Seeing What You Want to See: How Belief Biases Perception and Memory

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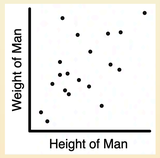
Background

Our interpretation of statistical data is affected by **belief-based bias** (a bias related to one's beliefs about a relationship).

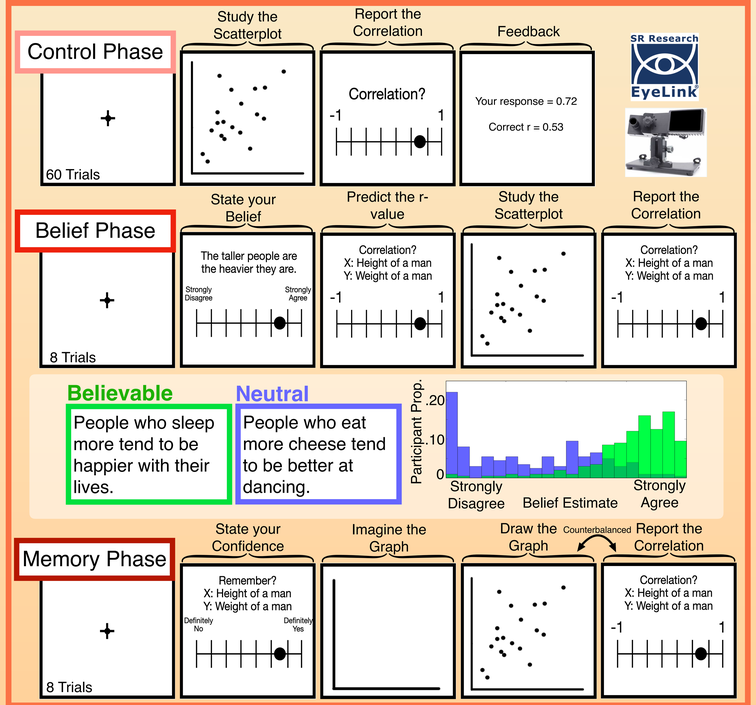
Research Questions

Does this bias **persist** into our **memory**, and if so **how does that happen**?

What **influences** your **susceptibility** to **belief-based bias** and **how is it influenced**?

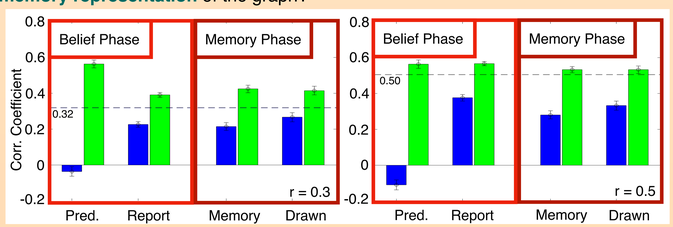


Methods



Results

Does this bias **persist** into our **memory** and does it affect our **interpretation** or our **memory representation** of the graph?

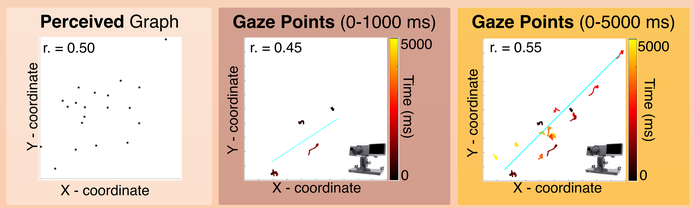


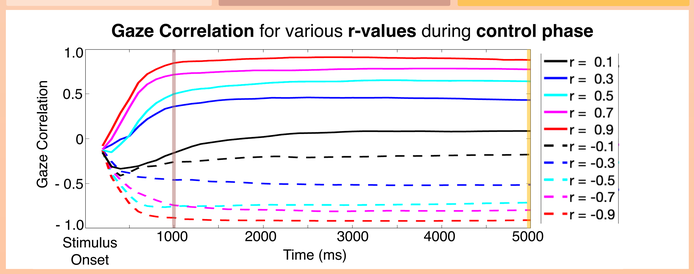
Belief-based bias **persists** into our **memory** and affects our **memory representation** of the graph.

± = 95% C.I.

Control Phase Gaze Correlation Over Time

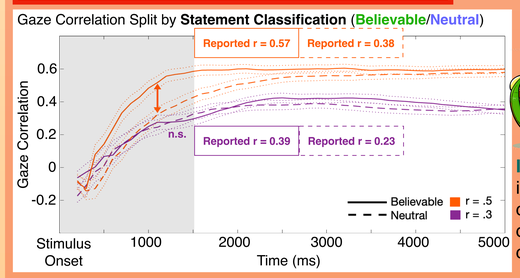
Plotting **gaze coordinates** creates a **gaze correlation** which matches the **correlation strength** of the perceived scatterplot.





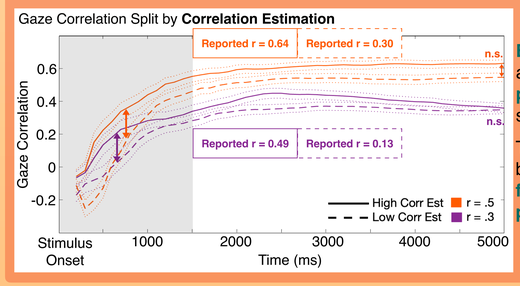
Does **belief-based bias** affect our **gaze pattern** during **perception of the scatterplot**?

Belief Phase Gaze Correlation Over Time



Individual differences in **statement appraisal** could be driving the difference between conditions.

Splitting **gaze correlation** by **participant estimations** can account for **individual differences** in gaze tracking data.



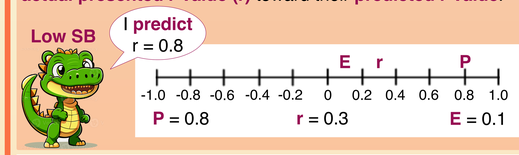
Belief-based bias affects how individuals **perceive** the scatterplot.

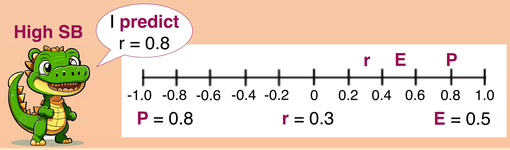
The **main effect** of this bias occurs during the **first 1500 ms** of **perception**.

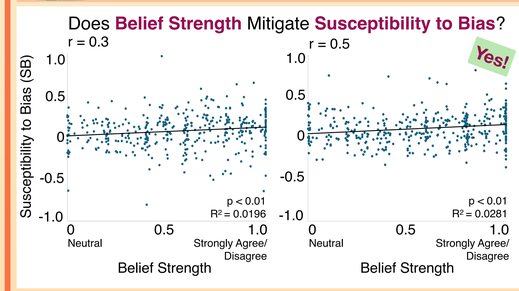
Results

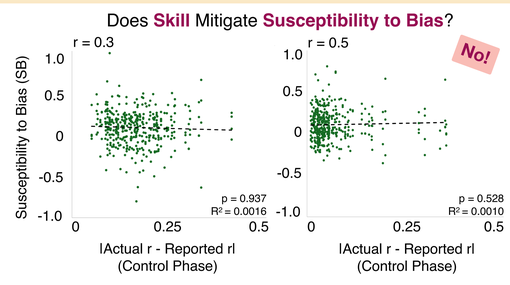
What mitigates **susceptibility to bias**?

Susceptibility to Bias (SB): The degree to which **participant prediction (P)** pulls **participant estimation (E)** away from the **actual presented r-value (r)** toward their **predicted r-value**.

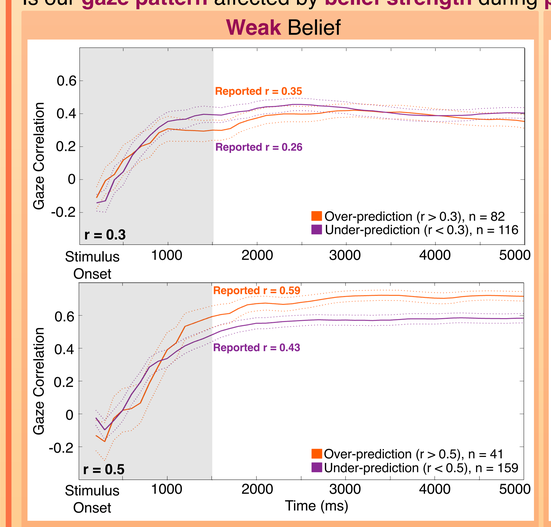


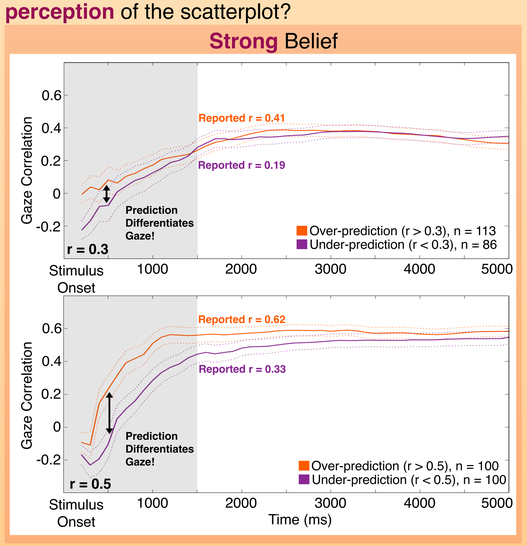






Is our **gaze pattern** affected by **belief strength** during **perception** of the scatterplot?





Discussion

Belief-based bias leads to a **persistent** effect on the **memory** and interpretation of the scatterplot.

Gaze patterns suggest that these biases are instilled within the **first 1500 ms** of viewing.

Gaze pattern analysis suggests that the **strength** of your **belief** about a relationship, but not your **skill**, affects your **susceptibility to bias**.

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References

Xiong, C., Stokes, C., Kim, Y.-S., & Franconeri, S. (2022). Seeing what you believe or believing what you see? belief biases correlation estimation. *IEEE Transactions on Visualization and Computer Graphics, 29*(1), 493–503. https://doi.org/10.1109/tvcg.2022.3209405