Regularity and stimulus salience jointly but independently shape attentional priority

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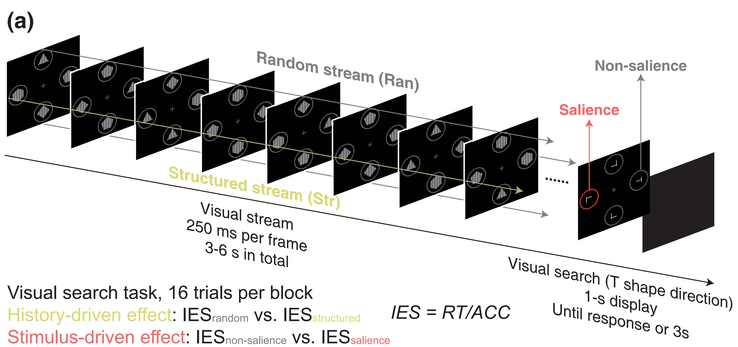
Introduction

Selection history built on statistical learning has been proposed as a third factor guiding attention, parallel to goal-driven and stimulus-driven selections [1-3].

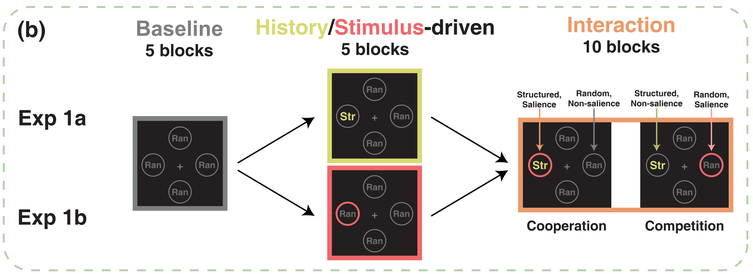
Within this framework, how history-driven factors (e.g., learned regularities) interact with stimulus-driven effects (e.g., physical salience) to influence attentional selection remain largely unclear.

Thus, the current research investigated the **mutual impacts** between statistical regularity and stimulus salience on attentional selection **(Experiment 1)** and the way these attentional effects **interact to shape attentional priority computation (Experiment 2)**.

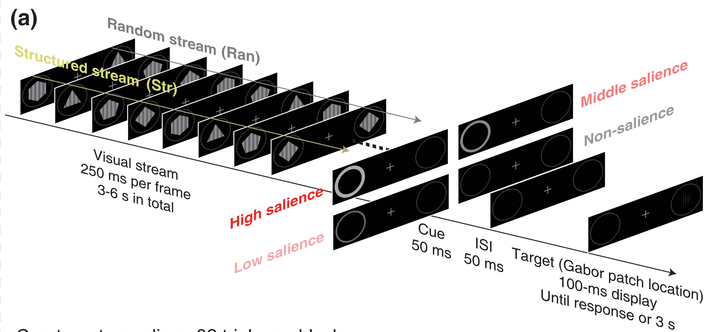
Experiment 1: Mutual influences



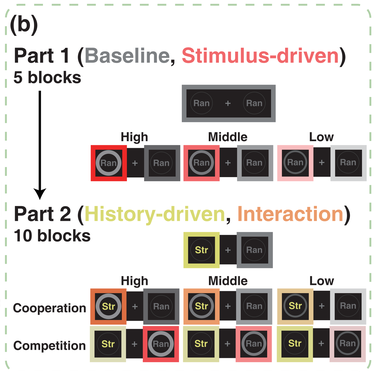
Visual search task, 16 trials per block
History-driven effect: IES_{random} vs. $IES_{structured}$
Stimulus-driven effect: $IES_{non\text{-}salience}$ vs. $IES_{salience}$
IES = RT/ACC

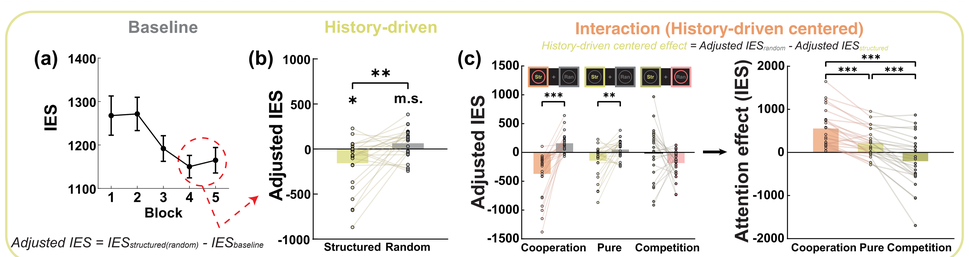


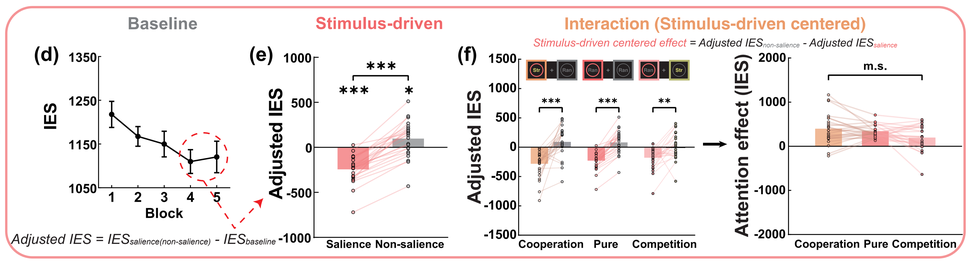
Experiment 2: Interaction mode



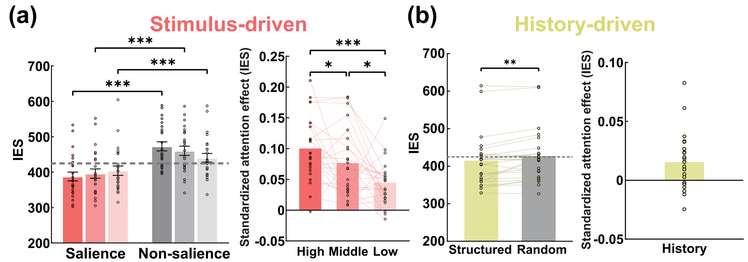
Cue-target paradigm, 32 trials per block

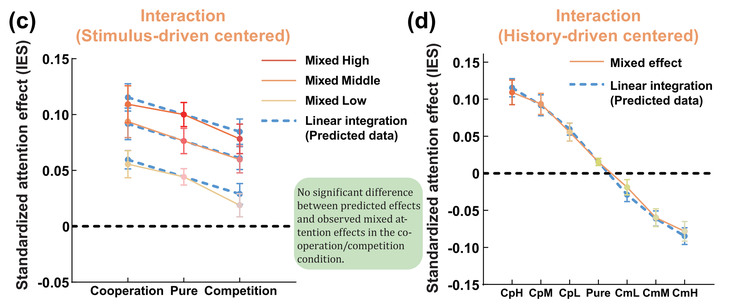






- When operating separately, both regularity and cue salience elicited prioritized attention selection.
- When the two factors coexisted, they exhibited mutual yet asymmetric impacts:
  The attention effect was augmented during cooperation but diminished during competition, where history-driven selection exerted a weaker influence than stimulus-driven selection.





- History- and stimulus-driven selections jointly shape attention priority without being modulated by the level of stimulus salience.
- The mixed attention effects in the cooperation/competition condition can be predicted by the linear combinations (sum/deviation) of the two observed attention effects.

Conclusion

- **Statistical regularity and physical salience jointly but independently influence the prioritization of attentional selection, following a linear integration rule.**
- **These results provide novel insights into how selection history and present information work in tandem to shape attentional priority computation.**

References

[1] Awh, E., Belopolsky, A. V., & Theeuwes, J. (2012). Top-down versus bottom-up attentional control: A failed theoretical dichotomy. *Trends in Cognitive Sciences, 16*(8), 437–443. https://doi.org/10.1016/j.tics.2012.06.010
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[3] Zhao, J., Al-Aidroos, N., & Turk-Browne, N. B. (2013). Attention Is Spontaneously Biased Toward Regularities. *Psychological Science, 24*(5), 667–677. https://doi.org/10.1177/0956797612460407

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