

Intersensory Facilitation Across the Life-Span: Adults Show Enhanced Discrimination of Tempo in Bimodal vs. Unimodal Stimulation

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Purpose

According to the Intersensory Redundancy Hypothesis (IRH; e.g., Bahrick & Lickliter, 2000, 2002), perceptual processing of amodal properties (e.g., tempo, rhythm, intensity) is facilitated in bimodal, redundant stimulation (intersensory facilitation) and attenuated in unimodal, nonredundant stimulation. Thus far, research supporting this hypothesis has primarily focused on infancy. However, we predict that intersensory facilitation extends across the life span, particularly for tasks of high difficulty or high cognitive load. Preliminary support for this hypothesis comes from a study of infants' discrimination of tempo change. Younger infants showed intersensory facilitation for easy tasks, but older infants showed intersensory facilitation only for more difficult tasks (Bahrick, Lickliter, Castellanos, & Vaillant-Molina, under review).

The present study addressed the effects of intersensory facilitation across the life span by extending tests of intersensory facilitation and task difficulty to adult perceivers. Similar to our infant study, we anticipated that adults would show enhanced discrimination of tempo changes in bimodal audiovisual stimulation as compared with unimodal visual stimulation, particularly for difficult tasks.

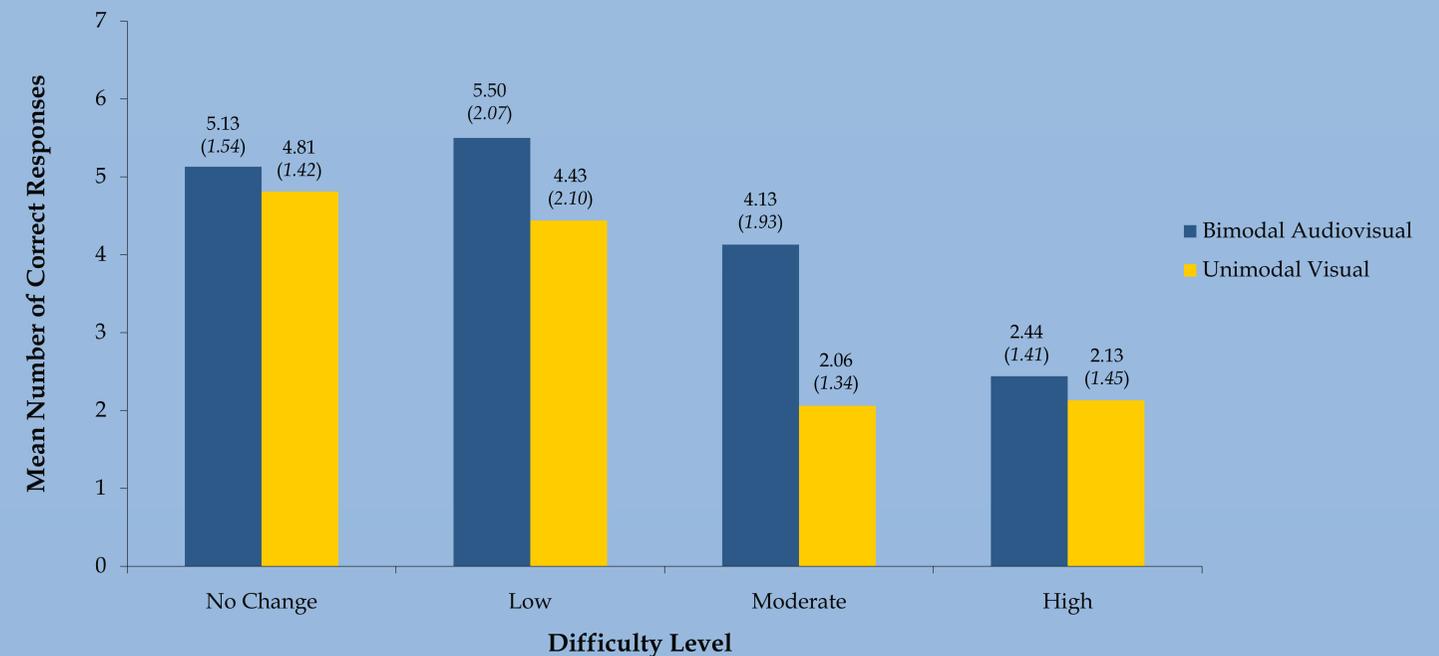
Methods

Adults (N = 32) were familiarized with a single trial depicting a toy hammer tapping a 4-beat rhythm at a particular tempo (standard) under conditions of either unimodal visual or bimodal, synchronous, audiovisual stimulation (N = 16 each). Following presentation of the standard tempo, they received 16 test trials in which there was no change in tempo (no change), a change of 25% (low difficulty), 17% (moderate difficulty), and 9% (high difficulty), with four trials of each difficulty level presented in one of two random orders. Two blocks of trials were presented, each with a different standard tempo (159 or 192 bpm, with 80 or 96 impacts per minute, respectively). The number of trials for which adults correctly discriminated the tempo change (same/different) was recorded.

Results

Analyses of the mean number of correct responses (see Figure 1) indicated a main effect of difficulty level with more correct responses for the no change and low difficulty trials than the moderate and high difficulty trials, $F(3, 90) = 22.05, p < .001$. Furthermore, consistent with predictions of intersensory facilitation, a main effect of condition emerged, with more correct responses for the bimodal than the unimodal condition, $F(1, 30) = 8.47, p = .007$. No interaction with task difficulty was found, however, the mean number of correct responses was low overall (3.8 out of 8), suggesting that the task was difficult for adults.

Figure 1. Mean number of correct responses as a function of condition (bimodal audiovisual, unimodal visual) and difficulty level (no change, low, moderate, high).



Conclusions

These results provide the first evidence that adult participants, like infants, show intersensory facilitation under conditions of audiovisual redundancy. Adults demonstrate enhanced processing and discrimination of amodal properties in the context of redundant, audiovisual stimulation as compared with unimodal visual stimulation. These findings converge with those of infant studies and indicate that predictions of the Intersensory Redundancy Hypothesis hold across the life span.

References

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