinese songs or, ironically, Western rock and roll music. Similarly, American Bluegrass is also popular in certain segments of American society. The popularity of American Bluegrass is far less than American rock and roll music. This might reduce the competitiveness of the stimuli relative to subjects' self-reinforcing stereotyped behaviors.

The following changes are necessary if the experiment is replicated:

1. Use a duration recording method in addition to frequency counting to record the scores of subjects.
2. Match subjects' age, intelligence level and prior music experience in order to make the two groups of subjects more comparable.
3. In a pilot study, test subjects' receptivity to different kinds of music and select those best preferred by the subjects as stimuli in order to enhance their competitiveness.

Finally, to enhance generalization of the data and the accuracy of statistically analysis, a larger sample size is desired. With these changes, it is worthwhile to conduct another cross-cultural research on musical effects on the frequencies of stereotyped behaviors. This can increase understanding of the nature of stereotyped behaviors, the

different dynamics of music as external stimuli and also the nature of autism with resources pulled from two heterogeneous populations.

APPENDICES

APPENDIX A

RAW DATA AND DEMOGRAPHIC INFORMATION

APPENDIX A

RAW DATA AND DEMOGRAPHIC INFORMATION

Chinese subjects

Subject	Sex	Age	Daily scores:				no Am Chin	M M M		
1	M	4.5	0	0	0	0	0	0	0	1
			0	0	0	0	1	0	0	0
			0	0	0	0	0	1	0	0
2	M	7	4	0	4	0	4	1	3	2
			3	3	1	1	1	2	1	13
			2	1	3	0	2	1	5	6
3	M	6.5	4	2	0	1	0	0	0	1
			2	0	0	0	2	0	2	0
			6	4	0	0	1	0	0	1
4	M	8.5	17	3	13	A	12	10	5	A
			9	2	6	A	7	5	4	A
			2	1	8	A	10	4	6	A
5	M	15	1	0	1	2	4	5	A	A
			1	1	1	3	2	7	A	A
			1	0	1	1	6	3	A	A
6	F	4	23	5	7	3	5	1	7	0
			8	1	3	13	5	2	7	3
			3	1	6	4	7	3	5	0
7	F	5.5	A	0	A	0	3	A	3	A
			A	2	A	4	1	A	0	A
			A	4	A	8	1	A	3	A

Subject	Sex	Age	Daily scores:				No Am Chin	M M M		
8	M	8	28	1	1	1	A	11	7	8
			2	5	2	2	A	10	8	8
			2	1	1	3	A	3	3	9
9	M	7.5	8	4	10	8	A	2	7	1
			5	2	7	6	A	5	10	4
			3	1	8	2	A	4	4	0
10	M	6.5	2	7	8	7	A	7	2	6
			3	2	0	4	A	5	7	8
			3	4	3	9	A	3	3	2

American subjects

Subject	Sex	Age	Daily scores:				No Am Chin	M M M		
1	M	10	0	2	3	0	0	6	A	4
			3	4	6	3	5	7	A	11
			4	3	3	5	3	5	A	8
2	M	13	A	4	3	8	4	3	4	5
			A	3	2	4	8	1	3	3
			A	2	1	9	5	1	10	6
3	F	14	7	6	12	A	3	2	5	1
			4	1	11	A	4	2	3	5
			2	6	10	A	4	4	6	2

Subject	Sex	Age	Daily scores:				No Am Chin	M M M		
4	F	6	5	2	11	12	1	3	7	9
			4	4	10	4	6	2	8	8
			1	9	10	13	9	3	7	5
5	M	14	12	10	7	12	4	10	10	9
			11	5	0	10	30	12	10	7
			3	5	1	10	27	3	7	5
6	M	6	2	3	2	14	13	A	2	15
			5	0	5	5	0	A	3	6
			7	0	3	1	0	A	2	4
7	F	5	0	1	3	1	0	3	0	3
			0	3	0	1	0	2	0	1
			0	2	1	0	1	1	0	2
8	M	8	9	5	5	10	4	2	14	5
			3	3	4	1	3	6	6	2
			3	3	7	4	4	4	9	6
9	F	9	1	1	4	3	2	3	0	4
			2	3	12	2	4	0	0	1
			2	4	4	10	9	7	6	20
10	M	8	11	19	17	12	3	A	15	A
			3	18	10	8	9	A	19	A
			16	17	19	6	18	A	15	A

APPENDIX B

SCORING SHEET

APPENDIX B

SCORING SHEET

	Chinese	American	No	M
rocking				
flapping the arms				
regarding cupped hands				
staring out of the corners of eyes				
pressing the finger on the same spot of body				
walking on toes or sole				
self-spinning				
spinning objects				
rolling or crossing of eyes				
flipping hands with fingers extended in front of eyes				
flinging or banging own head				
crying without cause				
other				

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