Spatiotemporal Factors in Audiovisual Rate Discrimination
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1. Motivation
Multisensory integration typically occurs when signals are spatiotemporally coupled. However, Raposo et al.\textsuperscript{3} found optimal integration of temporally uncorrelated click-flash sequences in a rate-discrimination task. Why?
H1) Insensitivity to temporal cues from temporal averaging
H2) Insufficient temporal cues in their stimuli
H3) Decision-stage rather than low-level integration
Exp. 1: Which hypothesis best describes audiovisual rate-discrimination?
Exp. 2: What are the temporal causal inference cues?

2. Stimuli

Raposo et al.: Within modality: 10 ms events separated by 60 or 120 ms delay. Across modalities: 20 ms minimum click-flash offset if temporally uncorrelated.

3. Tasks

**Experiment 1:** Comparison-to-Standard Rate-Discrimination Task
"Was the test stimulus slower or faster than the standard stimulus?"

**Experiment 2:** Causality-Judgement Task
"Did the clicks and flashes come from a common source or different sources?"

4. Experiment 1

**Result 1:** Behavioural consequences of multisensory integration versus no integration (example subject). Steeper psychometric function in the bimodal condition indicates multisensory enhancement effect.

**Result 2:** Most subjects are sensitive to both spatial and temporal conflict. This suggests auditory and visual signals are combined by a temporally sensitive mechanism (Hypothesis 2). Why did Raposo et al. find a different result? → Exp. 2.

5. Experiment 2

**Result 3:** Correlations between auditory & visual streams at lags within ±200 ms are associated with “common” responses (as in Ref. 3), whereas correlations at greater lags are linked to “different” responses.

**Result 4:** A GLM analysis revealed maximum click-flash offset had a significant negative effect on the probability of “common” judgement (proportion of synchronous click-flashes was n.s.). Our sequence-generating algorithm gave larger max offsets than Raposo et al.

6. Conclusion
Most subjects were sensitive to both spatial and temporal cues as typically found. Previous conflicting results’ likely stem from undetectable temporal conflict. Sequence similarity and maximum click-flash offset are salient temporal cues.

References: