Audiovisual Recalibration and Stimulus Reliability

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1. Unimodal Spatial Discrimination Task

Goal: Adjust spatial uncertainty of visual stimuli; adjust relation between visual and auditory reliability to: V > A, V ≈ A, and V < A.

Tasks: 2IFC unimodal spatial discrimination (1 auditory and 3 visual conditions)

Visual stimuli:
- High
- Medium
- Low

2. Bimodal Spatial Discrimination Task

Goal: Adjust for perceptual bias; for each of four auditory locations, find visual locations perceived as co-located.

Task: 2IFC bimodal spatial discrimination

3. Audiovisual Recalibration Expt.

Goal: Investigate whether audiovisual recalibration varies with stimulus reliability.

Tasks: Unimodal spatial localization
1. Baseline (unimodal auditory/visual stimuli)
2. Recalibration (spatially discrepant audiovisual stimuli)
3. Post-recalibration (identical to Baseline)

Visual stimuli:
- A or V stimulus (100 ms)
- AV stimulus (100 ms)

Models of recalibration:
- Fixed-ratio (FR) (Zaidel, Turner, & Angelaki, 2011)
- Reliability-based (RB) (Ghahramani, Wolpert, & Jordan, 1997)
- Causal-inference (CI) (Körding, Beierholm, Ma, Quartz, Tenenbaum, & Shams, 2007; Salo, Toyoizumi, & Aihara, 2007)

Conclusions

Auditory recalibration is best captured by the CI model, suggesting that auditory recalibration is contingent on visual reliability and location estimates based on causal inference about a common audiovisual source.

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