# When alternative hypotheses shape your beliefs: Context effects in probability judgments

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## Introduction

- According to support theory (Tversky and Koehler 1994) people make probability judgments based on the description of the event instead of the event itself. Crucially, the theory implies that the support of the event is independent from the other events being considered.

- However, we know in preference the utility of an option can depend on the other options also being considered. For example, adding new options reduces the probability of choosing similar options more than dissimilar options (similarity effect; Tversky 1972), which violates the independence principle.

- Windschitl and Chambers (2004) also found adding dud options can increase the likelihood judgments the dominant options (dud effect), which violates the regularity principle.

### Do independence and regularity hold in probability judgments?

- We tested whether the dud effect (study 1, $N = 102$) and the similarity effect (study 2, $N = 61$) exist in probability judgments.

- Following Windschitl and Chambers (2004), we also investigated if the dud effect and similarity effect were only present when people used a verbal probability scale as opposed to a numerical scale.

## General Methods

### Bicycle racing task

Participants were asked to estimate the probability that a bicyclist had won a race relative to 1 or 2 other bicyclists.

**Stimuli**

10 triplets bicyclists with sprinting an climbing statistics. **Sprinting ability** is how fast the bicyclist was able to complete a lap on a recent criterion race. **Climbing ability** is how far up a steep mountain in 20 minutes a bicyclist go.

Each triplet contained a target, a competitor, and a distractor bicyclist (study 1) or a resembler bicyclist (study 2). The distractor is dominated by the target. The resembler is similar to the target.



### Measure

Replicating Winschitl and Chambers (2004), half of the participants estimated the probability of the bicyclist winning with a verbal scale and the other half used a numeric scale.
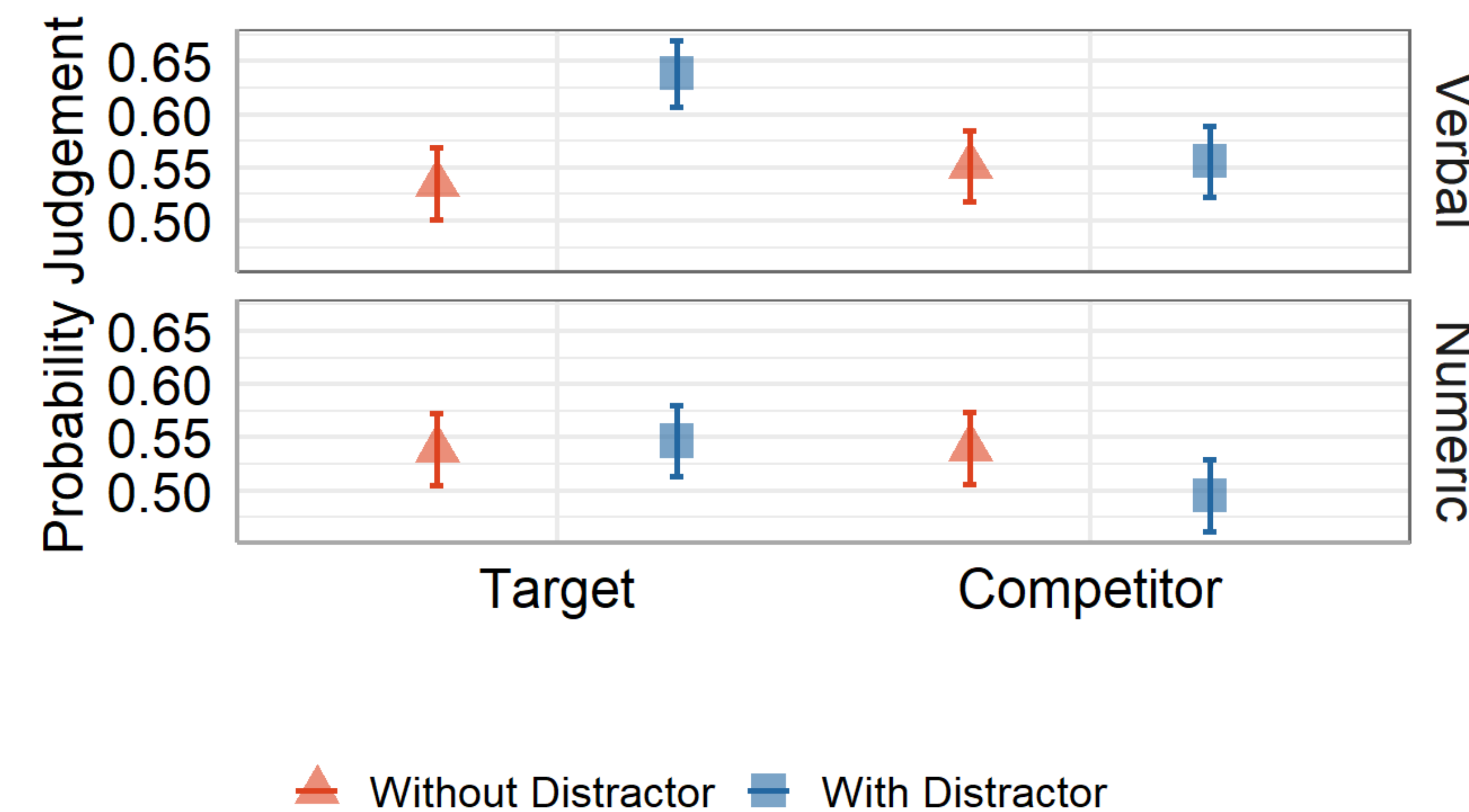
## Study 1 (Dud Effect) Results



Figure 1: Subjective probability that a bicyclist would win in tests of the violation of regularity and independence. Error bars are the 95% predicted credible interval.

### Regularity

- The verbal estimates for the targets winning were credibly higher when the distractors were present (blue) than when the distractors were absent (red) ($b = 0.19$, CI [0.12, 0.25]), which shows the violation of regularity.

- The numeric estimates for the targets winning were similar when the distractors were present and absent ($b = 0.01$, CI [-0.05, 0.07]).

### Independence

- Without distractors, the probability estimates for the targets and the competitors were similar. However, when the distractors were present, the estimates of targets were higher than those given for the competitors ($b = -0.18$, CI [-0.27, -0.09]).

- The violation of independence was present for both numeric and verbal scales ($b = 0.09$, CI [-0.04, 0.22]).

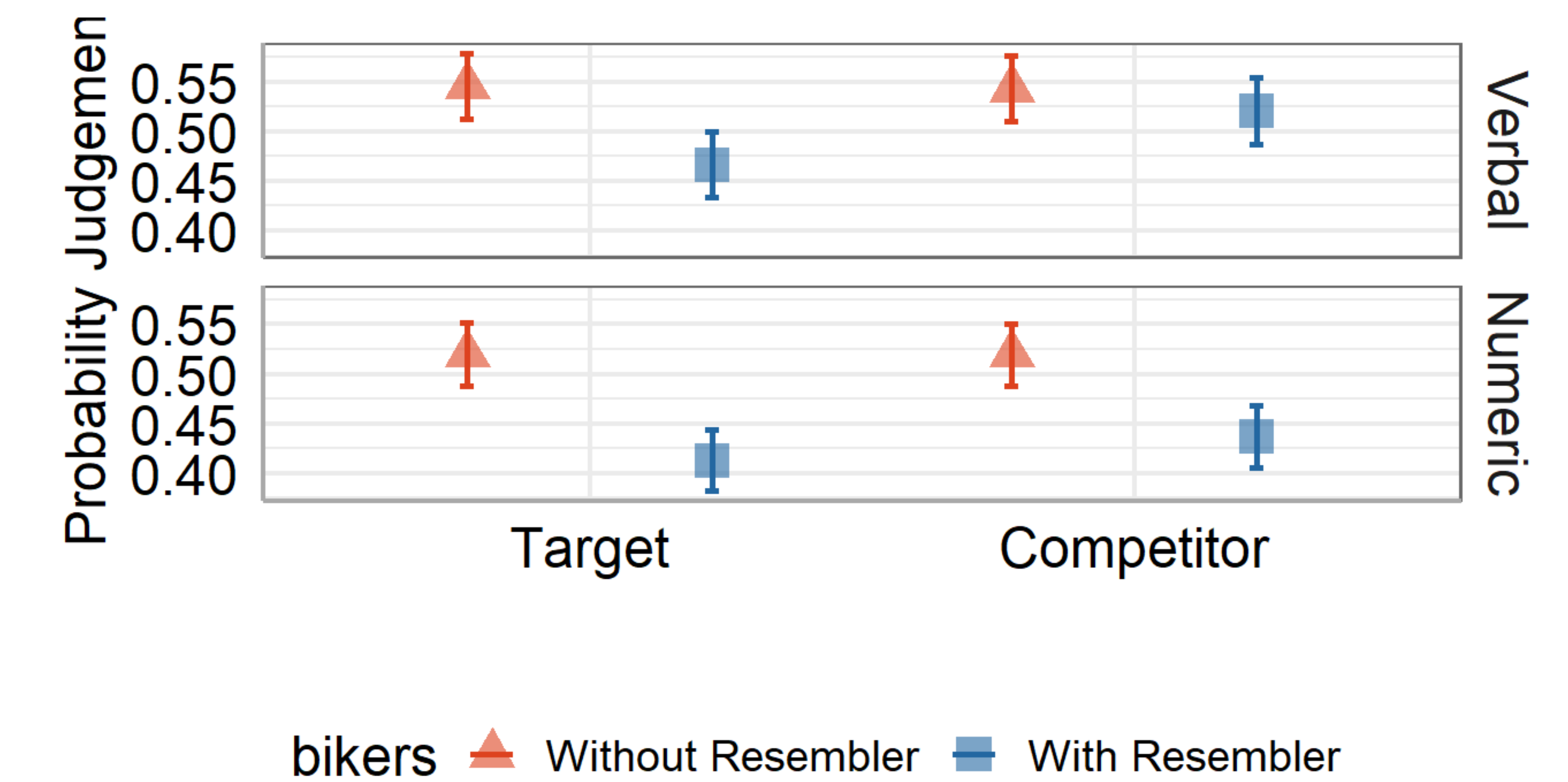## Study 2 (Similarity Effect) Results



Figure 2: Subjective probability that a bicyclist would win in tests of regularity effect. Error bars are the 95% predicted credible interval.

- Without resemblers, the probability estimates for the targets and the competitors were similar. However, when the resemblers were present, the estimates for targets were lower than those given for the competitors ($b = 0.10$, CI = [0.02, 0.18]).

- The violation of independence was present for both numeric and verbal scales ($b = -0.06$, CI [-0.17, 0.06]).

## Discussion

- We found the dud effect and the similarity effect in probability judgment. These context effects invalidate the independence and regularity assumptions of support theory.
- The dud effect was only presented for the verbal scale but not for the numeric scale, which replicated Windschitl and Chambers (2004)'s study. But the similarity effect was presented for both scales. The scale might not change the process of probability judgment.
- Choice and probability judgment have similar context effects, which suggests a similar process may underlie the construction of preference and belief.

## Contancts

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## References

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