Audiovisual integration in Musicians: improved precision and flexibility in audiovisual temporal processing

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Sensory recalibration allows the brain to compensate for temporal mismatches in sensory inputs to maintain a coherent perception (Vroonment & Keetels, 2010). While previous studies suggest that musical training may enhance recalibration through frequent training of complex rhythmic patterns (Jicol et al., 2018; O'Donohue et al., 2022; O'Donohue, 2024), the extent of this enhancement remains underexplored. To address this, we first replicated the double-flash illusion (Bidelman, 2016) to compare recalibration abilities between musicians (n=13) and non-musicians (n=10). Although the difference was not statistically significant, musicians demonstrated greater resistance to the illusion, more accurately reporting the number of flashes in illusory trials. Although this illusion measures audiovisual interactions, it primarily involves a visual task, with auditory stimuli being irrelevant. Thus, we conducted an additional study using the audiovisual correspondence detection task (Denison et al., 2013), where participants were asked to identify which of two Gabor patches oscillated in the rhythm of a given auditory reference stream. Stimulus onset asynchronies (SOAs) of the auditory tones and Gabor tilts were set within ±300ms. Our results showed that musicians demonstrated better sensory recalibration in the audiovisual correspondence detection task compared to non-musicians, as reflected in their higher performance accuracy ($p = 0.038$). This indicates that musicians effectively compensate for temporal misalignments across a broader range of SOAs. These findings suggest that musical training improves both the range and precision of sensory recalibration, enhancing the ability to adapt to temporal mismatches across modalities. In other words, this implies that musical training makes recalibration abilities flexible and adjustable to various task requirements.

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