



Past research suggests that graphics do not augment refutation text benefits¹. Based on the body of work supporting visualizations as a tool for persuasion², we find this surprising.

Background

Conflicting information, naive or biased beliefs, and mis- or disinformation can lead people to develop misconceptions about complex topics. **Refutation texts** can help counter this via two strategies:

- confronting misconceptions
- directly refuting misconceptions.



Changing people's beliefs can still be a difficult process. Therefore, we examined how **visualizations** may be a tool to augment the refutation text effect.

visualization = visual representation of info/data

Questions/Hypotheses

RQ1: How does the presence or absence of a visualization influence people's beliefs?



H1: People will report greater changes in their beliefs on climate change topics after viewing a visualization with a refutation text as compared to people who read a refutation text without a visualization.

RQ2: How does the presence or absence of a visualization influence how well people can acquire new knowledge?



H2: People who view a visualization with a text will perform better on knowledge assessments presented after viewing as compared to people who read a refutation text without a visualization.

Experiment 1

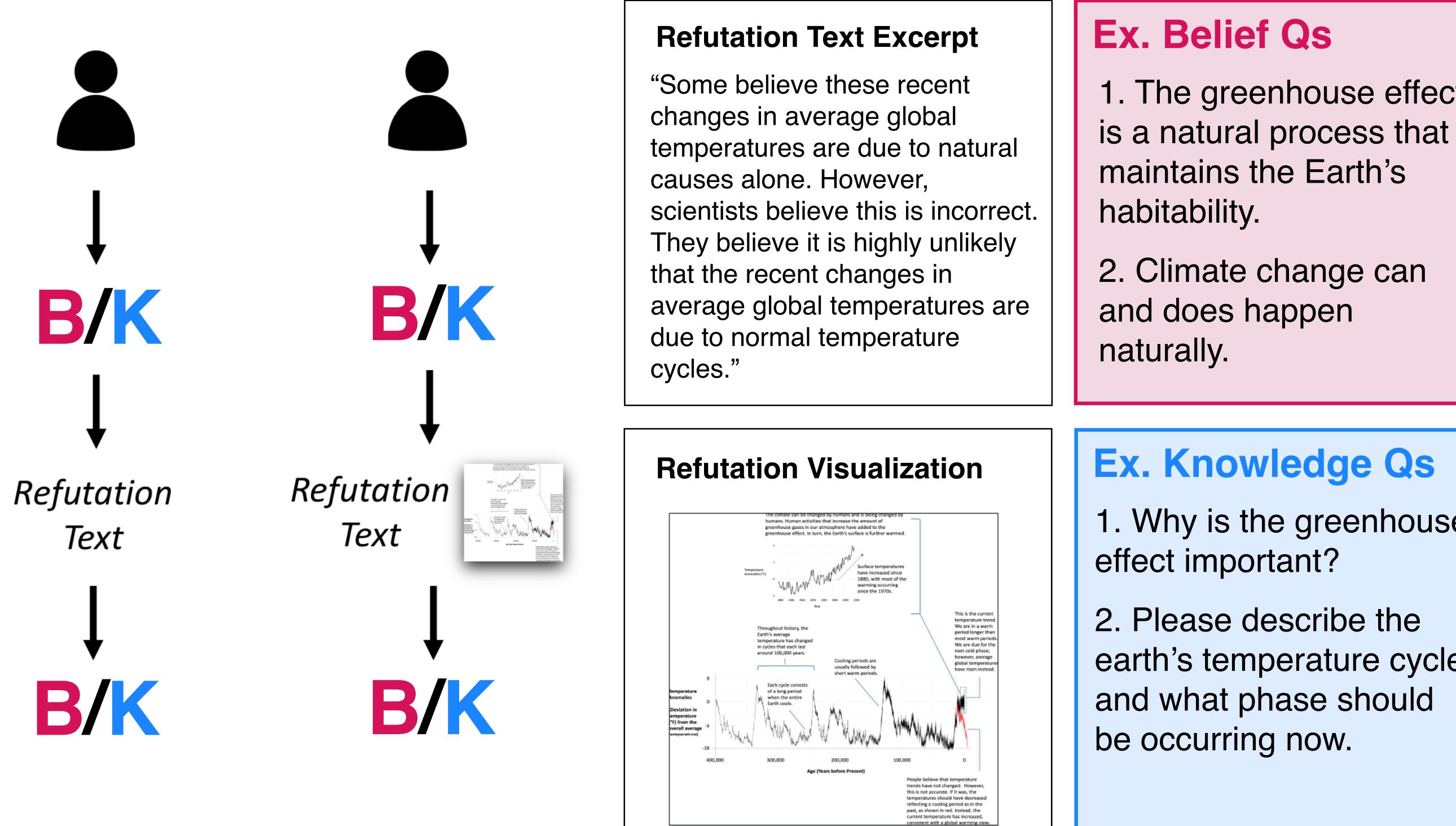
Procedure

Before and after viewing materials, participants (n=59) were asked:

- belief rating questions (0-100 scale)
- knowledge questions (open-response)

They were shown either a *refutation text only (REF)* or a *refutation text + visualization (REF+VIS)*.

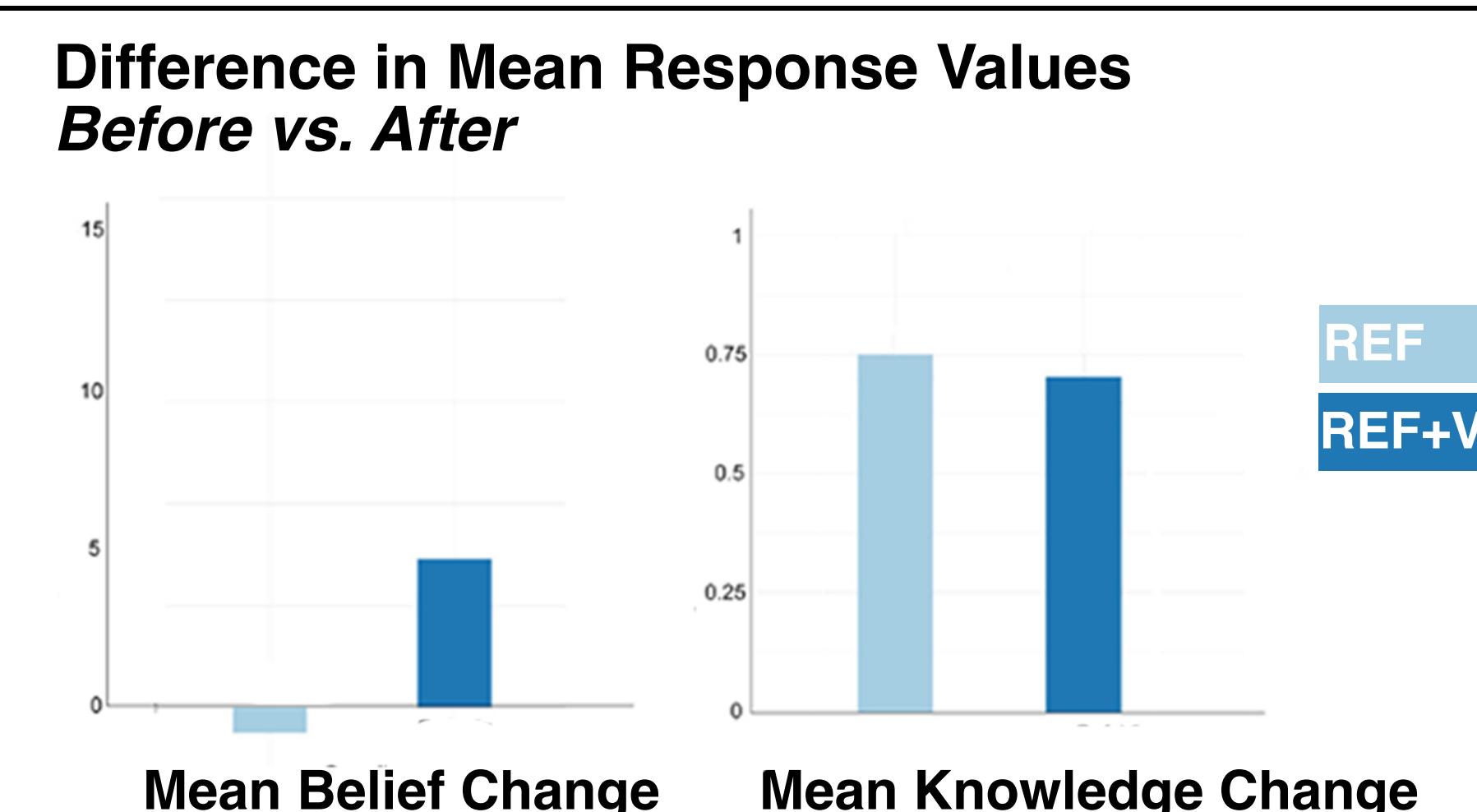
We measured the differences in belief and knowledge responses before and after viewing refutation materials.



Results

We obtained no statistically significant effects of visualization presence on participant's changes in belief or knowledge. Observed patterns indicate that participants in the REF+VIS condition showed:

- slightly greater belief changes
- slightly lower performances on knowledge questions.

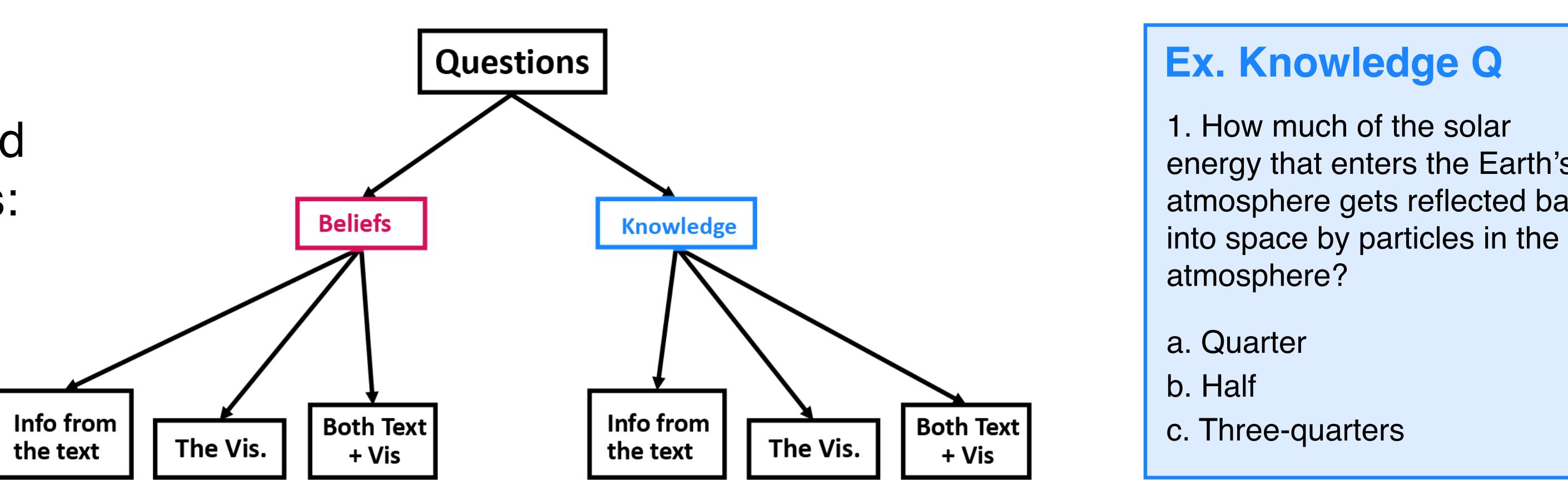


Experiment 2 Modifications to Experiment 1

Procedure

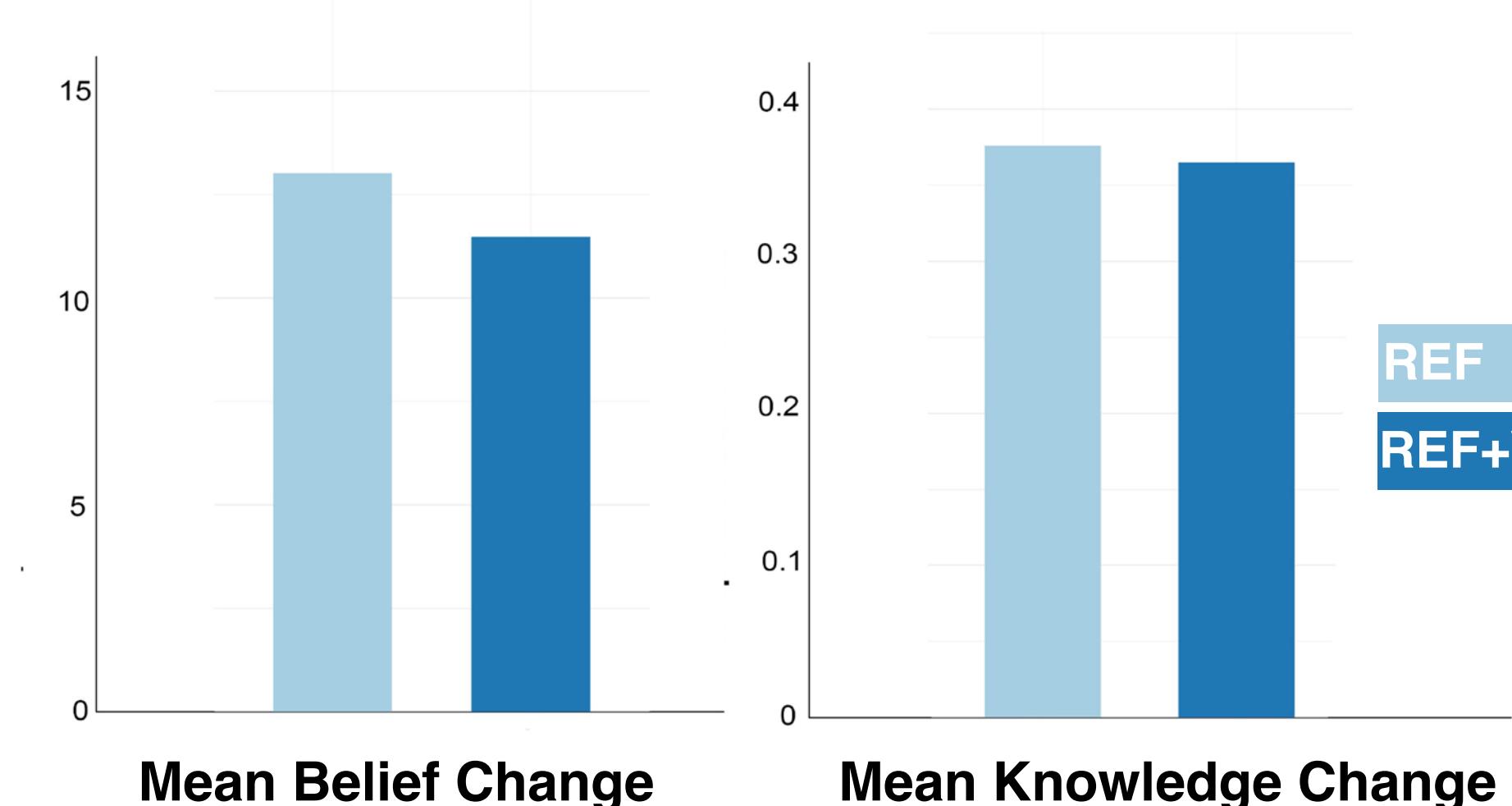
With new participants (n=89), we closely followed the procedure of Experiment 1 with two changes:

- Targeted questions for information in the text, the visualization, and both.
- Multiple-choice knowledge questions.

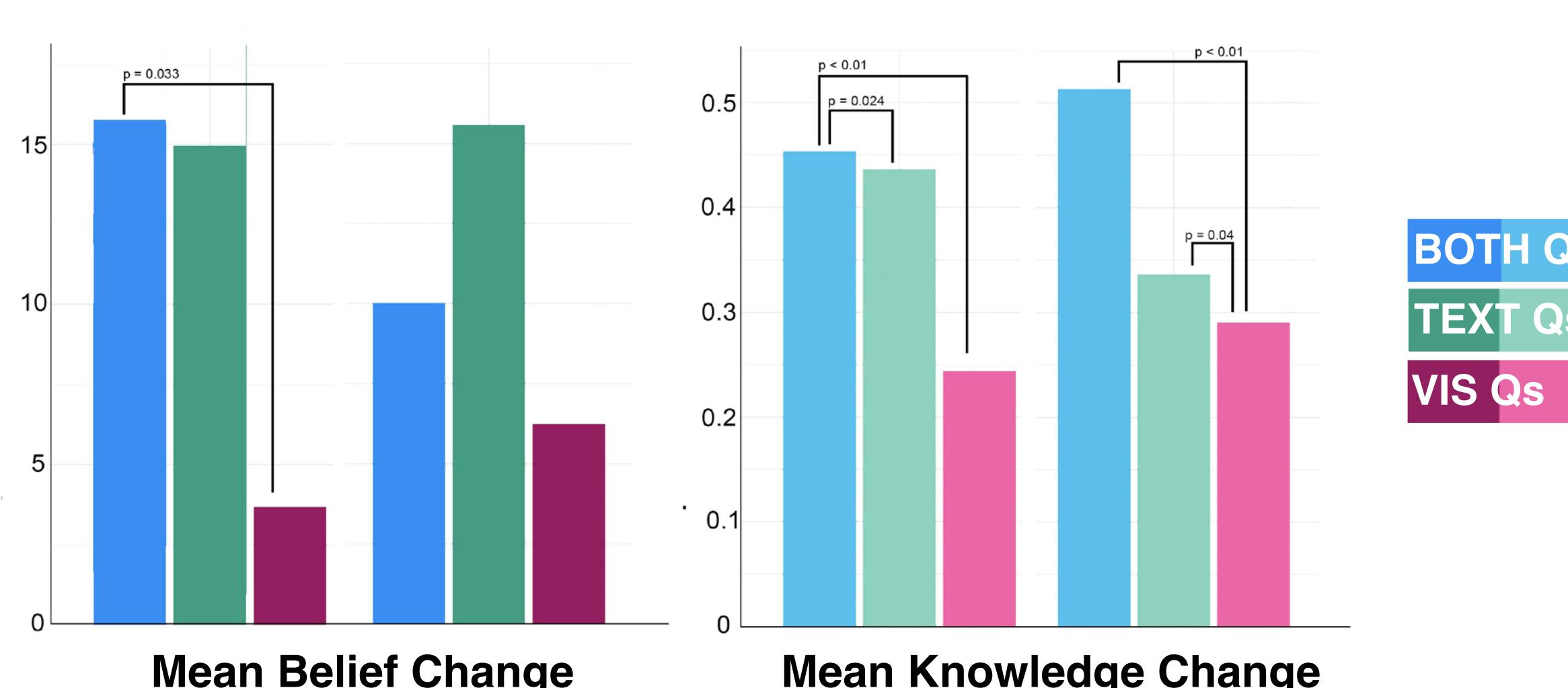


Results

Difference in Mean Response Values Before vs. After



Difference in Mean Response Values (by Question Type) Before vs. After



Conclusions

Overall, no statistically significant effects of visualization presence were observed. However:

Experiment 1

We noticed that the presence of a visualization may have the potential to promote changes in beliefs.

Experiment 2

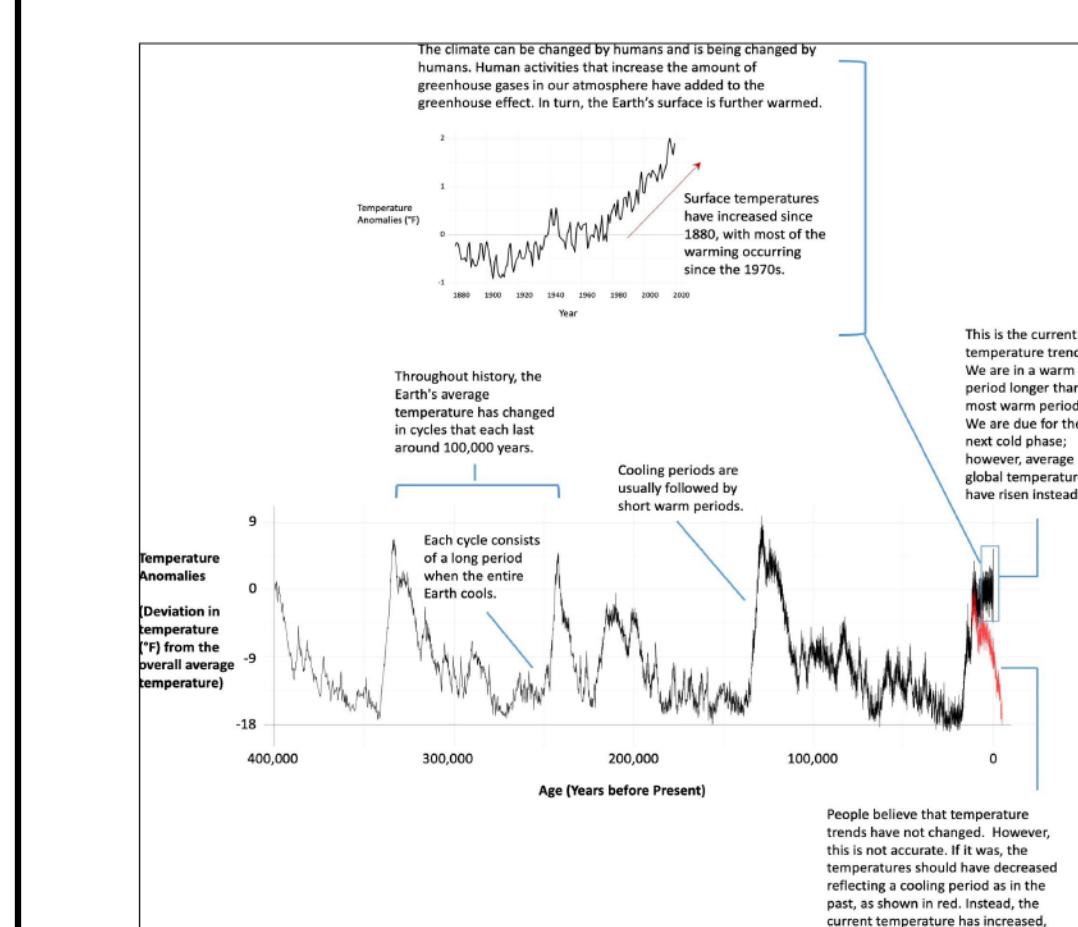
We were unable to replicate the patterns from Experiment 1.

However, the questions containing information only in the text drove lower knowledge question performance in people who viewed the refutation visualization.

Future Work

Key Shortcoming: The design of the refutation visualization may be too complex to communicate information.

Implications: Research on how specific elements of data visualizations support and discourage learning should be conducted and then referenced.



Too Many Words?

Too much information?

No focus?

¹Robert W. Danielson, Gale M. Sinatra & Panayiota Kendeou (2016) Augmenting the Refutation Text Effect with Analogies and Graphics, *Discourse Processes*, 53:5-6, 392-414, DOI: 10.1080/0163853X.2016.1166334

²Pandey, Anshul & Manivannan, Anjali & Nov, Oded & Satterthwaite, Margaret & Bertini, Enrico. (2014). The Persuasive Power of Data Visualization. *Visualization and Computer Graphics, IEEE Transactions on*. 20. 2211-2220. 10.1109/TVCG.2014.2346419.