

## Comments on Rauscher's Reply

Christopher F. Chabris, 26 August 1999

Rauscher's reply to the articles by myself and Steele et al. in today's issue of *Nature* states that I "echo the most common" of many misconceptions about the Mozart effect, "that listening to Mozart enhances intelligence." Rauscher further states that she and her colleagues, writing in the original report of the Mozart effect in *Nature* in 1993, "made no such claim. The effect is limited to spatial-temporal tasks involving mental imagery and temporal ordering."

While it is true that my review and meta-analysis of studies on the Mozart effect included tests of general cognitive ability (especially so-called "matrices" tests, which were originally designed to be very pure measures of general intelligence), it is not true that Rauscher et al. never made such a claim. In fact, the caption to the graph of results presented in the original 1993 report included the following statement: "The abstract/spatial reasoning tasks consisted of a pattern analysis test, a multiple-choice matrices test, and a multiple-choice paper-folding and cutting test. For our sample, these three tasks correlated at the .01 level of significance. We were thus able to treat them as equal measures of abstract reasoning ability."

The clear implication of these words is that the post-music enhancement applied to all three cognitive tasks, and that the authors considered the effect to be general to all three tasks, and to other "abstract reasoning" tasks like them. Nowhere in this article did they mention that tasks such as pattern analysis or matrices actually did *not* show a Mozart effect; this was only revealed by Rauscher and Shaw in a 1998 article in *Perceptual and Motor Skills*, which published for the first time the data from the original study broken down by task. This quotation, plus the use of language such as "the IQs of subjects participating in the music condition were 8–9 points above their IQ scores in the other two conditions" (from the main text of the original article), explain why readers of the original article and secondary reports of it believe that the Mozart effect was supposed to apply to a variety of tasks and reasoning abilities—in other words, to general intelligence. Thus, it is not a misconception or "oversight" on my part to interpret the original announcement of the Mozart effect as being more broad than Rauscher now says it is.

Rauscher also misinterprets my point regarding the shared right-hemisphere basis for cognitive arousal and spatial task performance. "Other abstract reasoning tasks (Ravens Matrices) are left-hemisphere functions, Chabris claims." But such a statement cannot be found in my article. Indeed, the most recent evidence suggests that matrices tasks are best understood in terms of frontal lobe processes. Similarly, Rauscher's point about "IQ-test variation" boomerangs: if the reliability of spatial-temporal tests is even lower than I have assumed, reports of a Mozart effect become even harder to credit.

It is also important to note that the exchange between Rauscher and myself is not an insoluble "he said, she said" difference of opinion. I have combined the results of 16 studies (15 of them published) involving over 700 participants, while Rauscher relies primarily on two unpublished studies and two unfinished manuscripts to make her key points. And even if one limits the Mozart effect to spatial-temporal processing, as Rauscher now insists, it is still about 75% smaller than originally claimed, and not statistically significant. Neither studies with rats and comatose patients, nor references to yeast and bread, are relevant to these facts.