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## **Musical Characteristics of Children**

By

Marilyn P. Zimmerman

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## CONTENTS

Perceptual Development .....	6
Conceptual Development	
Elements of Music .....	12
Implications from Piaget .....	15
Affective Development .....	21
Vocal and Manipulative Development	
Vocal Development .....	23
Motor Development .....	25
Playing Instruments .....	25
Individual Differences .....	27
Conclusions and Recommendations .....	28
Suggestions for Further Research .....	29
References .....	29

## FOREWORD

Research findings can be of much value in the teaching of music if they are considered cautiously and realistically. The results of any study are true for the particular circumstances in which the study was conducted, and they may or may not apply to different situations. Also, a host of factors influence the results of research involving human beings. Such diverse matters as the method of teaching; the length of time the experiment was conducted; the number, age, and abilities of the persons studied; the extent of the controls maintained; and even the knowledge by the subjects that they were involved in an experiment may significantly affect the outcome. For these reasons, a single study should not be considered final or conclusive. Research provides information, not proof in the usual sense of the word. Clearly, the more studies conducted in an area, the more information there is available, which, if reasonably consistent, encourages one to place greater confidence in the findings.

Research data must be interpreted, and all interpretation is subjective. For example, the ability of a group of twelve-year-olds to recognize intervals aurally may have been improved somewhat under certain conditions by a certain teaching method. Although the results achieved are not open to question (provided the research was carried out in a competent manner), the importance and meaning of the findings to the teaching of general music classes are a matter of judgment. Therefore, the interpretations of the research data presented in this publication are those of the author, and they do not necessarily represent the opinions of the Music Education Research Council of the Music Educators National Conference.

Research, even with all of its frailties, is the best way mankind has yet devised for unearthing objective truth. Intuition and personal opinion have their place in life, but they do not provide objective information. Because objective data can help one to make more intelligent judgments, research has a valuable place in music education. Thus, the publication of the series *From Research to the Music Classroom*.

We live in a research-oriented world. The knowledge explosion of recent years is the result of basic and applied research in many fields of human endeavor. Just as the results of scientific research have affected our modes and styles of living, so research in the behavioral sciences in general and music education in particular should influence music education practice.

A major concern of music educators is the elementary music curriculum, which provides for many American school children the only avenue for achieving any degree of musical literacy. A complete music curriculum intersperses experiences that challenge with those that reinforce what is already known. In order to plan such a curriculum, knowledge is needed about the musical characteristics of children and the developmental sequence of these characteristics. Research can provide insight into this development.

Why are research findings important for the music educator? Common sense can be extremely misleading. Knowledge acquired over the years through personal experience or intuitive judgment is also sometimes misleading. For in all areas of life, we tend to see what we want to see and to believe what we want to believe. Research findings can help us to systematize our experience and, equally important, research findings narrow the range within which our judgments can function.

From a negative point of view, research findings in education are sometimes based upon faulty or inconclusive experimentation. Generalizations may seem unwarranted and the implications for educational practice unsound.

The purpose of this monograph is to summarize selected research findings concerning the musical characteristics of children, and to show how they can be applied by the music teacher in his daily involvement with the teaching-learning process. Research findings will be summarized under the headings of perceptual, cognitive, affective, and vocal and manipulative development. Since these are the domains of knowledge usually considered when constructing taxonomies of educational objectives, it is hoped that this monograph also will have practical value in curriculum construction and revision. In addition, research pertaining to individual differences among children will be considered.

## **Perceptual Development**

### *Aural Ability and Discrimination*

Musical learning depends upon our perceptions of the musical sounds that we hear. In no other field of learning does the acuity of aural perception play such a paramount role.

The research of Jean Piaget, the Swiss developmental psychologist, has pointed to the tendency of young children to center or fixate their perceptions on dominating aspects of an otherwise diffuse and complex perceptual field. This tendency, known as centration, results in an inaccurate and incomplete survey of a total musical composition. Experiments designed to measure aural ability and discrimination early in the developmental sequence have practical implications for the teaching of elementary music. These experiments can tell us what musical dimensions or elements the child is capable of hearing and his interpretation of these dimensions.

A fundamental musical element is that of pitch, perhaps the most measured attribute of aural perception. Determination of an individual's ability to discriminate between and among pitches has captured the interest of researchers since Thorndike's famous dictum that "anything that exists, exists in some quantity and can be measured" (35).

Although experts agree that pitch discrimination is fundamental to melodic understanding, attempts to measure children's abilities in this area have not been too successful. The difficulties are inherent in the two methods that are generally used.

One method requires that the child express his discrimination in some simple manner, either verbal or manipulative. This is not as simple for the child as it sounds. A verbal response is the most efficient, but the terms up-down, high-low, large-small, when pertaining to musical sounds, have no immediate meaning for children. These are terms applied to other concepts that young children are learning, and they frequently serve only to confuse.

A startling example of confusion of the terms high and low as they relate to visual and aural perception has been found with three-year-olds. This age child tends to reverse the conventional meaning of high and low when applied to pitch because visually he thinks of these terms as meaning big or little in relation to himself. One researcher, using both a visual test and a pitch test, noted that three-year-olds selected the picture of a small airplane high in the sky to correspond to the low pitch because that airplane looked little or low to them (16).

In teaching the high-low concept, visual cues can be associated with pitches and melodic phrases as the terms high and low are presented. Visual representations of the terms long and short also should be provided with learning experiences designed to teach duration of sound. Self-instructional materials based on this idea would be excellent teaching aids.

The same-different comparison helps to overcome the difficulties of the high-low comparison and is a better one to use in teaching for discrimination. But it must be remembered that whether for research or for teaching purposes, in a test of immediate discrimination between the pitch of two tones, the order of judgment must be made very clear to the child. That is, he must know whether his answer is to concern the first or the second of two examples.

Some studies with kindergarten children have tried to surmount the problems in the totally verbal method by introducing an overt behavioral task, such as pushing one of two buttons to correspond to two different tones, or by using either the piano keyboard or song bells to portray pitch direction. These training methods helped the children to learn the initial task but did not provide transfer to new pitches (19) (38).

Another method requires the child to respond vocally to a given musical stimulus. The assumption underlying this type of response is that if a musical stimulus is accurately reproduced vocally, the element of pitch has been differentiated from the other elements. Several studies have supported this assumption by showing the relationship between singing ability and pitch discrimination (26) (33) (39).

What pitch intervals are within children's discriminative abilities? Are some intervals more difficult to hear than others? In general, the wider intervals are easier to perceive, with the percentage of correct discriminations increasing with both the size of the interval and the age of the children. In one study with 168 primary-age children, 30 percent of the children tested were unable to discriminate differences as small as a half-step, while only 4 percent were unable to discriminate differences as large as a sixth (11).

Age and ability to discriminate pitches have been found to be positively related with the greatest increase in ability occurring with younger children. An English authority believes that by age twelve, the critical period for pitch identification may have passed. In some reported instances, twice as much improvement in pitch discrimination has been found to occur between ages six and nine as between ages nine and nineteen (31).

Investigators also have explored the relationship between pitch discrimination and tonal memory. In all reported cases, there has been a definite relationship, with pitch discrimination being dependent upon tonal memory. The apprehension of melodic phrases also is dependent upon tonal memory and improves with age. Research has found that the greatest improvement in tonal memory scores occurs between ages eight and nine. After age nine, there is a fairly steady, though less spectacular, increase until age fourteen, at which time a leveling off process seems to occur (5) (31).

Children's abilities to perceive multiple sounds have been investigated by asking children to select an accompaniment from among three alternate accompaniments for a given melody, two of which were in different keys, or by distorting familiar melodies by altering the key of certain measures. Before age eight, the false accompaniments were readily accepted.

Two possible reasons for this finding exist. One is that the children's perceptions centered upon the dominating melodic line, making it difficult for them to consider simultaneously both



the melodic and harmonic aspects of the song. A second reason is simply that young children might not be completely conditioned to the harmonic cliches of the common practice period of Western music.

Two interesting experiments have been conducted with French children ages six to sixteen. The first was concerned with the perception of polyphonic lines in a fugue, and the second with the relationship between melodic perception and a sense of tonality. The results indicated that perceptual activity develops with age, as shown by an increasing ability to follow the polyphonic treatment of simple subjects. Perception of tonal melodies also increases with age, with a very marked development of a sense of tonality occurring at age eight (40).

The perceptual dominance or centration of one musical element over another also has been found with timbre and rhythm. When young children before age eight are intent upon maintaining a specific rhythm pattern, any available instrument will do. They do not consider the tone quality of the instrument in making a selection.

A child's rhythmic perception is basically dependent upon a tendency to focus on a dominating rhythmic unit or grouping. Traditionally, the elementary music program has approached rhythmic perception through rhythmic movement. The majority of research studies designed to study the rhythmic abilities of children have used rhythm in this behavioral sense. Two approaches have been used. In the first approach, free spontaneous expressions of rhythmic activity and actual rhythmic responses to music are observed. The second approach is more regulated, and involves measurement of the child's ability to recognize and imitate definite rhythm patterns under the influence of musical and verbal cues. Success for this kind of task is measured by the accuracy with which the pattern is reproduced over an established time period. The emphasis here is on conscious rhythmic perception as demonstrated by the child's ability to control his rhythmic activity so that it coincides with the perceived rhythmic pattern (38). These research findings will be further discussed under the topic of motor development.

There are differences of opinion as to whether melodic or rhythmic perception develop at the same time or if one precedes the other. Neither position has been absolutely substantiated by research findings. One writer found that young children responded with greater accuracy to the rhythmic content of a melodic-

rhythmic pattern than to the melodic content. When responses to melodic-rhythmic patterns were compared with those to rhythmic patterns alone, there was no significant difference in terms of accuracy of response to the rhythm patterns (26).

Perception of loudness has been studied experimentally through discrimination tasks of different intensities of sound. The results of these studies show that by age four, children can make accurate judgments concerning relative loudness, and that for first-grade children, this kind of discrimination is very easy indeed. One reason for the ease of these judgments may be the experience these children have with the application of the terms loud and soft to environmental sounds (30) (38). Unlike the terms high and low, which are not learned casually in everyday experiences with sound, the terms loud and soft are early additions to children's vocabularies.

In a significant five-year study, Petzold investigated the development of auditory perception in the areas of melodic perception, phrase learning, melodic reproduction with varying harmonies and timbres, and rhythmic ability. His major hypothesis that age is a major factor in the development of auditory perception was supported, although with limitations. For most tasks, a plateau in auditory perception was reached by the age of eight (third grade), and indications were that the most significant development occurs between ages six and seven (first and second grades) (26).

From this discussion of research findings pertaining to perception, it can be concluded that the perception of musical stimuli follows a developmental sequence. Loudness discrimination develops first, with pitch and rhythm discrimination developing somewhat concurrently. The latter discriminative abilities improve with the increasing attention span and the improvement of the memory function. Because perception of loudness develops without formal training, instruction can focus on methods of improving pitch and rhythm discrimination.

Perception of simultaneous sounds or harmony seems to be the last to develop, possibly because of the perceptual centration phenomenon. Studies with American, English, and French children were consistent in the finding that a rapid development in melodic perception occurs between ages six and eight, with age eight marking the beginning of a critical period for the development of harmonic perception.

The following suggestions for the elementary music teacher are based upon the above discussion of research findings into perceptual development:

1. Visual cues should be associated with pitches and melodic phrases when using the terms high and low. Visual representations of the terms long and short also should be provided in experiences concerned with the duration of sound.
2. Singing and playing melody instruments such as the song bells should be a part of every melodic experience since these activities give a concrete representation to pitches that are otherwise abstract.
3. Wide intervals should be used in early experiences in pitch discrimination, with the smaller intervals being introduced gradually and with older children.
4. The experiences recommended above should be used extensively with children before age nine, since most progress in pitch discrimination is made in early childhood.
5. Experiences to aid tonal memory, for example, immediate repetition of a phrase on the song bells or vocally, should be emphasized with eight- and nine-year-olds.
6. Simple chord progressions and keyboard and autoharp chording should be introduced at about age eight, or the third-grade level.
7. Musical elements should be studied both in isolation and in a total musical context in order to overcome the tendency to listen to only one aspect of the music.
8. Rhythmic experiences in music should move from free rhythmic responses to more teacher-directed responses.
9. Rhythmic patterns and melodic patterns can be isolated for early clarification. For example, the underlying rhythmic pattern of "America, the Beautiful" can be recognized and performed before the melodic patterns are learned.
10. Dynamics, especially loud-soft contrasts, need not be overly emphasized since perception of loudness develops early and without formal training.

## Conceptual Development

### *The Elements of Music*

Concept formation *per se* was a fashionable area for research during the 1960's. Yet there were almost as many definitions of the term as there were researchers. The term concept, as used here, will refer to a clear and complete thought about something that has been acquired through sensory perception.

Conceptual development in musical learning is dependent upon aural perception, since musical learning begins with the perception of sound. From our various perceptions of music, we develop the musical concepts that permit us to make comparisons and discriminations, to organize sounds, to generalize, and finally, to apply the emerging concepts to new musical situations.

Research into children's development of a conceptual framework based upon concepts of the elements of music has been initiated by a few researchers in recent years. However, there has not been perfect agreement as to what constitutes the elements of music. The physical dimensions of sound—pitch, duration, loudness, timbre, and simultaneity—have been identified by some researchers, while others considered the more musical manifestations of these dimensions—melody, rhythm, harmony, form, and dynamics.

In the preceding section, several discrimination studies in aural perception were discussed. Each of these studies also could be considered under the heading of conceptual development, since it is the percept that germinates the concept.

A well-designed battery of musical concept measures for use with elementary school children was developed by Andrews and Deihl in a USOE-funded research project (1). Conceptual understanding of the dimensions of pitch, duration, and loudness was studied by means of verbal, listening, manipulative, and overt measures.

The verbal measure involved a discrimination and comparison of natural or music-related sounds recalled from prior experience with these sounds and required a minimum ability of reading comprehension. Ability to identify changes in the dimensions of pitch, duration, and loudness in orchestral excerpts was ascertained by the listening measure. The manipulative measure, developed for use with individual children, provided a way of demonstrating understanding of the dimensions of pitch, dura-

tion, and loudness through manipulation of simple classroom instruments, such as resonator bells, triangles, finger cymbals, and the like. The overt measure determined individual movement responses to the dimensions of pitch, duration, and loudness within an orchestral context.

These measures were administered to randomly selected fourth-grade classes in Pennsylvania. Results indicated that the listening and verbal measures have high potential for use in the identification of musical concepts. The manipulative and overt measures, although requiring more time and trained personnel for their administration, seem to have possibilities for use with preschool-age children and with those children who have learning disabilities. As measured by this battery, attainment of the concept of loudness was most highly developed, followed by duration, and then pitch.

A very real difficulty that researchers in conceptual development encounter, and to which an allusion has already been made, is the differentiation between the existence of the concept as such and the possession of a vocabulary with which to express the concept. It is similar to the difficulty that teachers have in distinguishing between teaching a concept and teaching the meaning of a term or expression that designates the concept. The Andrews and Deihl study attempted to overcome this difficulty by using both verbal and behavioral measures. On the basis of their multimodal technique, they concluded that a number of children possessed the concept but not the vocabulary. Most often confused were the three terms high, loud, and fast, and the three terms low, soft, and slow.

Ideas taken from the verbal and listening measures could be used effectively in everyday classroom teaching. For example, in the verbal measure the child was asked to fill in the square with the best answer: when music gets softer, we hear

- ☐ higher sound
- ☐ lower sound
- ☐ faster sound
- ☐ less sound
- ☐ more sound

And in the listening measure, he was asked to fill in the square that tells how the music just heard changes:

- ☐ louder
- ☐ higher
- ☐ lower
- ☐ faster
- ☐ slower

Results of an investigation that used the verbal and listening measures with third-, fifth-, and seventh-grade children showed that each succeeding grade level scored significantly higher than the preceding one on the dimensions of pitch and duration. However, the seventh graders did not score significantly higher than the fifth graders on loudness. Here is another indication that the concept of loudness develops earlier than those of duration and pitch. With the third and fifth graders, confusion in the application of terminology was still quite evident. One fifth-grade response quoted here exemplifies the confusion of the terms down, low, and soft in a description of a music example that also includes a visual representation of the term high. "The second one [musical example] sounds like birds going away, and the music is going down and down. . . .The birds are sitting on a tree and singing, and at the second part it sounded like the birds are flying; the music gets lower and lower because they're too high up in the air, so far away" (20). Here the terms down, low, and far away are all used instead of the term soft.

Research into the listening skills of eight- and nine-year-olds found that 81 percent of the children tested were presumed able to conceptualize rhythmic patterns to the extent that their rhythmic bodily movements gave an accurate representation of the patterns. These same children were unable to relate the aural sound of a tonal pattern to its notation. This finding might indicate that development of rhythmic concepts precedes that of melodic concepts. It must be remembered that the same standard was not applied in each assessment, since one required a physical response and the other a reading response. Responses to the form test in this battery showed that the children had not developed the ability to hear design in music to a very high degree (7).

The use of notation as an aid to melodic understanding has been experimentally tested in grades four through seven. Only a narrow range of achievement in the development of melodic concepts was detected throughout these four grade levels. With

the sample tested, it was not until grade seven that the notation proved to be of significant value in melodic concept formation (25). Other researchers have found in working with five-, seven-, nine-, and thirteen-year-olds that only the latter two age groups were aided by notation in making cognitive judgments about music (41).

In a study to analyze the cognitive processes involved in musical ability, Mainwaring assumed that music is a matter of relationships. His tests of pitch and rhythmic pattern perception and auditory recall were based on this assumption. With subjects nine through eleven years of age, Mainwaring found that perception of pitch differences and perception of rhythmic patterns were not significantly related. He did conclude, however, that age is an important factor in the development of cognitive abilities as measured by his tests (21).

A summary of findings on conceptual development substantiates the dependency relationship between perception and conception. Again age proved to be an important factor in the development of musical concepts, with that of loudness developing first, followed by duration and pitch. Overt behavioral responses to music appear to be a necessary adjunct to concept formation, while notation does not seem to be an important factor in music concept formation, at least in the early grades. The need to teach vocabulary with the concept was reaffirmed.

**Suggestions for the elementary music teacher based upon these findings are as follows:**

1. Vocabulary tests dealing with concepts about music should be used in conjunction with musical examples of the concepts.
2. Conventional notation should not be stressed at the primary level until the children have had many opportunities to notate sound according to their own suggestions and ideas.
3. Children should be guided and encouraged in their spontaneous music-making before the cognitive aspects of musical learning are emphasized. These attempts can also be notated in any system the children invent.

#### *Implications from the Work of Piaget*

The research of Jean Piaget presents a graphic description of how children build a conceptual framework that enables them to

interpret their surroundings. Through the intensive study of a few cases rather than through the statistical investigation of a few traits in a large population, Piaget developed an elegant and highly sophisticated theory of the growth and development of human intelligence. Piaget views this development as moving in stages from activity without thought through thoughtful activity to conceptualization.

In Piaget's theory, intellectual processes have their roots in sensorimotor behavior. During the first eighteen months of a child's life, his activities are related to his perceptions of the immediate surroundings. These perceptually-dominated activities provide the infant with the necessary raw materials from which to form concepts about his world.

Piaget designates the second period in the intellectual development of the child as the preoperational representation stage. Throughout this period, which follows the sensorimotor and lasts until about age seven, the child's thinking is dominated by his perceptions, which can be exceedingly seductive. Things are what they seem to be in immediate egocentric perception, and so the child reasons from perception to perception or from one particular event to another.

The concrete operational stage covers the middle childhood years (ages seven or eight through eleven or twelve). At this stage, the child's thought is no longer tied to his perceptual activities, for he is able to decenter his thinking from his perceptions. A child at the concrete operational level is able to grasp relationships among more than two things at a time and can carry out trial-and-error procedures mentally, provided the problem lies within the scope of immediate reality. The pre- and early-adolescent years mark the emergence of formal operational thought. At this point, the individual can reason about theoretical possibilities through hypothesizing and deductive and inductive thinking.

Piaget's idea of the reversible operation, a definitive characteristic of mature thought, is the keystone of his theory. According to Piaget, reversibility is essential to any form of mental experimentation and to logical inference. The reversible operation is at the heart of the principle of conservation. Conservation refers to the invariance of a particular dimension of empirical objects even though changes occur in its other dimensions. Piaget views concept development in terms of conservation, which is nothing more than the stabilizing of a particular concept in the



child's thinking. When a child is able to return to the initial state of a given material by an inverse operation, he exhibits reversibility of thought and so affirms the conservation of that material.

An application of Piagetian theory to the development of musical concepts raises a fundamental question as to the role of

the intellectual process in musical learning. Piaget's research deals almost exclusively with quasimathematical structures and quasimathematical invariances. In his more recent work, Piaget has considered the question of qualitative invariants, which do not require a quantitative composition of parts as does a mathematical invariance. This phenomenon Piaget calls qualitative identity. In a qualitative identity, the permanent quality is simply dissociated from the variable qualities. These qualities can be color, shape, or pitch, and are identified through perception. For example, when an individual identifies the rectangular shape of objects as the invariant or unchanged quality even though their size and color vary, he has made a qualitative identity. Similarly, when he can abstract identical pitch patterns from varying rhythms, he also has made a qualitative identification. This kind of identification is a step in musical concept formation (41).

These notions from Piagetian theory have formed the theoretical basis for several recent research projects in music education. An early study by Pflederer (Zimmerman) to test conservation of meter, tone, and rhythm showed that the five-year-old children gave answers indicative of preoperational thought. Responses of eight-year-old children, for the most part, reflected an intermediate stage of conservation, although some gave evidence of operational thinking. In several instances, the children arrived at correct solutions by clapping, swinging, tapping, counting, or singing to themselves. These overt activities were a manifestation of sensorimotor intelligence where action guides thought (28).

A replication of the preceding study also found a general improvement in performance with increasing age. This study, however, did not support the contention that conservation was being studied, since it seemed impossible to separate the twin processes of perception and conception (32).

One fascinating research project attempted to apply the properties of mathematical groupings, which Piaget used to describe cognitive structures at the concrete operational level, to the learning of the musical dimensions of time, pitch, loudness, timbre, and simultaneity through a planned listening program. An ingenious system of pegs on a pegboard was constructed to represent the perceived musical dimensions, both singly and in combination. Difficulties in the procedural and administrative aspects of the experiment led to inconclusive results, for it was not proved that children at the elementary level can learn

concepts of the musical dimensions and their relative values through listening exercises that focus attention on those dimensions (23). Nonetheless, the visual representation on a pegboard of the musical dimensions provides a vivid introduction to the more conventional notation system. Used with preschool, kindergarten, and first-grade children, this notation could be very effective in mediating sound into symbol and in portraying the creative efforts of the children.

A series of experiments by Pflederer and Sechrest was designed to study the conservation process in musical learning. Their working definition of musical intelligence was that it is found in the conceptual framework of rhythmic, melodic, harmonic, and formal relationships, which develops through a progressive organization of musical perceptions.

Five experiments were designed and administered to 679 elementary and junior high school students. For each experiment, original musical tasks were devised. The children were tested for their ability to identify an unchanged aspect of the musical stimulus. Four of the experiments were preceded by a brief period of instruction; one experiment was preceded by six instructional periods spread over two weeks. The basic procedure in each of the experiments was to take a fairly simple musical stimulus, to alter it in certain systematic ways, and to note whether the subject still could retain and report accurately his recognition of elements of the original stimulus. For example, in a simple tonal pattern, the tempo might be altered, and it would be noted whether or not the child believed that the tonal pattern was the same one he had heard initially.

Findings of the experiments seemed to be in agreement with those of other researchers. Across the first four experiments, a progressive improvement on the tasks from the younger to the older age groups was indicated. In the fifth experiment, a plateau in the music conservation skills measured by the tasks was reached by the fourth grade. Instruction helped the children to consider all aspects of the music. Children across age groups lacked the musical vocabulary with which to describe and discuss the music. Conservation of meter and rhythm, that is, maintaining the identity of a specific meter or rhythm pattern, was more difficult than conservation of tonal pattern. Change of instrument, tempo, and the addition of harmony did not interfere as much with the child's identification of the invariant musical

element as did change of mode, inversion, and rhythm pattern. It was easier for the subjects to identify an invariant rhythm pattern when the pattern was presented in minor mode than when it was presented atonally or in major mode (41).

In this short summary of Piagetian theory and the music education research based upon it, far-reaching implications can be found for elementary music education. First, the developmental stages provide a framework within which to plan musical experiences that will build upon the child's conceptual capabilities, and so provide that dynamic match between curriculum and child that is essential before any learning can take place. Second, insight into perceptual development shows the importance of experiences from preschool through the primary grades that are designed to shift the perceptual focus from one aspect of a musical stimulus to another for clarification of the total stimulus. Third, the need for active experimentation with raw materials of music to reinforce and confirm developing concepts is underscored. Fourth, the identification or conservation of a musical element or thematic material is an important factor in the hearing and understanding of musical relationships, for it enables a child to identify previously heard material when this material occurs in changing contexts.

**Specific suggestions for the elementary music teacher based upon these research findings are as follows:**

1. Active participation on the part of the children in the musical experience by performing and moving to the music should be sought continually.
2. Experimental methods of representing and notating sound should be encouraged. For example, sticks of various lengths can be used to portray duration of sound, different colored discs can be used for various timbres, and these can be arranged in vertical and horizontal sequences to indicate melodic and harmonic movement.
3. Variations of familiar songs should be used to bring melodic, rhythmic, harmonic, and expressive concepts into perceptual focus. The students should be given ample opportunities to improvise their own variations.
4. Inversion and modal changes should be taught in the context of familiar songs. Melodic inversion can be introduced by the intermediate level.
5. Rhythmic patterns can be taught by using them in changing

melodic patterns and vice versa. For example, simple patterns can be played in any mode, in a disjunct or conjunct melodic movement, and atonally.

### **Affective Development**

Affective development refers to the domain that includes appreciations, attitudes, interests, and, unique to musical learning, musical taste. Most of the research in this area has concerned itself with the development of musical taste during the adolescent years. These studies range from samplings of opinion to more detailed and sophisticated methodology.

Research has shown that affective development does not occur in a vacuum but is connected with cognitive and perceptual development. Increased knowledge and understanding lead to increased appreciation and interest. One of the central purposes of music education is to teach for intelligent discrimination. As the young person becomes more discerning and discriminating, it is only natural for him to find his values shifting and his tastes changing. It is the province of education to provide exposure to a variety of musical styles and to provide guidance in shaping taste (2) (4).

Research involving the affective development of young children has been primarily concerned with collecting verbal responses to music. An examination of several hundred of these responses pointed to a tendency for young children to read a vague meaning into purely auditory stimuli. This is not at all unusual since childhood is the great period of synesthesia; hence, sounds have certain images. And so the child translates a purely auditory stimulus into a different modality. Characteristic examples of this phenomenon in the research literature are the following responses of nine-year-olds to short musical examples: "sort of hazy," "half-a-percent lower," "sounded like a funeral was on" (29).

Research reported in England sought to obtain introspective comments to the question, "Do you like that?" The youngest commented simply, "nice," "sweet," "good." Those at age nine commented in reference to unpleasant effects upon the self, while children aged twelve to thirteen described pleasant as well as unpleasant effects (37).

Valentine also studied the development of a feeling for consonance in order to determine whether or not a developmental sequence could be ascertained. His subjects included 146 adults, 195 children ages six to fourteen from two elementary schools, and 76 girls from a privileged preparatory school. All musical intervals were played before a judgment on each was given. The children in the elementary schools showed no discernible preference for consonance over dissonance before age nine, when considerable differences were noted. Perhaps they had not yet been conditioned to music of the common practice period. The twelve- and thirteen-year-olds gave an order of preference remarkably like that of adults. The girls from the preparatory school showed an aversion to dissonance at age seven, and by age nine their preferences were similar to those of the adults. Thus, at age nine they reached a stage of development not attained by the elementary school children until ages twelve to thirteen (37).

This research leaves one with an uneasy feeling about an unanswered question. Should music education condition children to Western music of the common practice period? Current opinion seems to point toward the importance of an environment that provides rich musical stimulation conducive to the understanding of all musics.

A summary of the findings on affective development indicates that the so-called appreciation tests largely measure how well the more primitive perceptual and memory functions have operated. Musical taste, a manifestation of musical attitudes, develops through conditioning and education as do other social phenomena. Responses of elementary school children to musical stimuli exhibit the peculiar impressionability of childhood, marked by a propensity to fuse sense impressions into symbols relating to other modalities. Affective development, like perceptual and cognitive, also follows a developmental sequence, but environment and education can speed the process.

**Suggestions to aid the music teacher in assisting affective development are as follows:**

1. Music of all styles, periods, ethnic groups, and media should be used. Contemporary and avant-garde music can be used beginning in the kindergarten. Most children can react and respond to far more complex sound environments than their teachers provide. Ears must learn to select and

discriminate within today's sound world, not only yesterday's.

2. The children should be encouraged to tell *why* the music sounds the way it does to them; for example, *why* it sounds "like a funeral is on," or *why* it sounds "sweet." Emphasis should be on the musical element rather than on the reaction to the music.

### Vocal and Manipulative Development

#### *Vocal Development*

Vocal development is primarily dependent upon maturation. Maturation can be defined as the interaction of developmental factors within the organism. These factors include inherited capacities, environmental circumstances, and the learning process itself. Research shows little evidence that training in specific skills has much effect until the child reaches a level of maturity at which he can assimilate such training.

In their classic work on child development, Gesell and Ilg concluded from a series of twin studies that learning is greatly conditioned by maturation (14). Although training cannot transcend maturity, maturity does tend to modify the results of training. Hence, instruction often may be quite uneconomical before a certain level of maturation is reached. These statements do not negate the importance of critical periods in the development of specific skill and behavior patterns. When a child reaches a stage of maturation where he can best profit from a certain kind of learning, the withholding of this learning experience may cause the behavior pattern in question to remain undeveloped.

One research team working with experimental and control groups, ages three to five, found that the ability to reproduce a melody develops gradually without stimulation, but that acceleration of this ability is possible (36). Results of tests of vocal production administered to 407 children, ages two to ten, showed that children achieve the ability to sing a wide range of tones at a relatively early age. Expansion of the vocal range from d' to a' at age two, to f to g'' at age ten was noted (18). Other researchers have indicated similar expansion.

Smith concluded from the early phase of a longitudinal study

that stages occur in the vocal development of three- and four-year-olds. His research suggests that group vocal training is appropriate for young children, and results in a significant improvement in tuneful singing ability. As a result of his investigations, Smith also suggested that the first songs learned by inexperienced singers should range from c' to f' or from d' to g'. These should be followed by songs in the range c' to a', with the final range to be emphasized including the pitches from c' to e'' (34).

Research also lends credence to the developmental nature of accurate reproduction of intervals, regardless of training (10) (38). A follow-up study of kindergarten, first-, and second-graders who had participated as three- and four-year-olds in Smith's research was undertaken by Boardman. Her research was designed to investigate the relationship between maturation and the development of vocal accuracy of young children, and to determine the effect of preschool training on that development. Her findings indicated that no significant difference in vocal accuracy existed between children who had experienced vocal skill-centered training at the preschool level and those who had not. She concluded that pretraining may accelerate the normal development of vocal accuracy, but will not noticeably affect it in any other way. The gradual improvement with age for both experimental and comparison groups provides additional evidence that both cumulative musical experiences and maturation are important factors in the development of vocal accuracy (6). For any given age, individual differences can and do occur.

Research findings concerning the relationship of interval size and direction to vocal accuracy have been somewhat contradictory. There is agreement, however, that the vocal maintenance of tonality is a more primitive ability than the accurate reproduction of specific intervals. The ability to reproduce a given tonal pattern is an evolutionary process that progresses from a vague apprehension of the total pattern to a differentiation of the specific intervals within the pattern as evidenced by accurate vocal reproduction (8). In this process, perception is of primary importance. Indeed, the development of vocal control follows a developmental sequence similar to that of perception. This development advances from an indefinite perception of a diffuse auditory stimulus to a definite perception of its separate parts, which are then reintegrated into the total structure.



One recent funded research project concluded that for elementary school children, learning to sing is a matter of learning how it feels to sing. Two basic principles of learning to sing were established by this project: (a) the child must listen to his own voice in speaking and in singing so that he can control high and low pitch levels; (b) the child must be able to sing in unison either with another voice or with an instrument so that he learns the sound and feeling of his own voice as it matches pitches (15).

#### *Motor Development and Moving to Music*

The section on perceptual development discussed two approaches used in determining rhythmic perception. In each of these approaches motor development is an important factor, since a movement response presupposes some degree of motor control. Contrasting results concerning motor development appear in the research literature (3) (38). However, a developmental trend according to age has been noted in children's ability to maintain a steady beat by tapping (38). After age nine, this ability does not seem to change substantially (26). This finding would seem to indicate that rhythmical pattern responses are less influenced by training than is pitch discrimination.

Tempo also has been shown to be a contributing factor to accurate motor responses, with children better able to keep time with fast tempi than with slow tempi. Nursery school children in particular are more successful in synchronizing their movements with fast tempi than with slow ones. Kindergarten and primary school children adapt to both, although maintaining a steady beat at slower tempi is still more difficult than at faster tempi (9) (26).

Dance, as expressive movement, is engaged in continuously by very young children. The root of this dance seems to be movement for movement's sake, as witnessed in the continuous dancing of two-year-olds. Three- and four-year-olds can gallop, jump, and run in time to music. A kindergarten child already possesses a command of the basic locomotor movements. These movements can be used successfully by elementary school children to create organized dance forms (24).

#### *Playing Instruments*

Music for young children is primarily the discovery of sound, and the imaginative use of instruments aids this discovery. Some

researchers view the imaginative playing of instruments by young children as an extension of sounds made by their own bodies (22) (24).

Violin and piano classes for nursery school children stress the development of accurate performing gestures and the playing of simple nursery rhyme tunes by ear. The Suzuki method of violin instruction incorporates this approach with carefully programed learning sequences accompanied by frequent reinforcement.

The critical age for serious study of piano seems to occur at about seven years. The kinesthetic sense, which is extremely important, is adequately developed at this time (31). Playing by ear and improvising should occur prior to the serious study of any instrument.

Exploratory string instruments have been used experimentally with fourth-grade children. An interesting finding from one study was that a positive relationship existed between scores of a manipulation test to determine motor dexterity of the arm, wrist, and finger, and the manipulative ability of the children on the stringed instrument (13). Refinement of this type of manipulation test could help in the identification of children who possess unusual dexterity.

**Suggestions based on the research findings pertaining to vocal and manipulative development that will aid the elementary music teacher in promoting development in these areas are as follows:**

1. Songs that lie within the range of a sixth from c' to a' should be used in early singing experiences. These can be followed by songs that encompass a tenth from c' to e''.
2. Songs that have sections in both the lower and upper ranges should be used to develop both parts of the range and to help the children feel comfortable in using their full vocal ranges.
3. In the early stages of vocal study, emphasis should be on maintaining the tonal center rather than on the exact reproduction of each specific interval.
4. Children should be reminded to listen to their own voices in relation to other voices and accompaniments.
5. Music with fast tempi should be used first in rhythmic movement experiences. Slower tempi can be gradually inserted as the children become more adept in synchronizing their movements with the music.

6. Creative movement should be encouraged and used as a basis for organized dance forms.
7. Children should be encouraged to organize environmental sounds into patterns of sound. Sounds produced by clapping, patting, tapping, and snapping also should be used.
8. Early instrumental study should be based upon aural experiences, and should use songs that the children already can sing by rote.
9. Keyboard experiences should be included in the elementary music curriculum by the third grade.

### **Individual Differences**

There is some evidence that genetic factors contribute to musical ability, but these factors do not emerge as clearly as in the case of general intelligence. Research has shown that the home environment also can be a contributing factor (31). Musical aptitude reveals itself early. In one-half of 441 cases reported in the literature, musical aptitude manifested itself between ages two and four, while 96.8 percent of the boys and 98.7 percent of the girls revealed musical ability before the age of fifteen. One researcher has noted two distinct critical periods for musical development: the sixth year, when greater application and concentration is possible, and the period from nine to twelve years, when both technical facility and mental concentration can be developed (17).

Research conducted with blind students has shown that in pitch discrimination, intensity, and tonal movement, their acuity did not differ greatly from that of average sighted individuals. Scores for tonal memory, timbre, and rhythm discrimination were superior to the average sighted person. Perhaps the necessity for the blind to rely on memory was a contributing factor to their high scores for tonal memory (31).

Whether or not an individual should be encouraged to study music with the goal of becoming a professional musician is largely dependent upon his musical abilities and motivation. Music aptitude, music achievement, and interest inventories are available for use in determining the musically gifted. Nonetheless, a sequential and rich program of music education in the public

schools, which allows for the unfolding of each individual child's musical capacities, will enrich and lend meaning to the aesthetic component of his life.

### **Conclusions and Recommendations**

A review of research findings pertaining to the musical characteristics of children points to a sequential progression and development of these characteristics. There is some indication that, especially in the areas of vocal development and rhythm discrimination, this progression is more dependent upon maturational factors than upon a particular type of instructional or environmental experience. Yet any explanation of emerging musical characteristics and behavior certainly cannot ignore the nature of a child's musical experiences. Two components are absolutely essential: a child with potential to respond, and the opportunity to hear and participate in music. A consideration of these findings can aid music educators in planning musical experiences that will make optimum use of the child's capacities at each age level, and so facilitate that dynamic match between child and curriculum.

Findings on perceptual development indicate that perception of loudness develops first, followed by pitch and rhythm, with perception of harmony developing last. The ages of six to eight are marked by a rapid advance in melodic perception.

The music program in the first three grades, therefore, should emphasize experiences that develop rhythmic and melodic perception. Experiences that emphasize harmony need not be stressed until the intermediate grades, although multiple sounds can, of course, be included from the very beginning. Experiences to aid tonal memory also should be emphasized in the intermediate grades. Since perception of loudness occurs early in the developmental sequence, it need not be stressed to any degree.

Conceptual development follows a sequence similar to that of perception. As a perceptual or conceptual learning experience unfolds, the proper musical vocabulary should be taught and verbalization of the concept by the child should be encouraged.

Affective development likewise follows a growth pattern that is interwoven with perceptual and cognitive development. Experience with all styles and media of music through multisensory

exposure can advance the process and should be included in the curriculum.

The vocal development of children will proceed at a rate commensurate with their maturational and perceptual development. Both vocal and manipulative development are manifested through performance. These performance skills are essential for behavioral responses that reflect perceptual and conceptual understanding. Reciprocally, a child's perceptual and conceptual understanding will guide his developing skills.

### **Suggestions for Further Research**

In order to present a more complete depiction of musical characteristics of children, additional research is needed. Promising areas for further research activity are as follows:

1. Determination of the relationships that may exist between melody and rhythm in terms of their effect upon the auditory perception of musical sounds.
2. Determination of the element of timing as a major variable in the training of young children's voices.
3. Determination of the feasibility of using motor dexterity tests in connection with beginning instrumental study.
4. Determination of teaching strategies to aid conceptual development and the use of proper labels in this development.
5. Determination of the efficacious use of Piagetian models in curriculum construction.
6. Determination of the effects of both sensory deprivation and multisensory stimulation on perception, ability, interest, and motivation.

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