

MUSIC

In the 1990s, a survey of music teachers published in *The Psychologist* reported that over 75% believed that a special talent was needed in order to learn music. However, in contrast to this “folk psychology” view, the past two decades of neuroscientific research have generated findings that starkly contradict such a belief that musical ability is confined to a small section of the population. For example, when modern imaging technologies have been used to investigate how the brains of newborn infants respond to music, it is found that neonates have a sense of timing and beats (essential for the recognition of sound sequences in speech and music) and can respond to whether a melody is “in-tune” (consonant) or “out of tune” (dissonant). Newborns are also able to distinguish musical intervals (the differences between two pitches) and are sensitive to the kinds of harmonic structures (the combination of pitches) found in Western music.

This body of neuroscientific and related psychological evidence demonstrates that each human is born with the prerequisites needed to learn, make, and create music and that musicality is an inherent component of human design in a way similar to, for example, the trait of bipedalism. Indeed, the fetus is capable of hearing throughout the final trimester inside the womb and so enters the world at birth with already significant experience of the maternal sound world.

This naturally raises questions as to why, in the light of the theory of evolution, humans have developed this general biological ability to make music, which, unlike bipedalism, does not seem to produce such an obvious benefit with regard to the survival

of the human species. The question of the relative usefulness or uselessness of music is pertinent in our determination of whether it has a core place in formal education, or whether it should be a largely extracurricular and perhaps solely pleasure-based activity.

In answering this question, the current evidence suggests that musical behaviors are widely represented in the brain, that learning musical skills physically restructures multiple areas of the brain by developing synaptic connections, and that engaging systematically in active music making over time appears to enable this more than any other human activity. Moreover, studies of other aspects of children's development suggest that there are potential increases in IQ measures, at least in the short term, with longer benefits evidenced in working memory, reading skills, spelling, foreign language learning, spatial skills, self-regulation, empathy, confidence, and sense of being socially included. This entry seeks to provide an overview of the nature and significance of children's early musical development and how this can be nurtured by appropriate educational strategies in order to provide benefits that are musical, cognitive, emotional and social.

Benefits of Early Music Education

The most recent research on the benefits of learning music reveals that they can be lifelong and also places particular importance upon the early years. During early childhood the brain undergoes enormous synaptic development that is unmatched in later life and the brain has a high degree of plasticity, i.e., malleability to environmental influences. Many studies report that whether the child starts learning music before or after age seven makes a difference with regards to several cognitive outcomes. For

example, the corpus callosum, the nerve tract that connects the left and right hemispheres of the cerebral cortex, is found to be thicker in musicians who have started learning at age seven or before; the ability to recognize melodic tones and produce accurate rhythm is stronger; and the ability to label heard pitches accurately on a musical scale (termed *absolute pitch*) is more likely if you begin studying an instrument that needs tuning (such as a violin) before the age of seven. A recent overview of over 75 studies reported that sustained instrumental practice by children produces neurological changes associated with specific sound-related cognitive tasks.

What makes engaging in rich musical experiences a particularly fascinating opportunity in the field of early childhood education is that there appears to be no lower age limit at which to begin. For example, the Italian music educator Johannella Tafuri conducted a detailed longitudinal study of weekly music activities with mothers and their children that spanned six years and that began pre-birth when the mothers first attended the local conservatoire to begin a specially designed music program. She reported that participant children became much more advanced musically than expected.

In another early intervention study, six-month old babies were randomly assigned to groups that experienced music education inspired by Suzuki, had free play while listening to Mozart, or had no special music input. When all the babies' development was measured five months later, it was found those in the Suzuki-based group were significantly more advanced in their musical behaviors and also in their emotional, social, and communicational skills compared to the others, despite all babies initially being assessed at the same levels of development. It was significant that just hearing classical music did not produce any distinctive measurable benefits. The popular myth that

listening to Mozart (or classical music in general) improves the intelligence of babies has been refuted in many studies, including by the researchers of the original, misinterpreted “Mozart effect” study.

However, although there is no general effect, music listening is reported to bring specific benefits, such as improving the resting condition of pre-term infants, mitigating cognitive dissonance (discomfort caused by holding conflicting cognitions simultaneously), ameliorating pain in hospitalized children, and supporting visual acuity and cardiovascular function. Although listening to music *per se* does not make children more intelligent, active and sustained participation in music making and in the learning of musical skills can produce numerous cognitive, emotional, and social benefits.

It is perhaps noteworthy that, before the invention of recording technology, the pleasure of listening to music—which is reported to stimulate the same evolutionarily critical brain regions as the cravings of sex and food—was inextricably tied to the act of performing, something that is still witnessed in tribal cultures around the world. Our Western culture is historically and prehistorically unusual in its conceptual separation of the act of performing from the act of listening.

Musical Interactions Between Parents and Young Children

Several ways in which active music participation can be experienced are already part of the “repertoire” of instinctual interaction between the infant and their main caregivers, although parents rarely recognize these as a form of musical education. In diverse cultures around the world, parents have been found to speak to babies in particular ways that have distinctive musical features, such as exaggerated melodic contour, a prevalence

of musical intervals that are common to the world's genres of music, and wide variations in vocal loudness. This "infant-directed speech" (also known as "motherese" and "parentese") accentuates the prosodic features of language (pitch and rhythm). Similarly, "infant-directed singing" tends to be higher in pitch, slower, and with exaggerated emotional features compared to normal singing. These features of parental voicing appear to be tuned to the ways that the brains of newborn infants are wired to comprehend.

Moreover, computer-based analyses on the vocalizations of babies with their mothers indicate that the mother and the baby engage in a form of musical conversation: taking turns with each other, and responding to the musical cues in each other's voices. In recognition of their powerful role in shaping such human-infant communication, mothers have also been described as the first "mentors" of their children's singing.

Furthermore, parents commonly play musical games with their infants, such as rocking or bouncing them rhythmically. Among the new findings on the effects of music on babies is the finding that bouncing babies to a regular beat (as opposed to doing random, irregular bounces) is likely to make the babies spontaneously more cooperative as a result and to an unprecedented degree. It has also been reported that ten-month old babies spontaneously try to adjust their own movements (such as "jiggling along") to match the beat of a rhythmic song that they are hearing. Indeed, in humans of all ages, it is found that simply hearing rhythmic music activates the motor regions of the brain; thus, instead of rhythmic engagement with music being thought of as something that humans need to "study," it is perhaps better to consider this as a naturally developing response to sufficient and appropriate musical stimuli that can be nurtured.

Biological and Instinctual Bases of Music

Music is one of the earliest known forms of human cultural expression. According to evolutionary psychologist Robin Dunbar from the University of Oxford, there is evidence that humans made music 500,000 years ago, presumably by means of vocal and percussive instrumentation. In contrast, speech is reported to have appeared only 200,000 years ago, and evidence is accumulating that instead of music being something on top of language (as suggested by one eminent psychologist), humans developed speech from their musical behaviors. In a similar way, a baby's linguistic learning evolves from musical components of speech to verbal comprehension, and it is recognized that the neural networks for music overlap those of language. As mentioned earlier, musical activity in early childhood also supports parent-child interactions, as well as prosocial group relations in general.

Due to the biological and instinctual bases of music making, it is therefore important for any form of early music education to build on these pre-existing and naturally emerging abilities. Music education need not be thought of as simply musical instrument instruction, nor solely group singing, although both can be significant in the musical lives of children. Ideally, before children embark on formal music learning, such as in the sense of structured study, they should be encouraged to continue to be active music makers, building on their propensity to create and re-create musical artifacts.

Early Opportunities for Musical Activity

Children around the ages of two and three years are able to learn simple songs from their

maternal culture, but they will also create their own versions, borrowing and adapting pre-existing elements, improvising lyrics and musical features and composing in real-time as they explore, develop, repeat and master elements of their experienced sound world. They are also programmed to “notate” such experiences if given the opportunity, such as by making marks that symbolize their sonic experiences. Musical notation is usually driven initially by young children’s sensorimotor experience, the physical “feelings” associated with making sound, such as banging a drum as an “action equivalent” of the motor behavior.

Invented notations typically will first indicate one perceived musical dimension (such as pitch or loudness) rather than several, which comes later. Such activities allow the young child to expand his or her musical understanding and build repertoire and musical vocabulary, which can form a positive foundation for subsequent musical learning that is more structured and shaped by systematic adult intervention.

As the baby turns into a toddler and a toddler into a preschooler, further opportunities arise for the development of musical skills. There are a variety of well-established examples of music education methods for children that are both structured but age-appropriate, developed in various countries such as the Kodaly method in Hungary, the aforementioned Suzuki method in Japan, the Orff approach in Germany, and Musiikkileikkikoulu (“music playschool”) in Finland. Although these methods are all different in their cultural origins, they share a child-centered approach where musical skills are built upon aurally, experimentally, and playfully. Such music education is thus motivating and enjoyable for a wide range of children under school age.

Also, related to the earlier comments on invented notation, to focus music

instruction on learning to play from standard notation is generally considered unsuitable for most young children, for the reason that it is teaching music “backwards”; just like children first learn the language aurally and verbally before proceeding to read written text, musical development should follow a similar pathway of sound before symbol.

Overall, it seems clear that early years music educators should recognize the power of music, both as a central feature of a child’s basic human design, but also as a means of nurturing other aspects of the young child’s development. Music is important in its own right, but it will also contribute to physical, cognitive, social, and emotional development where children are provided with rich opportunities for sustained and active musical engagement.

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See also Art; Arts Integration; Neuroscience and Early Education

FURTHER READINGS

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