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Making music in a group: synchronization and shared experience

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To consider the full impact of musical learning on the brain, it is important to study the nature of everyday, non-expert forms of musical behavior alongside expert instrumental training. Such informal forms of music making tend to include social interaction, synchronization, body movements, and positive shared experiences. Here, I propose that when designing music intervention programs for scientific purposes, such features may have advantages over instrumental training, depending on the specific research aims, contexts, and measures. With reference to a selection of classroom approaches to music education and to the shared affective motion experience (SAME) model of emotional responses to music, I conclude that group learning may be particularly valuable in music pedagogy.

Keywords: music; pedagogy; group learning; social; synchronization; shared experience

Musical behavior is a fundamental part of human experience and especially important during childhood, when lullabies, nursery rhymes, and action songs provide rich and enjoyable forms of social interaction and play.[1] Educators have often suggested that musical learning during childhood can have a positive impact in other learning domains, from the high academic performance found in Hungarian singing schools in the 1960s,[2] to Swanwick's influential description of "the incredible mind-making potential of music."[3] More recently, researchers have indicated the potential impact of musical training on neural function and neural structure, from motor,[4,5] auditory,[6] and language regions,[7] to brain stem responses.[8] Such research is contributing to the growing idea that musical learning can play an important role in child development and perhaps even throughout the life span.[9,10]

In this context of potentially "recommending" music training for children, it is particularly important to note that musical learning experiences are not always positive. In experimental research, musical learning is often equated with musical instrument training—a specialized and technologically challenging form of expert human musical behavior. Although some children excel at such training, many children actually have negative experiences of learning to play a musical instrument and discontinue their lessons,[11–13] with common reasons being that they are considered "boring" or the child "dislikes practice."[14] Meanwhile, overtraining on a musical instrument can lead to problems such as repetitive strain injury[15] or focal dystonia,[16] while many musicians, both amateur and professional, experience anxiety when performing,[17,18] often relying on medication.[19,20] Even informal singing in social situations can produce severe anxiety in adults,[21] which is often anecdotally related to memories of negative experiences of childhood music lessons.[22]

At the same time, it is well established that music listening plays a strong and positive role in the daily lives of a great many individuals who do not consider themselves to be "musical," from the phonograph, to the radio, to the advent of personal, portable sound systems, and extensive personal music collections.[23,24] Music seems to be especially important to adolescents and can play a strong role in identity formation and social independence.[25–28] In addition, music is employed and enjoyed in a wide range of formal and informal social situations, such

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as the pub, nightclubs, birthday parties, weddings, rock concerts, church services, and sports events. Such "real-world" musical experiences tend to involve small or large groups of untrained "nonmusicians," usually involved in some kind of interactive movement such as clapping, foot-tapping, singing, or dancing together. The case of football fans jumping up and down together, singing can be compared with music fans jumping up and down together singing at a rock concert or, indeed, with the young children jumping up and down together to music. All three cases involve exuberant, whole-body, synchronized movement with opportunities for variation, creativity, leadership, imitation, error, and humor (and little fear of individual performance exposure).

Thus, an important question when considering music intervention programs for scientific research is how to reconcile these two types of musical behavior: nonexpert, real-world, social experiences of music, compared with expert instrumental performance. In either case, genuine musical learning and skill development is important if potential transfer effects are to be examined. This requires specific pedagogical aims and methods in addition to controlled variables. Expert instrumental training has now been directly and substantially correlated with neural differences,[29,30] presenting a very strong candidate for future research. However, there are also many other approaches to music education, many of which have been developed specifically for group learning in the classroom.[31] These range from well-established music education approaches developed in the 20th century by Kodaly,[32] Orff,[33,34] Dalcroze,[35] and Gordon,[36] to national interpretations and developments of these approaches,[37–39] traditional, intercultural approaches,[40] and methods developed in the context of psychology research with specific transfer aims in mind.[41,42] Such methods involve group learning, shared musical experiences, synchronization, imitation, and a range of other socially interactive behaviors that are common to "real-world" social musical experiences, and could perhaps be used effectively and systematically in music intervention research.

The idea of music as a shared experience is central to the SAME (shared affective motion experience) model of emotional responses to music, which proposes that auditory musical signals are heard not simply as abstract patterns of sound, but rather as a series of intentional, expressive motor acts, recruiting similar neural networks in both agent and listener.[43–46] According to this model, the synchronization of such networks between actor and perceiver (or between multiple actors or multiple perceivers) can create a sense of empathy and social bonding, which is potentially of value in educational, therapeutic, and social contexts. Research into multibrain rather than single brain conceptions of human cognition has suggested that actors and perceivers show similar neural activations during language tasks,[47] and that closer coupling of such activations correlates with increased communication.[48] It has also been shown beautifully by Kirschner and Tomasello that group musical activity with children can lead to increased cooperative behavior,[49] a finding that is comparable to studies showing that synchronization activities in adults can lead to increased cooperative behaviors.[50] In addition, there is evidence that children and adults seem to perform better when synchronizing with a human agent than with a nonhuman agent,[51,52] indicating that an important aspect of human musicality may be its capacity as a medium for social interaction, probably from infancy.[53] Such synchronized, social interaction might bring specific benefits to musical learning paradigms, for example, by improving motivation or by providing immediate temporal feedback.

The temporal, pulse-based nature of such social interaction is clearly important. The ability of humans to synchronize with a steady pulse has been shown extensively in a range of complex conditions,[54,55] with temporal prediction abilities playing an important role in synchronization accuracy.[56] It has also been shown that the auditory perception of pulse and meter engage neural motor regions, including the cerebellum,[57] basal ganglia,[58] and premotor cortex,[59] as well as the vestibular system.[60] These research findings provide strong evidence in support of theories of the embodied nature of music cognition[61] and, indeed, embodied cognition in general.[62] Evidently, musical behavior is deeply rooted in motor behavior, from vibrating vocal chords and clapping hands to expert fine motor control of musical instruments at great speeds. Even young children tend to respond very physically to a steady beat, naturally moving their bodies in approximate synchronization.[1,63] It thus seems likely that encouraging children in their natural musical movement behaviors—through clapping, marching, dancing, and singing together—might provide advantages in a musical learning context.

In conclusion, the aim of this brief paper is not to set up one kind of musical training or music education program against another, but rather to emphasize the wide range of possible approaches to musical intervention programs. In certain contexts and under certain conditions, different musical intervention paradigms may be found to have greater or lesser effects, depending on the aims and selected outcome measures. We should not ask the question, *does* music have an impact, but rather *can* specific kinds of musical experience have an impact, and *how* and *when*.[64,65] Experimentally, it is important to isolate individual variables to establish mechanisms, correlations, and causes, but pedagogically it may be crucial to combine multiple facets of musical experience, such as motivational, affective, motor, and social behaviors. When we ask children to learn music, perhaps in some cases we should encourage them to engage their entire motor systems and to jump around in groups together, rather than to sit still and develop their fine motor control on a difficult instrument. There remains a wealth of knowledge from music pedagogy, therapy, psychology, and sociology that can help us to understand the full potential of music to affect the developing brain.

Conflicts of interest

The author declares no conflicts of interest.

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