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Title:

Music production deficits and social bonding: The case of poor-pitch singing

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Abstract:

Both of the companion target articles place considerable performance on music performance ability, with specific attention paid to singing in harmony for the Music and Social Bonding (MSB) hypothesis proposed by Savage and colleagues. In this commentary I evaluate results from recent research on singing accuracy in light of their implications for the MSB hypothesis.

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Conflict of Interest:

I am presently collaborating with Patrick Savage as part of a larger research team.

Main text:

Both target papers in this issue focus on the importance of music performance for engaging in collective behaviors. Although the target papers did not place great emphasis on individual differences in performance ability, these differences are clearly relevant. In particular, the Music and Social Bonding (MSB) hypothesis proposed by Savage and colleagues proposes that collective musical performance promotes social bonding, which in turn may have yielded survival benefits to our species. If music performance promotes social bonding, and social bonding promotes evolutionary fitness, then we may make predictions about music performance ability. By this logic, we may predict that the ability to perform music (in general) emerges spontaneously in development, that this ability is widespread in the population, and that the lack of this ability may be associated with reproductive costs.

Singing is arguably the best form of music performance on which to test these predictions. In contrast to other forms of music performance, singing does not require learning of a human-made instrument and thus may emerge without any specialized training. Furthermore, singing involves the ability to regulate actions along both dimensions cited as important for social bonding in the MSB hypothesis: synchronization and harmonization. I focus here on the latter dimension.

Singing in harmony requires accurate tuning of vocal pitch control, or pitch accuracy. If singing in accurately arose from a process of gene-culture coevolution, one would expect singing accuracy to be widespread and learned early in life without considerable intervention. Singing does emerge spontaneously in children at around the same time as language acquisition appears (Stadler Elmer, 2020). By adulthood, most individuals appear able to match pitch

within the boundaries set by their culture's tuning system. Tests of singers matching pitch within equal tempered tuning (which dominates Western music) suggests a majority can match pitch within a musical semitone. For instance, a recent large-scale study of over 1,000 individuals found that roughly 1/3 of participants matched over 90% of pitches within these boundaries on average (Pfordresher & Demorest, in press). By contrast, relatively few participants exhibit a dominant tendency to deviate from a target pitch by a half semitone or more (the dividing line between pitch classes in the equal tempered scale). In the aforementioned sample, only 25% of participants exhibited this tendency; a figure that accords well with other reports (Dalla Bella, Giguère, & Peretz, 2007; Hutchins & Peretz, 2012; Pfordresher & Brown, 2007; Pfordresher, Brown, Meier, Belyk, & Liotti, 2010). Existing data therefore suggest most humans should be able to harmonize within acceptable limits as per the claims of MSB hypothesis.

Given the fact that accurate singing is widely represented in the population, thus facilitating harmonization, one might predict that collective singing is widespread. Unfortunately, self-evaluation of singing in Western cultures tends to run against the levels of accuracy found in the data, and this may suppress participation in collective singing. Pfordresher and Brown (2007) found that in a sample of over 1,000 psychology undergraduates in Texas, 59% believed they were unable to imitate a melody via singing. In the more recent large data set discussed above (Pfordresher & Demorest, in press), only 34% agreed with the claim "I am a good singer" whereas 62% agreed with the claim "I enjoy singing". Although self-assessments did correlate with singing accuracy in this data set, there is clearly a disconnect between overall levels of self-evaluation and levels of pitch-accuracy. These dissociations can

have significant consequences given that self-assessment of musical skill predicts future musical participation during late childhood (Demorest, Kelley, & Pfordresher, 2016). Reported experiences of inaccurate singers of their early choral singing experiences tell of significant embarrassment and avoidance of future singing (Welch, 2006). Thus, if collective singing is beneficial to social bonding and to our species, this strong tendency in Western culture may have considerable negative consequences.

This leads to a prediction of the MSB hypothesis that is less clearly supported: What are the consequences of music production deficits, including inaccurate singing? The fact that a trait may have had adaptive value in the past does not necessarily mean that the success of modern humans relies on this trait; nevertheless, the importance of traits in modern life are often held up as evidence for such claims (as is the case for language, for instance). Pinker's (1997) speculations about the non-adaptive nature of music, for instance, arose in part from the lack of evidence that music plays a fundamental role in modern-day survival. In the case of singing, the evidence is mixed. To date there is no evidence that inaccurate singers, or individuals with other deficits such as congenital amusia, fare worse in life than others. On the other hand, participation in singing may promote well-being at a physiological level, via reduction of cortisol secretion (Grebosz-Haring & Thun-Hohenstein, 2018; Kreutz, Bongard, Rohrmann, Hodapp, & Grebe, 2004), the release of oxytocin (Keeler et al., 2015), and through the promotion of social relationships.

Evidence from research on singing accuracy among modern Westerners thus accords with the MSB hypothesis in some ways but not others. More important, the MSB hypothesis helps to place research on singing accuracy in an informative broader context. Ultimately,

although pitch accuracy is an important component of musical communication, it may be the case that the evolution of music was not so much based on the ability to perform accurately but may instead be rooted in the benefits of engaging in this collective activity. The fact that feedback from multiple singers may lead to a collective chorusing effect that obscures accuracy of an individual singer supports a limited role for accuracy of an individual. Moreover, fine-grained tuning of singing is negligibly related to the aesthetic quality of singing (Hutchins, Roquet, & Peretz, 2012; Pfordresher & Brown, 2017). If music evolved to be participatory, those of us in Western nations may wish to reconsider the current value placed on virtuoso solo performances.

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