

Counterpoint to Chabris and Steele

My colleagues and my research on the effects of listening to Mozart Sonata K. 448 on spatial-temporal task performance^{1,2,3} has generated much public interest and, subsequently, several misconceptions, many of which are reflected in attempts to replicate the research. Chabris' and Steele's letters echo the most common of these: Listening to Mozart enhances intelligence. Our reports made no such claims. The effect is limited to *spatial-temporal* tasks involving mental imagery and temporal ordering.

Chabris' oversight led him to include in his analysis "abstract reasoning" tasks other than spatial-temporal tasks, a subset of the former. He overlooked four studies,⁴⁻⁷ all demonstrating a Mozart effect, and excluded comparisons of scores following Mozart versus other composers,^{2,4,8-9} further undermining his results. Finally, Chabris' claim that the effect is limited to one task is incorrect. It has been demonstrated with three other spatial-temporal tasks.^{6-7,10} Chabris attributes "...whatever...remains of the Mozart effect..." to IQ test variation, a fair hypothesis had the Mozart effect anything to do with overall IQ. Test-retest reliability of spatial-temporal scores must be significantly smaller than that of general IQ score, a composite of many unrelated sub-tests.

Chabris dismisses the neural model¹¹ that motivated the original report,¹ proposing the following: Mozart produces "enjoyment arousal," a right-hemisphere function, as is spatial-temporal task performance. Other abstract reasoning tasks (i.e., Ravens Matrices) are left-hemisphere functions. Chabris claims music therefore improves spatial-temporal tasks, not matrix tasks, due to a shared right-hemisphere locus. However, listening to music also includes processing, for example, rhythmic information, a left hemisphere function.¹² Chabris' reasoning would then predict that music produces enhancement of left-hemisphere tasks, such as Ravens Matrices, due to a shared left-hemisphere locus. These tasks, however, are not improved by music.

Irregardless, several studies suggest that the "enjoyment arousal" explanation is unlikely. First, rats exposed to the Mozart sonata *in utero* plus 60 days *post-partem* during their waking cycles learned a spatial maze faster and with fewer errors over days than controls.¹³ It seems unlikely that these animals' improved learning was due to pleasure they derived from the treatment. Second, students who listened to Mozart, Mendelssohn, relaxation instructions, or silence demonstrated a Mozart effect despite ratings of the Mendelssohn work as maximally arousing.⁴ Third, students who listened to the Mozart sonata scored higher on a spatial-temporal task than after they listened to other stimuli, regardless of their preference.⁵ Finally, researchers investigating the Mozart effect on epileptiform activity found that the sonata produced a reversal of epileptic state in comatose

patients.¹⁴ No effects were found from exposure to control music. According to the researchers, this finding strongly suggests that the effect is not caused by emotional state or arousal.

Steele's report summarizes three non peer-reviewed studies claiming the absence of a Mozart effect, each utilizing a different design. Not one design replicated the original reports,¹⁻³ introducing several methodological concerns. For example, spatial-temporal task performance varies widely between individuals, making randomization an inefficient method of ensuring uniform before-treatment task proficiency.² What measures were taken by the two studies employing between-subjects designs to tackle this? Also, was testing performed blind, as in other replications?¹⁻⁵ Steele's account, based on unpublished studies and virtually no literature review, is as scientifically useful as media reports claiming that Mozart makes one smarter.

Chabris' analysis is incomplete and includes studies not relevant to the effect he was supposedly exploring; Steele's report is sketchy and ill-informed. Although the Mozart effect cannot be found under all laboratory conditions, several studies have successfully replicated it.^{1-10,13,15-16} It does, in fact, exist. Correspondingly, the fact that some people cannot get bread to rise does not negate the existence of a "Yeast effect."

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