

Serial Reproduction Reveals the Interaction of Tempo and Rhythm Perception in Music and Speech

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Abstract

Music and speech differ in their time scales: music is generally slower, reducing linguistic communication but facilitating discrete rhythm categories, a universal feature of music but not speech. However, the mechanisms underlying these differences remain unclear. Here, we examine the interaction between tempo and categorical perception of rhythm using large-scale iterated reproduction experiments. Participants (N=1,304) heard music or speech rhythms and reproduced them by tapping or speaking. Their productions were then passed to the next participant over 5 iterations. In music, complex rhythm categories emerged at preferred tempo, while simple categories dominated at extreme speeds. In speech, the pattern deviated from simple integer ratios, and its tempo dependency differed from that of music. Importantly, slowing speech rhythms during transmission induced music-like categories, suggesting that speech categories are temporarily dependent. Our findings highlight how communicative constraints shape distinct rhythmic structures in music and speech.