The Influence of Prior Knowledge on Sensitivity to Statistical Information in Music

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As a domain general mechanism statistical learning interests both music and language cognition researchers (Patel, 2008). Recently, Siegelman, Bogaerts, Christiansen, and Frost (2017) proposed that statistical learning ability varies among individuals. Using musical stimuli we have a unique opportunity to examine whether prior knowledge may influence statistical learning. Prior knowledge of music may be acquired by either past informal exposure or formal music training. Here, we examine the correspondence between music training and statistical learning, and whether prior exposure to pitch distributional information through music exposure influences participants' responses. Twenty-eight participants listened to two blocks of 80 sequences, each sequence containing 34 isochronous tones of 150 ms each and followed by a probe-tone. Participants judged each probe-tone's fit with the prior sequence. In one block, sequences were generated from an unfamiliar tone distribution; in the other, sequences were generated from a familiar distribution analogous to that of a piece written in C-major. *Congruent* probe-tones were tones that had occurred during the tone sequence while *incongruent* probe-tones had not occurred. The probe-tones were physically identical for both blocks but differed in their congruency to the distributions. Congruent probe-tones were judged as "fitting" more often than incongruent probe-tones, with a stronger effect for the familiar distribution. Sensitivity as measured by *d*' (hits and false alarms corresponding to congruent and incongruent tones judged as fitting respectively) was higher for the familiar than for the unfamiliar distribution. The correlation between years of music training and sensitivity was positive only for the familiar distribution. The difference in sensitivity between distributions supports our hypothesis that prior knowledge influences participants' responses. In particular, the association between music training for the familiar distribution and the lack thereof for the unfamiliar distribution shows that prior knowledge and music training jointly influence responses but may not influence statistical learning itself.

Patel, A. D. (2008). *Music, language, and the brain*. New York, NY, U.S.A.: Oxford University Press.

Siegelman, N., Bogaerts, L., Christiansen, M. H., & Frost, R. (2017). Towards a theory of individual differences in statistical learning. *Phil. Trans. R. Soc. B*, *372*(1711). doi:10.1098/rstb.2016.0059