

Effects of title wording on memory of trends in line graphs

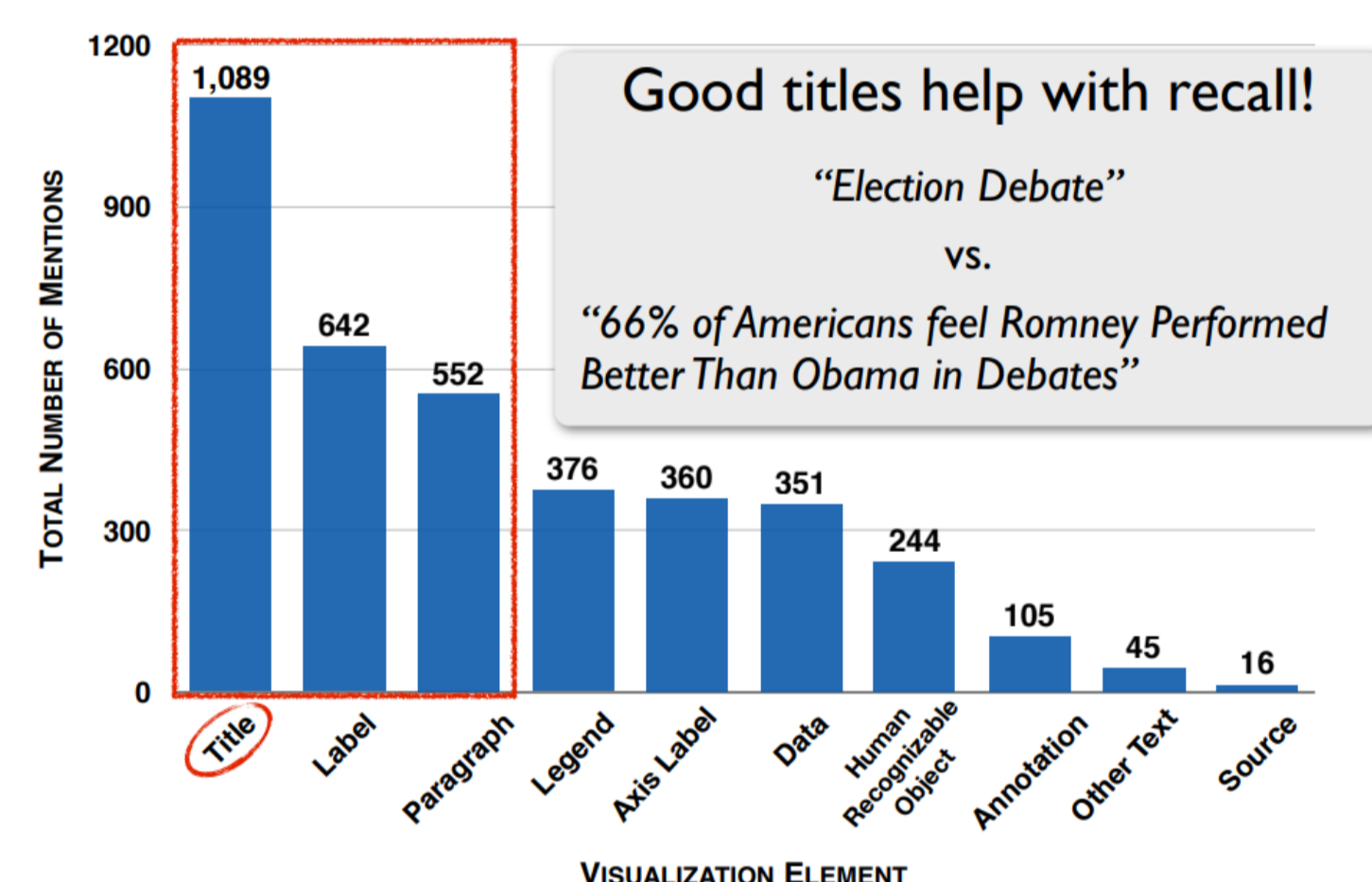
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Motivation

Can we change a participant's memory of a graph by modifying its title?

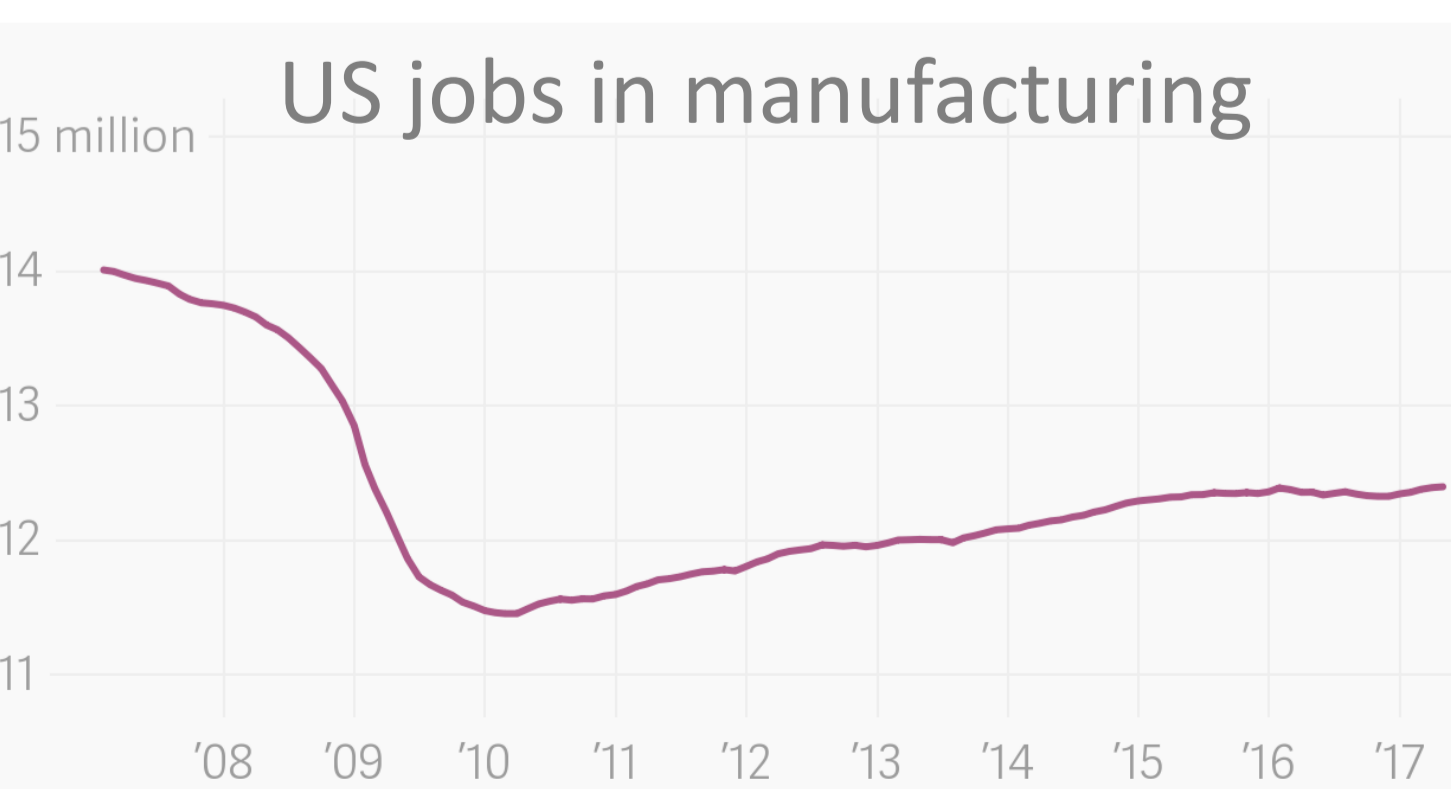
Prior work



Titles are:

- The most **memorable** part of a visualization
- Where people spend the most time
- More effective when they contain the main message
- Effective at biasing people's interpretation of a graph (Kong 2018)

Variance in title intensity



Participant-generated titles:

- The **drastic** drop in manufacturing jobs in America
- US Manufacturing Jobs **slowly** making a comeback
- US Manufacturing Jobs **Steadily** Return

Memory Experiments

1 Rank words by intensity

Select the word that is more intense when inserted into the phrase 'a _____ change'.

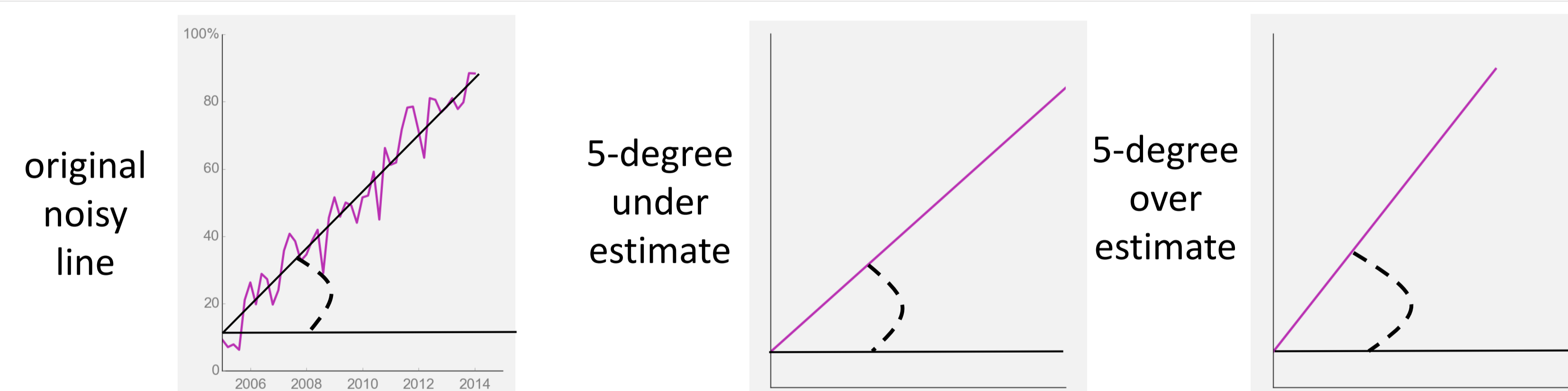
sharp huge

Substantial
Dramatic
⋮
Slow
Gentle

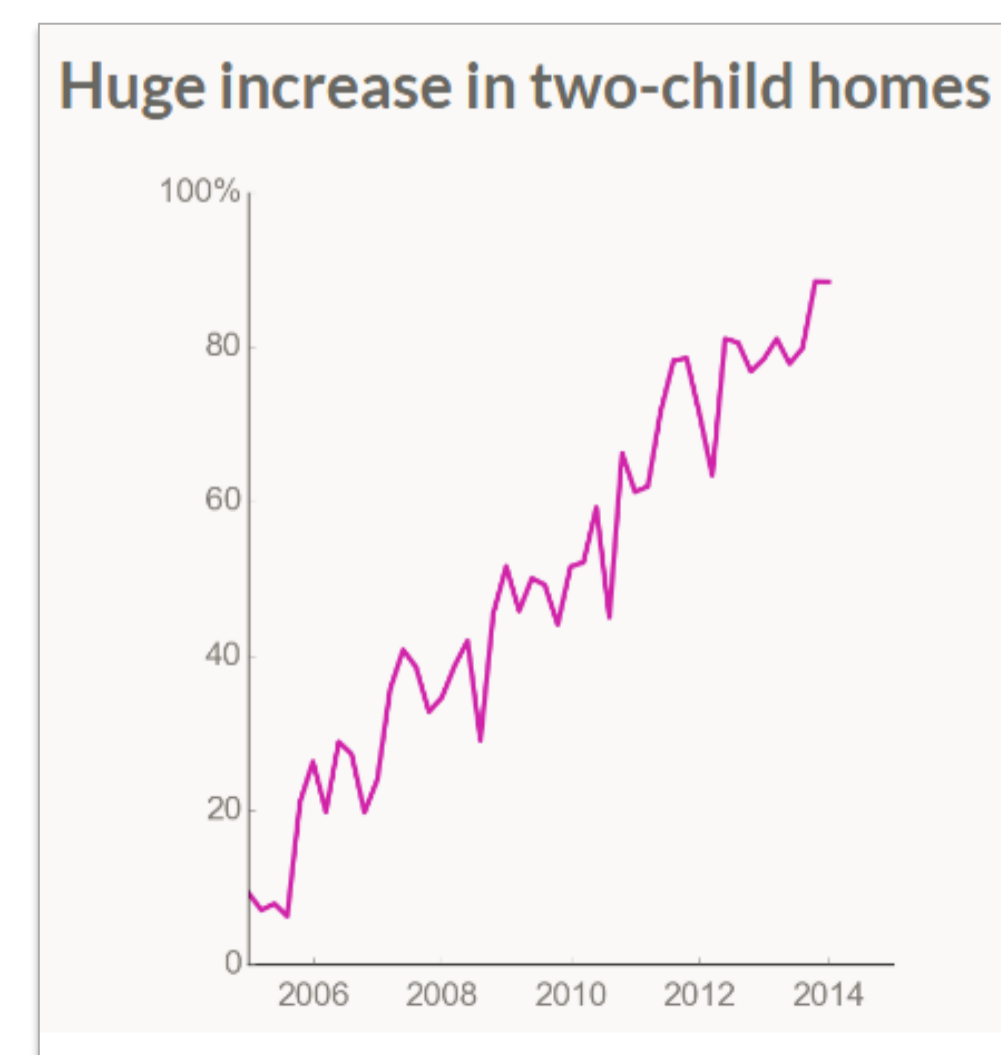
2 Generate titles

Substantial Gentle The _____ increase in voter turnout

3 Create a visual memory task



4 Run a crowdsourcing experiment



You will see 4 letters, one after another. Then, you will be asked to enter the letters you saw. This process will repeat twice.

R → M → P → L

What letters did you see?

Distractor task: remember a sequence of letters

Repeat 24 times per participant, varying graph & title conditions

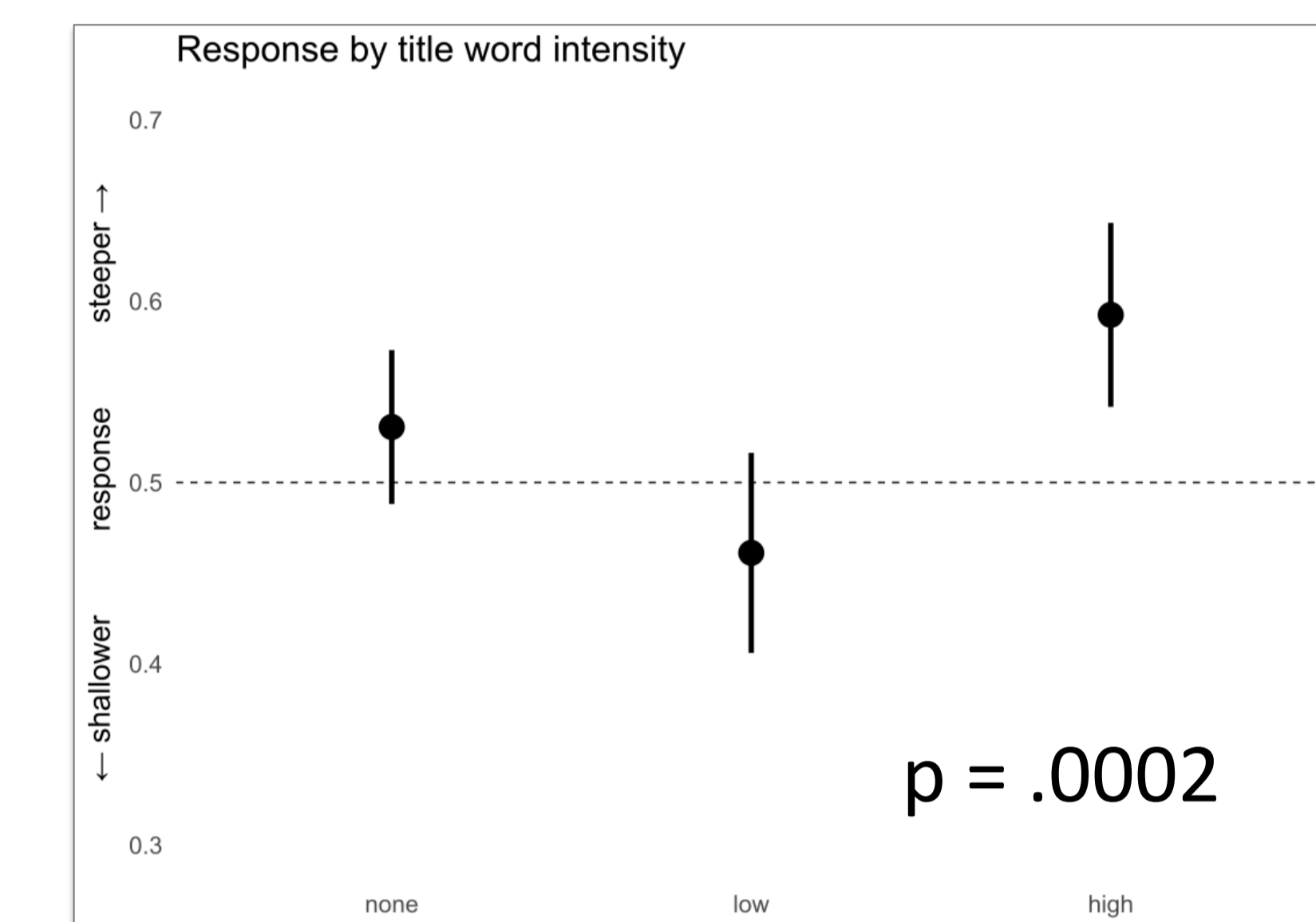
What was the title of the graph?

Check recall of the graph's title

Select the trend line that best approximates the most recent graph:

Collect data on graph memory

Results

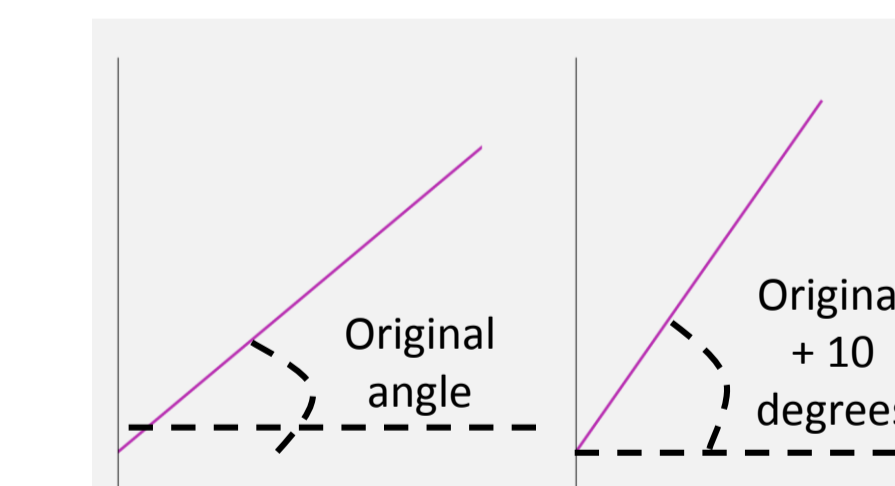


Data collection :

- 100 subjects, 24 trials/subject
- Filter based on distractor and title recall accuracy
- 1628 usable trials (67.8% of collected data)

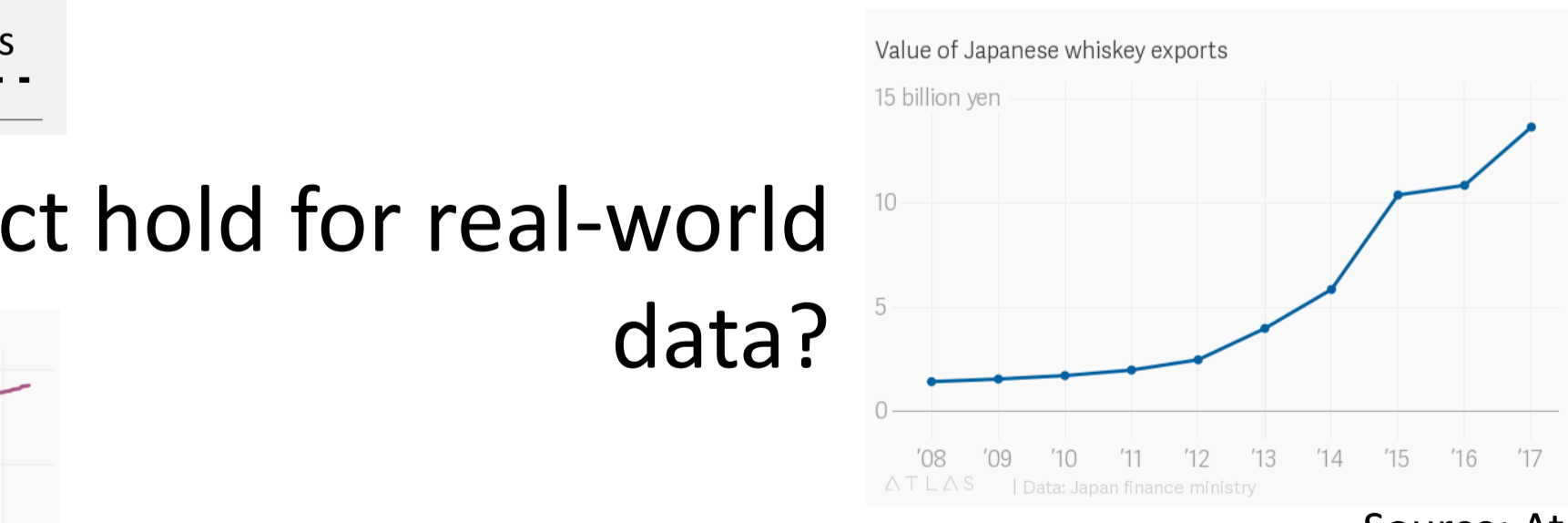
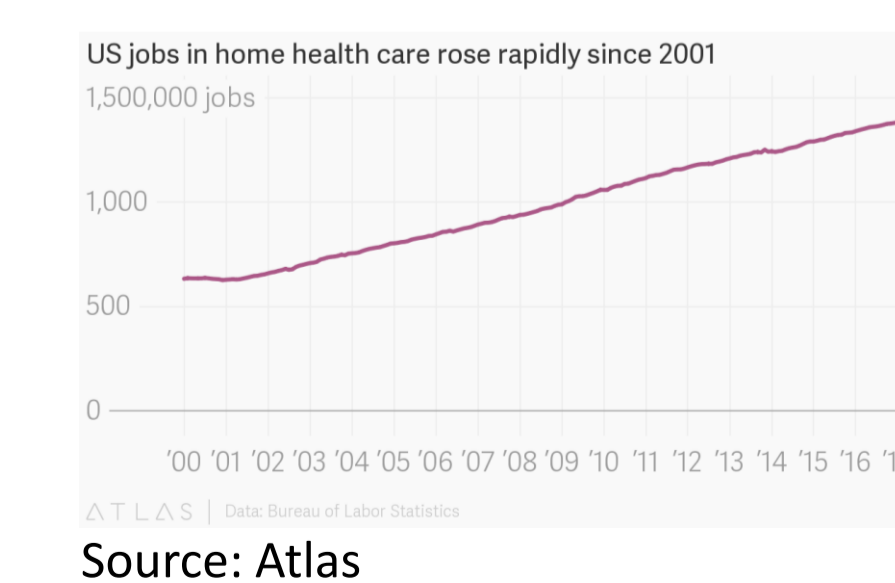
Title wording can bias memory of a graph

Future Directions



Can we bias subjects to choose an incorrect answer?

Does the effect hold for real-world data?



How extreme are graph titles in real-world sources?

References:

- Borkin, M., Bylinskii, Z., Kim, N., Bainbridge, C., Yeh, C., Borkin, D., H. Pfister & Oliva, A. (2015). Beyond Memorability: Visualization Recognition and Recall. *IEEE Transactions on Visualization and Computer Graphics*, PP, 1-1.
- Ha-Kyung Kong, Zhicheng Liu, and Karrie Karahalios. 2018. Frames and Slants in Titles of Visualizations on Controversial Topics. In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (CHI '18). ACM, New York, NY, USA, Paper 438, 12 pages. DOI: <https://doi.org/10.1145/3173574.3174012>
- ATLAS: the new source for charts and data. <https://www.theatlas.com/>