Music, Reading, and the Brain

Jennifer Zuk, PhD & Nivedita Ravi

How does musical training relate to children's cognitive, language, and reading abilities?

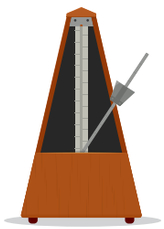
Pitch and Timing: Important for Both Music and Language

Our ability to perceive changes in pitch (tones) and timing (e.g., rhythmic patterns) is not only important for music but also language. Precise pitch and timing changes in spoken language allow us to recognize individual speech sounds within words, distinguish between different words, and ultimately comprehend the meaning of full sentences.

Pitch

Pitch perception skills in music have been positively linked with foundational language skills for learning to read, such as phonological awareness (the ability to recognize individual speech sounds within words, such as /c/ /a/ /t/ in the word /cat/).[4] Long-term engagement in musical training has been shown to improve children's abilities to discriminate pitch changes in not only music but also in language.[8]

Timing



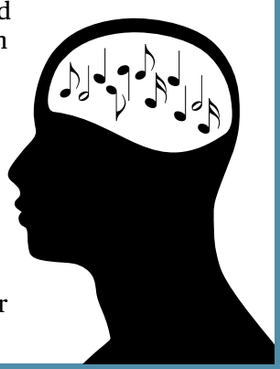
Children with reading difficulties have demonstrated increased difficulty perceiving timing changes in both music and language compared to their typically developing peers.[2] When provided musical training in conjunction with traditional reading instruction or intervention programs, children with reading difficulties have demonstrated improvements in phonological awareness and word reading abilities.[1]

Reading Music

Similar to written text, musical notation requires mapping sounds onto visual symbols. Early evidence suggests that learning to read musical notation may bolster sound-symbol mapping and interpretation of a written code.[3]

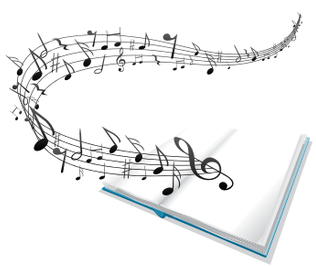
Shared Cognitive Processes Underlying Music and Reading

Musical training requires higher-order cognitive processing (e.g., goal-directed behavior, planning, inhibition, task-switching) to coordinate and produce music in real-time, and these cognitive skills are known to be important for reading and academic engagement. Musically trained children show heightened cognitive abilities compared to those without musical training,[9] and longitudinal investigation suggests that musical training can improve these higher-order cognitive skills.[6]



Music and the Reading Brain

Beyond behavioral relationships between music, language, and reading, neuroimaging offers the potential to understand the brain mechanisms that underlie these associations. Neuroscience research suggests anatomical overlap in the brain regions responsible for processing pitch and timing in music and language.[5] In addition, recent research has found that musically trained children show greater brain activation compared to unmusically trained children and those with dyslexia in brain regions known to be important for reading.[7]



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BOSTON UNIVERSITY

Zuk CaNDL
Communication and Neurodevelopment Lab

THE SOUTHPORT COLAB