Music training, music aptitude, and speech perception

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In a paper published recently in PNAS, Mankel and Bidelman (1) challenge environmental accounts of associations between music training and speech perception. Such accounts claim that music training causes improvements in the neural encoding of speech and in performance on related behavioral tasks (e.g., speech-in-noise test) (2). On the one hand, Mankel and Bidelman (1) present a refreshing counterpoint to views that mistakenly consider music training to be an ideal model for the study of plasticity (3). On the other hand, they make questionable claims about the impact of music training on speech perception, overinterpreting results from the available literature and the data presented in their article.

Mankel and Bidelman's (1) findings complement previous results showing that music aptitude is better than music training at predicting performance on speech-perception tasks (4). Such an association must have a neural basis, which the authors also document. However, their comparison of musicians, nonmusicians with high music aptitude, and nonmusicians with low aptitude rests on the assumption that musicians differ from nonmusicians only in music training. No test of music aptitude was given to the musicians, who would have performed very well on such a test and much better than the top 50% of nonmusicians. In short, the authors' data are consistent with a nativist account of music aptitude and listening skills.

Individuals with music training also differ from other individuals in terms of cognitive abilities, demographics, and personality, with such differences increasing as the duration of training increases (5). Although Mankel and Bidelman (1) report that the two nonmusician groups did not differ significantly in terms of formal education (cognitive ability) or parental education [socioeconomic status (SES)], no test of personality was administered to any of the three groups. More crucially, the authors provide no evidence that musicians were similar to nonmusicians in terms of cognitive ability or SES.

Finally, Mankel and Bidelman (1) diminish the importance of their contribution by claiming that results from longitudinal studies provide "compelling evidence for brain plasticity" as a consequence of music training. Some of this evidence comes from studies of individuals without random assignment to a music intervention (6) or who were compared with passive control groups (7). Metaanalysis confirms that positive effects of music training are more likely to emerge from studies with such suboptimal (rather than optimal) designs (8). Mankel and Bidelman (1) also cite short-term, intensive interventions that are unlike real-world music lessons (e.g., no practicing at home) and provide no evidence for long-term effects (9). In short, previous evidence of plasticity is suggestive at best.

Mankel and Bidelman (1) deserve to be commended, however, for adopting a view that acknowledges influences from both nature and nurture. Nevertheless, as with much research on intelligence (10), effects presumed to stem from genetics are easier to document than shared environmental effects. In the case of music training, such effects are the likely consequence of nonshared environment, specifically two- and three-way interactions among the pedagogy, the teacher, and the student, and therefore almost certain to be idiosyncratic rather than systematic.

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