Voluntary Action and Time Perception

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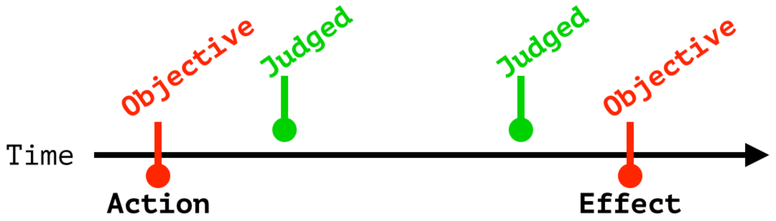
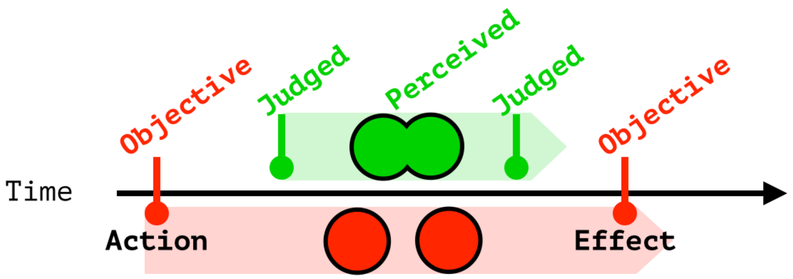
Introduction



Intentional binding: Past research has established that relative to their objective time of occurrence, voluntary actions and their effects are judged to occur closer together in time[1].

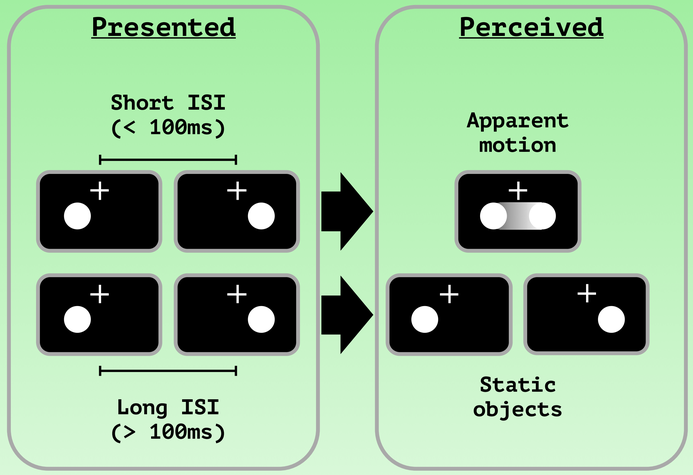


The slowed clock hypothesis: According to this hypothesis voluntary actions reduce subjective durations (shaded green arrow), and would therefore cause stimuli (filled circles) to be perceived as closer together in time[2].

Hypothesis

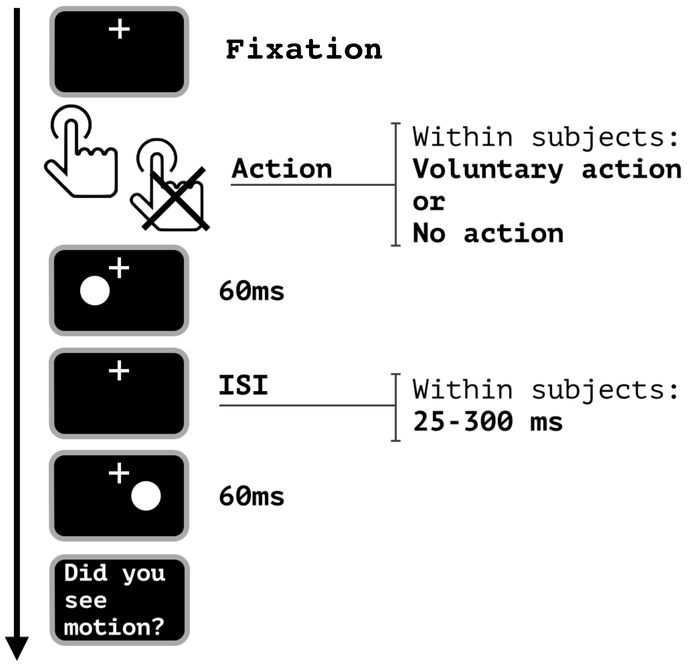
If voluntary actions reduce subjective durations, the ISI should be subjectively shorter, and therefore subjects should report more motion, in the *voluntary action* condition.

Apparent motion



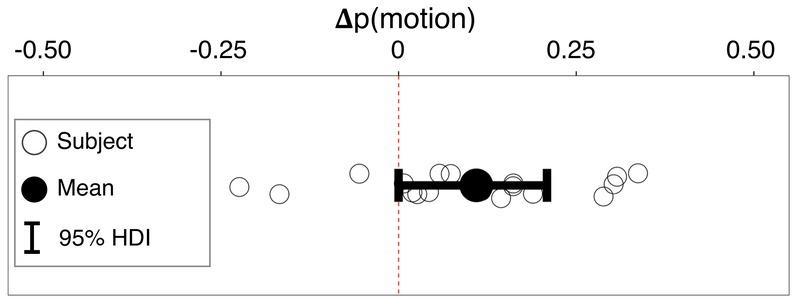
Two visual stimuli appear as one moving object when the ISI between them is short enough[3].

Method

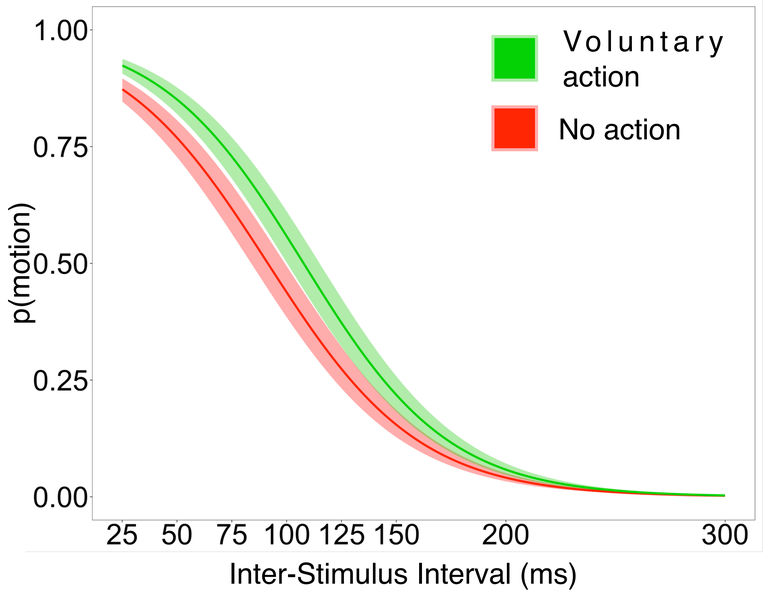


Action manipulation: Subjects either pressed a key at a time of their choosing, or waited for the stimuli to appear automatically. N = 24, but 6 subjects were excluded because they were at ceiling / floor, or insensitive to ISI.

Results



Average difference in motion perception proportions between conditions (*voluntary* - *no action*; 95% HDI*: [0.00, 0.21]).



The predicted mean proportion of motion responses with 95% HDI*.

Conclusion

- Voluntary actions increased apparent motion responses.
- These results support the slowed clock hypothesis.

References

[1] Haggard, P., Clark, S., & Kalogeras, J. (2002). Voluntary action and conscious awareness. *Nature neuroscience*, 5.
[2] Wenke, D., & Haggard, P. (2009). How voluntary actions modulate time perception. *Experimental brain research*, 196.
[3] Wertheimer, M. (1912). Experimentelle studien über das Sehen von Bewegung. *Zeitschrift für Psychologie*, 61.

*Highest Density Interval of posterior parameter distribution from a multilevel Bayesian logistic regression model
More information and supplementary material available at https://osf.io/ihbeu/.
Thank you to everyone in the Memory and Metacognition lab for comments, questions, and support.

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