

Processing Fluency improves Trust in Scatterplot Visualizations

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background

processing fluency:

- speed and accuracy with which one processes a stimulus
- positively associated with trust in non-visualization contexts

visualization camouflage:

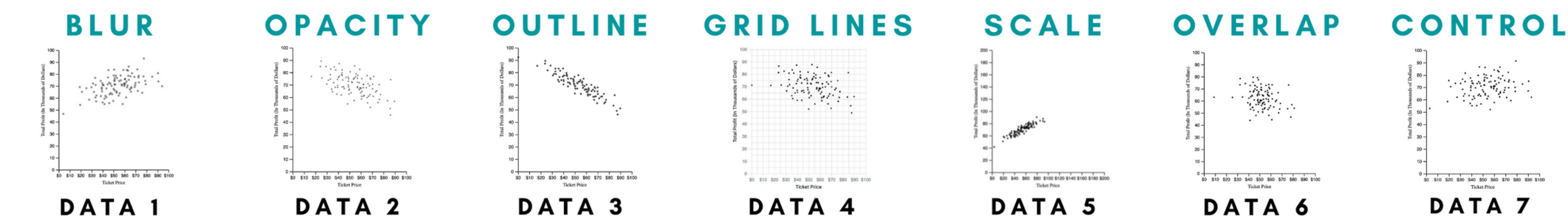
- blurred visualizations, opacity of marks, outlined marks, visualization gridlines, visualization scale changes, and overlapping marks

hypotheses

1. Participants that complete the perceptual task with camouflaged visualizations will be less accurate than those using non-camouflaged visualizations
2. Camouflaged visualizations will increase participants' perceived effort when completing perceptual tasks
3. Participants will report higher trust in non-camouflaged visualizations than camouflaged visualizations
4. In a trust game setting, people will invest more of their currency (e.g., tickets) in non-camouflaged visualizations than in camouflaged visualizations.

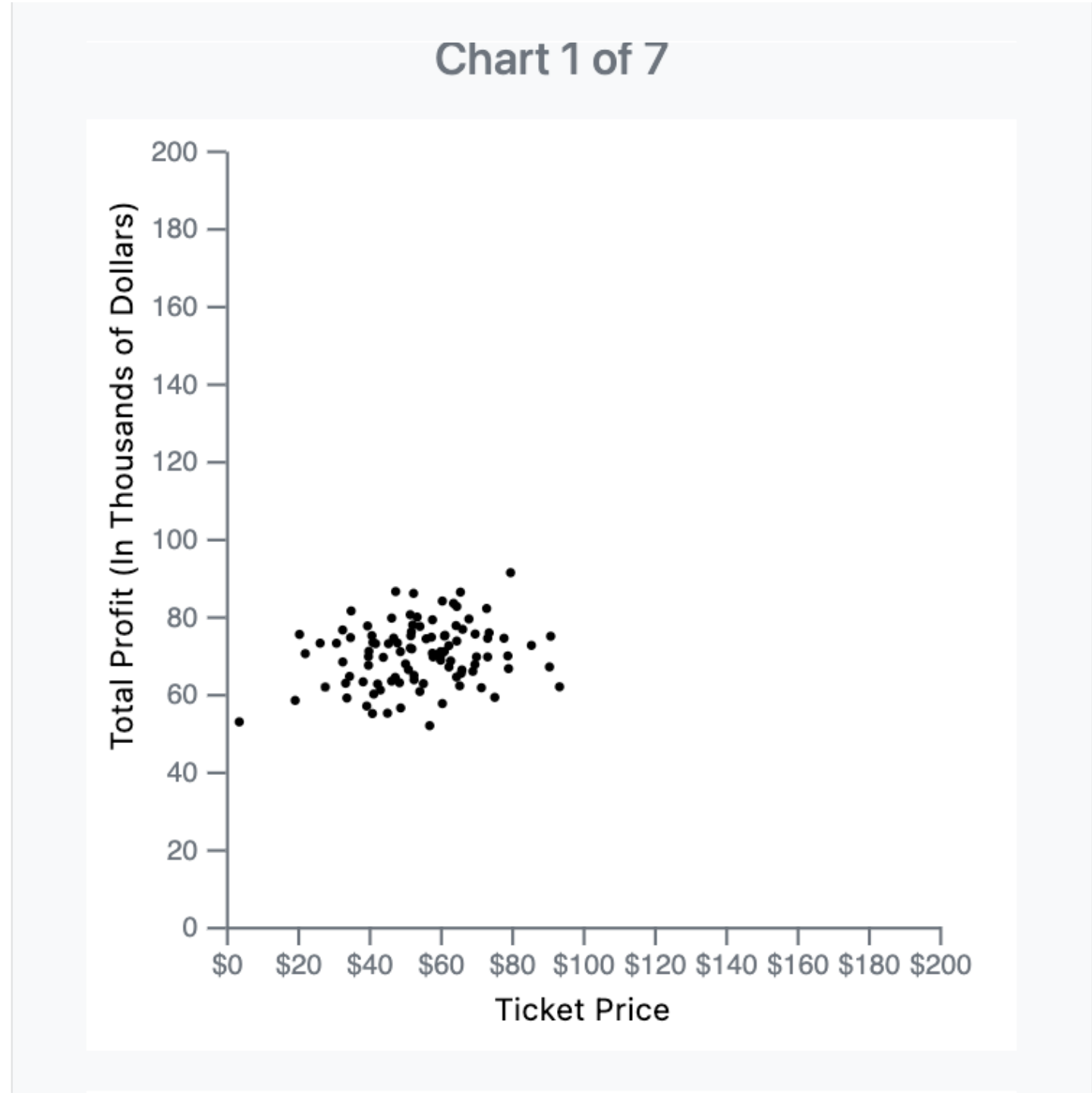
experimental procedure

experimental camouflage conditions:

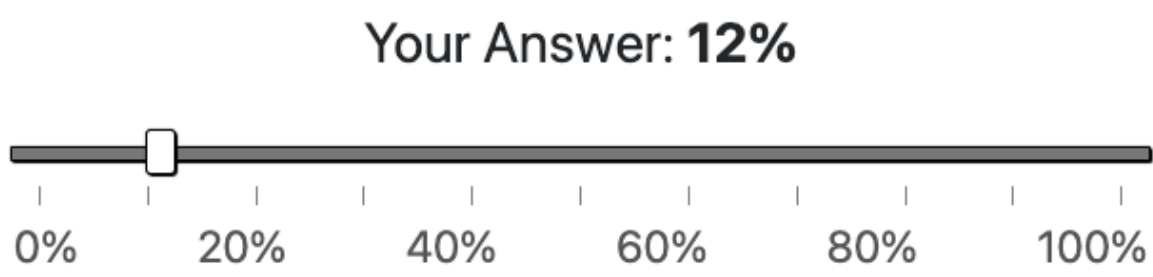


We used several different datasets along with the 6 camouflage types + 1 control (counterbalanced using a 7x7 latin square)

Experiment 1:



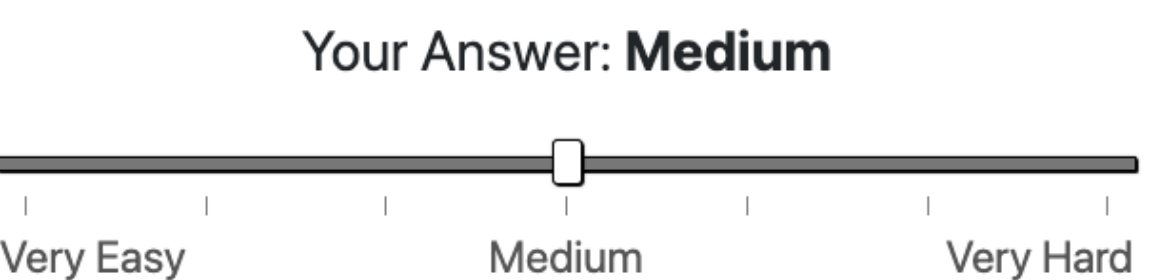
What percentage of the tickets are priced between \$10 and \$30?



Task 1: Perception Task

Participants completed a perception task (estimating the proportion of data values within a specified range)

How hard was it to answer the question above?

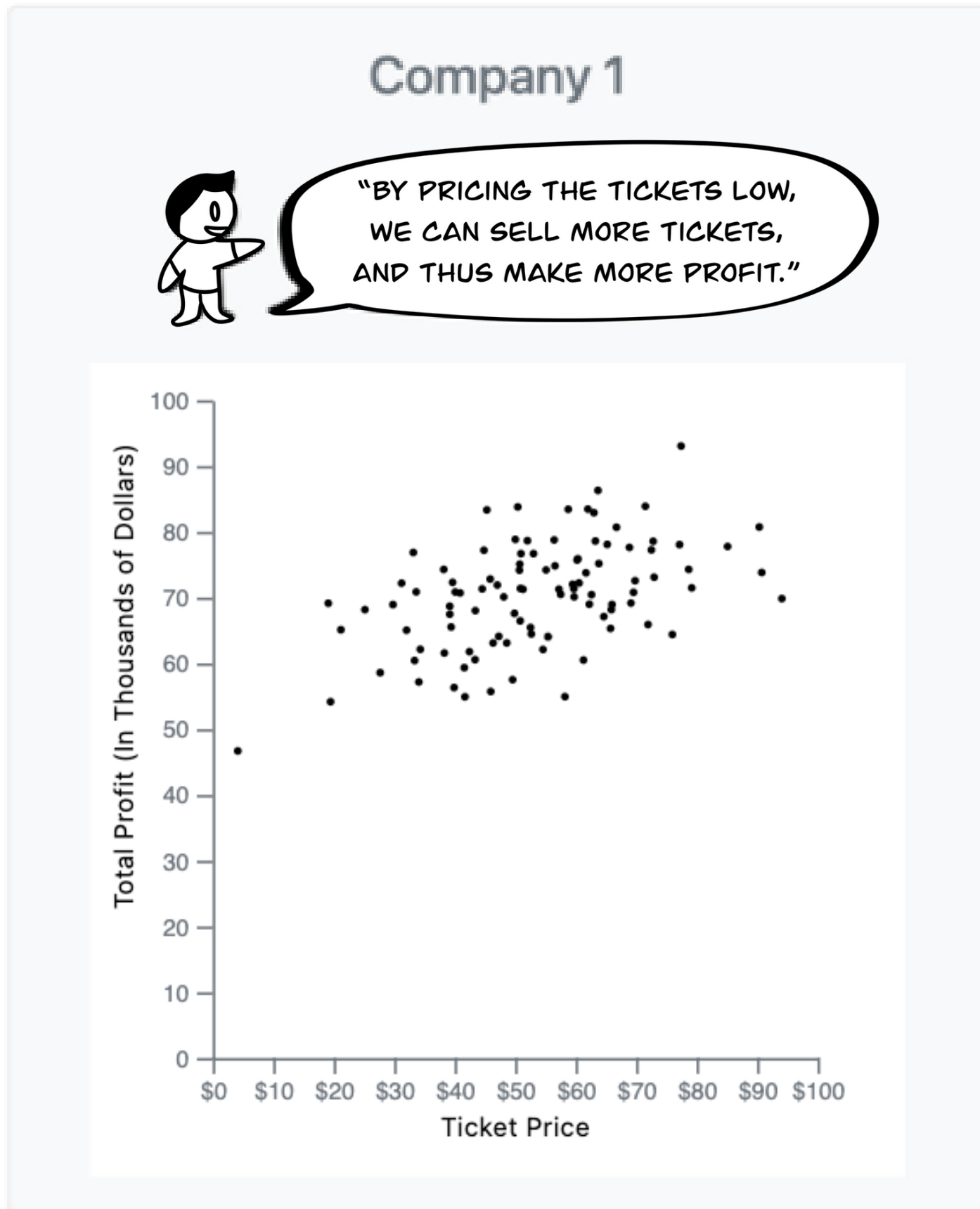
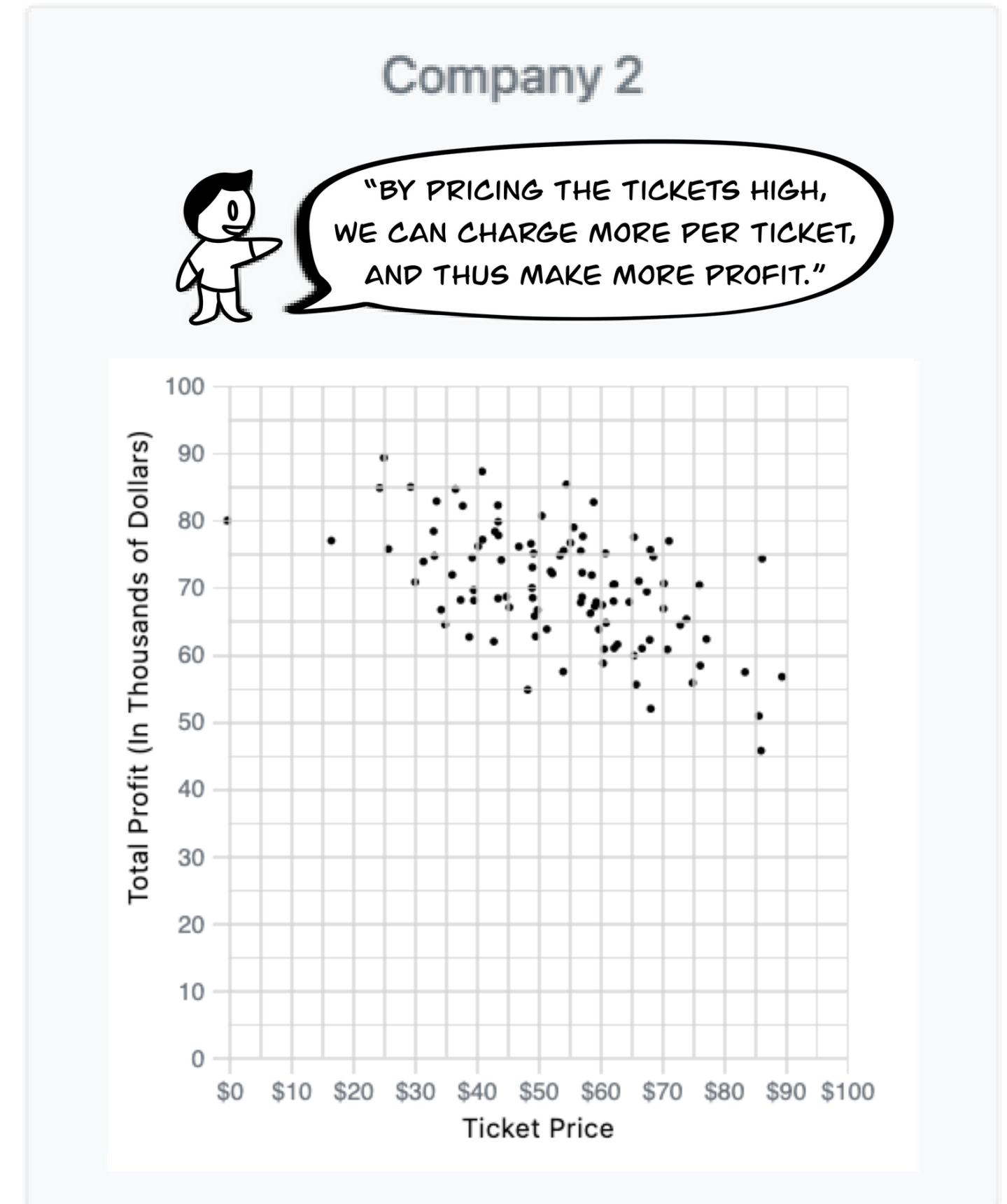


Task 2: Effort Reporting

Participants self-reported the effort (on a scale from 1 to 7) required to complete the task.

Experiment 2:

Participants viewed two visualizations depicting ticket-selling strategies from two companies (one with a positive correlation between ticket price and total profit; one with a negative correlation between ticket price and total profit)



Task 1: Allocate Tickets

Participants then reported the percentage of total tickets they would like to invest with each company (for a total of 100% of the tickets)

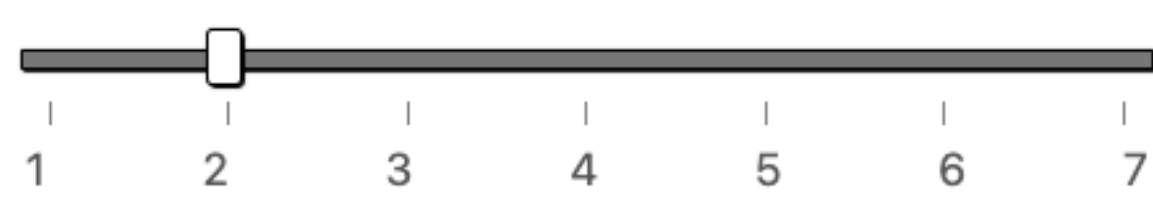
Please type the **percentage of tickets** you would like to give to Company 1 and Company 2 in the boxes below. Make sure the two percentages **add up to 100%**.

I will give % of my tickets to Company 2

I will give % of my tickets to Company 1

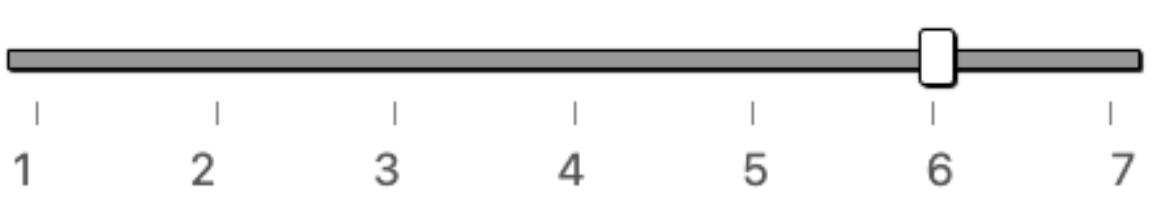
Based on the visualization above, on a scale from 1-7, how much do you trust Company 2 to help you sell tickets?

Your Answer: **2 - Slightly Trustworthy**



Based on the visualization above, on a scale from 1-7, how much do you trust Company 1 to help you sell tickets?

Your Answer: **6 - Very Trustworthy**

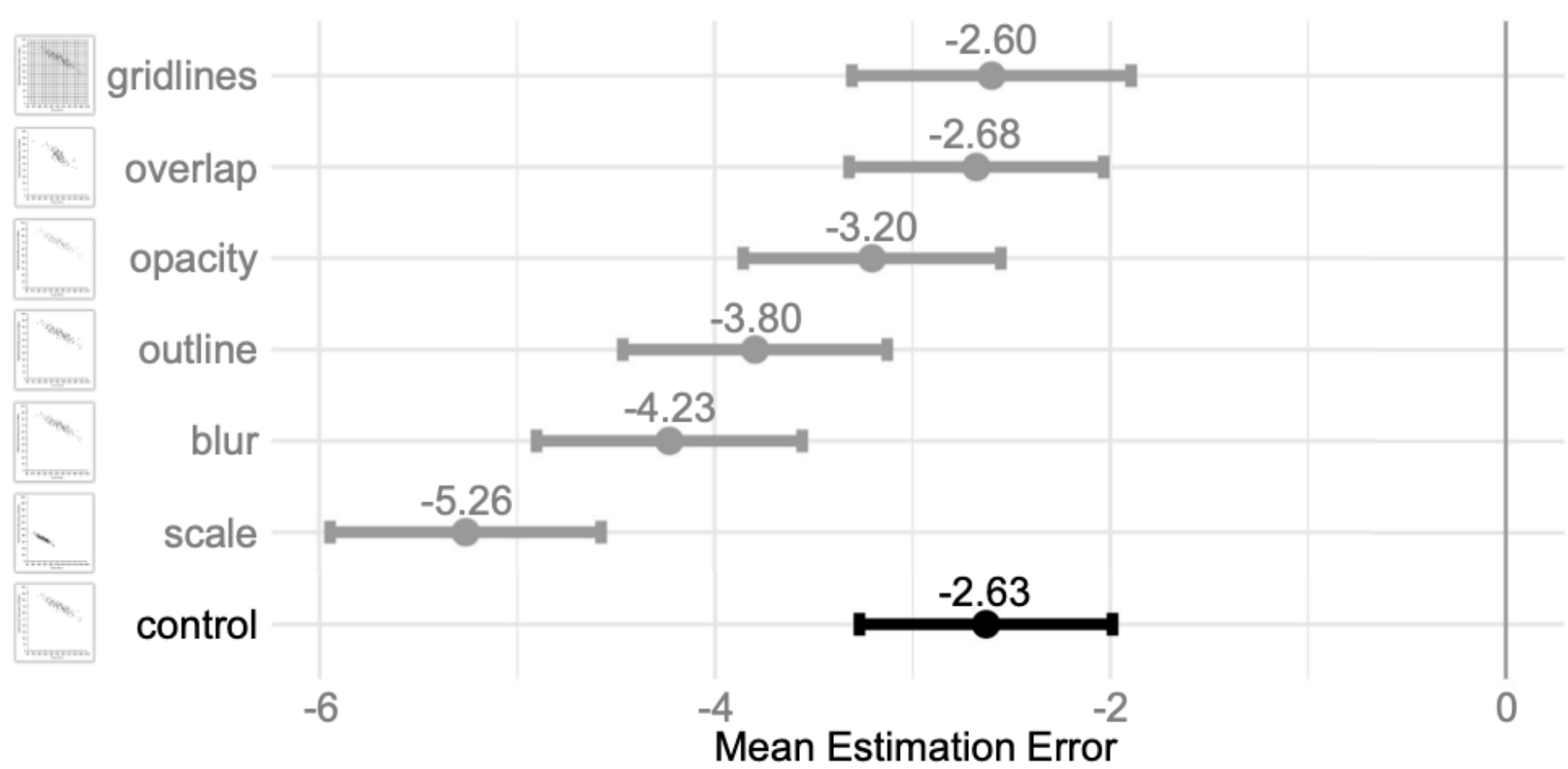


Task 2: Trust Ratings

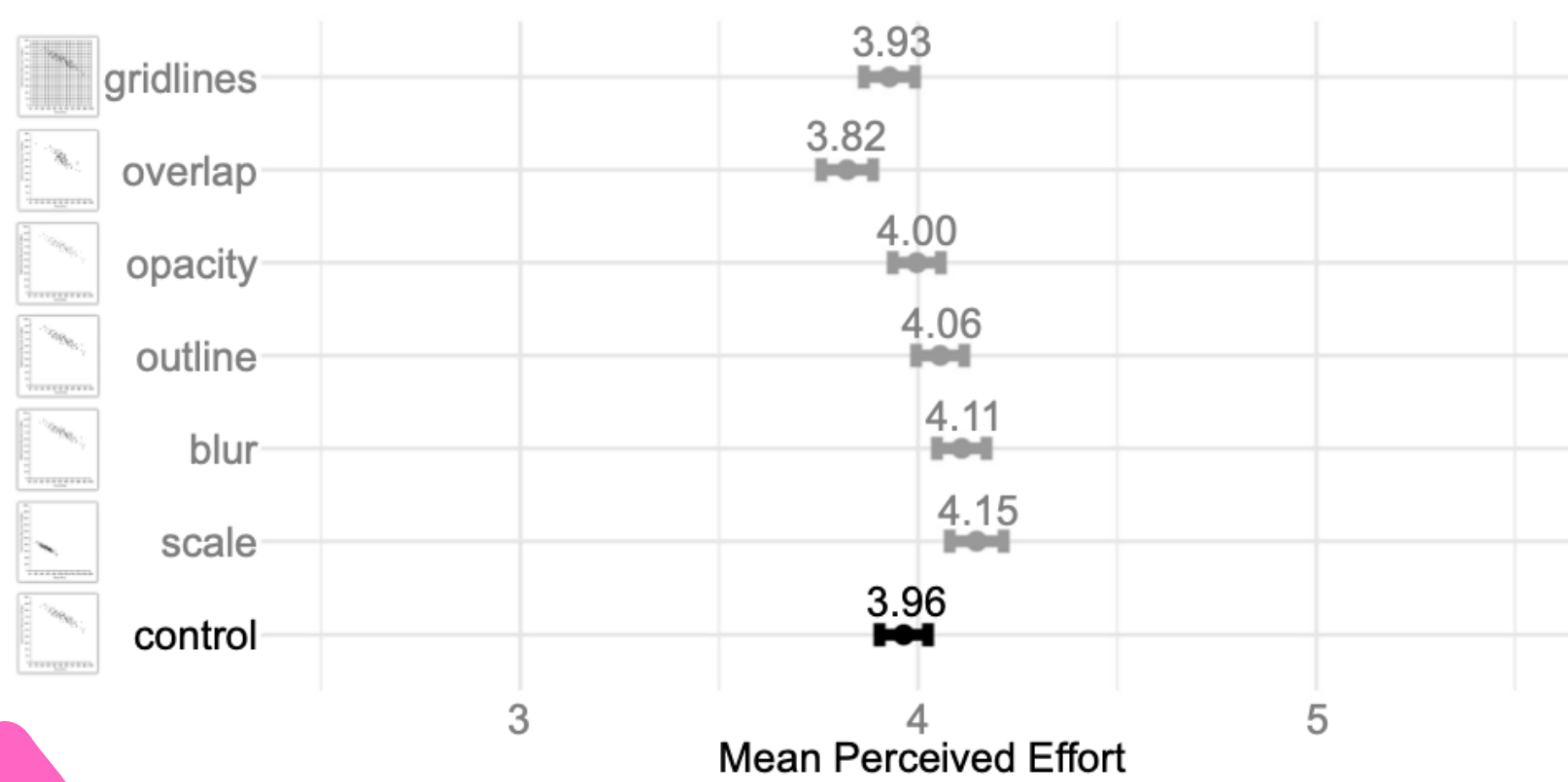
Participants reported their subjective trust ratings for each visualization (on a scale from 1 to 7)

experimental results

Experiment 1:



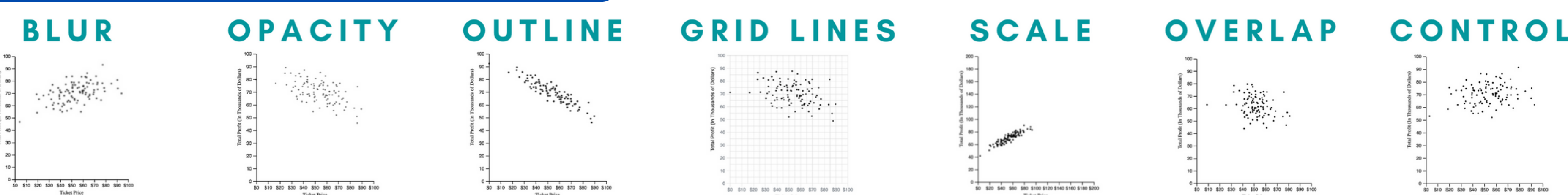
Perception Task: Participants were slightly less accurate on the perception task when they viewed the camouflaged visualization than when they the controlled version.



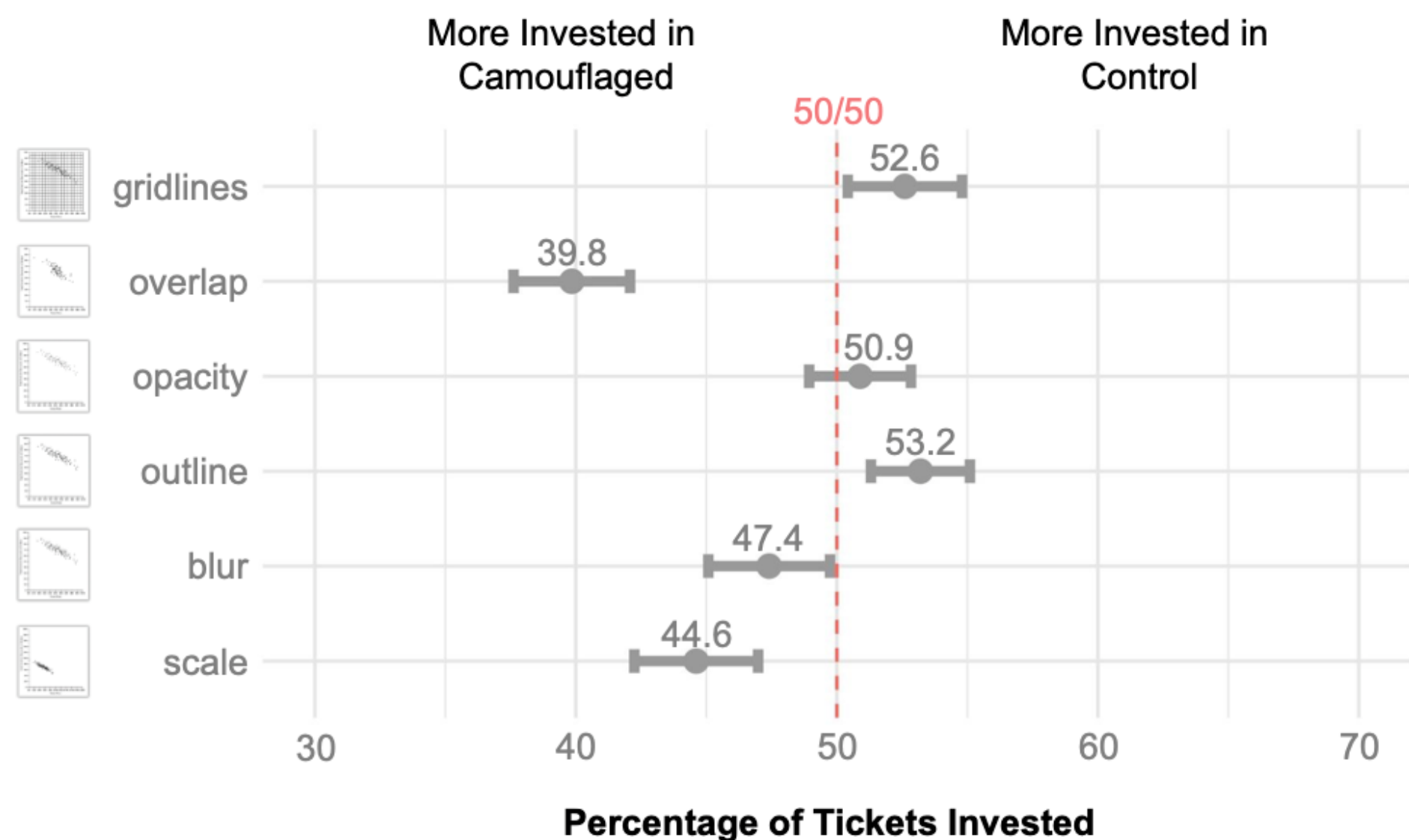
Effort Rating: Participants expressed similar levels of perceived effort for camouflaged and controlled visualizations.

ITS HARD TO SEE THOSE LITTLE CAMOUFLAGE VISUALIZATIONS UP THERE

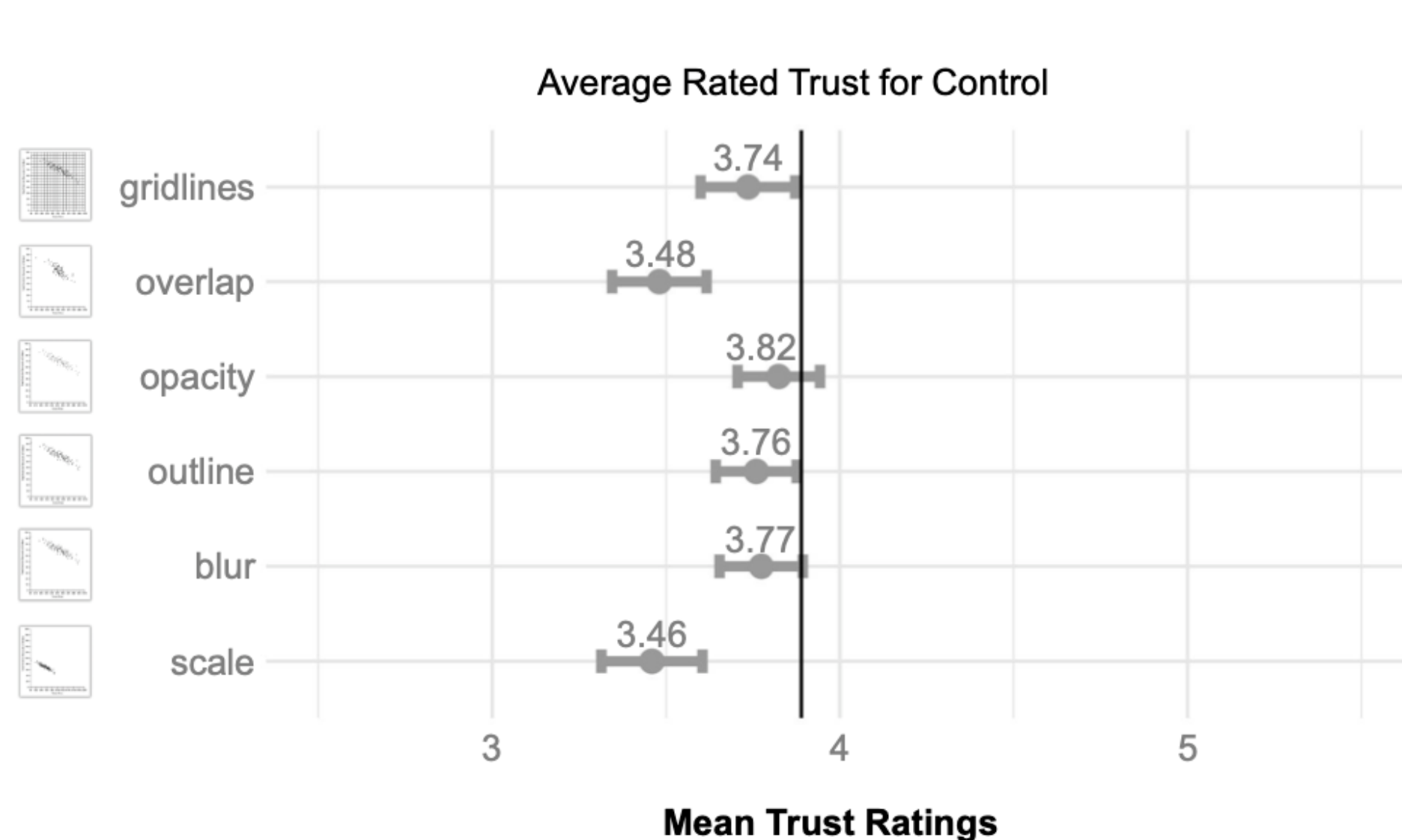
NO WORRIES! HERE THEY ARE AGAIN THESE FOR REFERENCE!!



Experiment 2:



Investment Task: On average, participants reported wanting to invest more tickets in the company with the control visualization than the company with the camouflaged visualization.



Perceived Trustworthiness Task: On average, participants rated the company with the control visualization and the company with the camouflaged visualization.

references

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- [2] M. Olszanowski, O. K. Kaminska, and P. Winkelman. Mixed matters: fluency impacts trust ratings when faces range on valence but not on motivational implications. *Cognition and Emotion*, 32(5):1032–1051, 2018.
- [3] D. M. Oppenheimer. The secret life of fluency. *Trends in cognitive sciences*, 12(6):237–241, 2008.
- [4] R. Reber, N. Schwarz, and P. Winkelman. Processing fluency and aesthetic pleasure: Is beauty in the perceiver's processing experience? *Personality and Social Psychology Review*, 8(4):364–382, 2004. PMID: 15582859. doi: 10.1207/s15327957pspr0804
- [5] M. Z'urn and S. Topolinski. When trust comes easy: Articulatory fluency increases transfers in the trust game. *Journal of Economic Psychology*, 61:74–86, 2017.