

Abstract

- ◆ Common-ratio effects (the certainty effect and the possibility effect) violate expected utility theory.
- ◆ Previous research^{1–3} shows that these effects are eliminated in multiple-play decisions, but **seven new studies** ($N = 2391$) and two small meta-analyses show that they are not.⁴
- ◆ On average, **common-ratio effects are reduced but not eliminated in multiple-play decisions**. In within-participants studies, **common-ratio choice patterns almost always remain the modal or majority patterns**.
- ◆ The oft-cited benefits of multiple plays for the rationality of decision makers' choices⁵ may be smaller than previously realized.

Background

Common-ratio effects

- ◆ In a **scaled-up problem** (with high probabilities), the lower-EV option is usually preferred.

100% chance of \$60 > 80% chance of \$100
- ◆ In a **scaled-down problem** (with probabilities that are reduced by a common ratio), the higher-EV option is usually preferred.

25% chance of \$60 < 20% chance of \$100
- ◆ This reversal is a **common-ratio effect**. The choice pattern violates EU theory.
- ◆ There are two types of common-ratio effects.

In the **certainty effect**, the lower-EV option in the scaled-up problem is a sure thing, as above.

The **possibility effect** is similar, but there is no sure thing and the scaled-down problem has options with very low probabilities (e.g., 1% and 2%).

Multiple-play decisions

- ◆ In a **multiple-play decision**, a single choice will be played many times, with outcomes aggregated over plays.
- ◆ Previous research^{1–3} shows that common-ratio effects are **eliminated** in multiple-play decisions.

Usually, more people choose the higher-EV option in the scaled-up problem in multiple play than in single play.

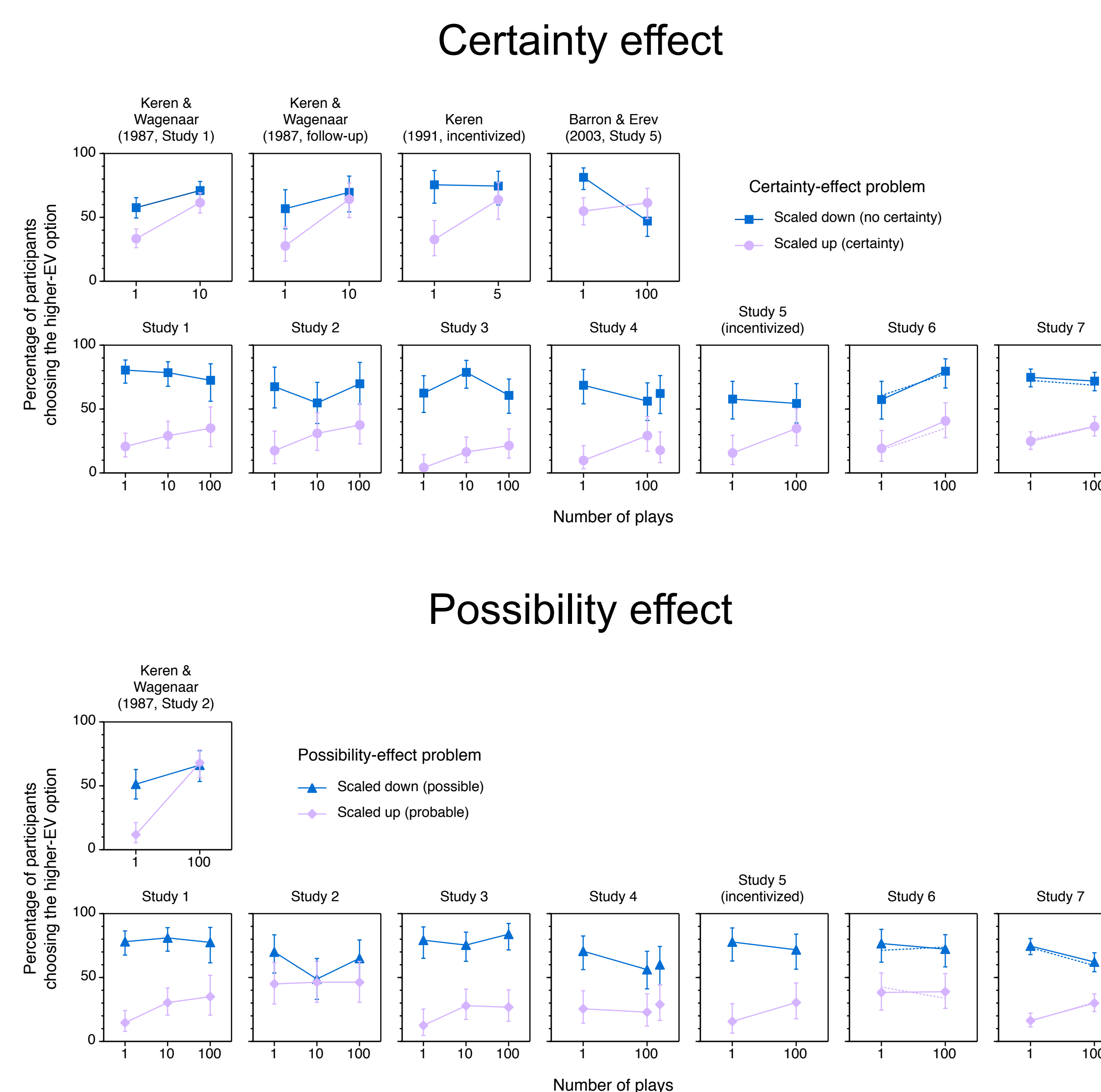
Method

- ◆ We conducted **seven studies** with a mix of participants (CMU, OSU, MTurk) and methods (e.g., within- and between-participants designs).⁴

Results

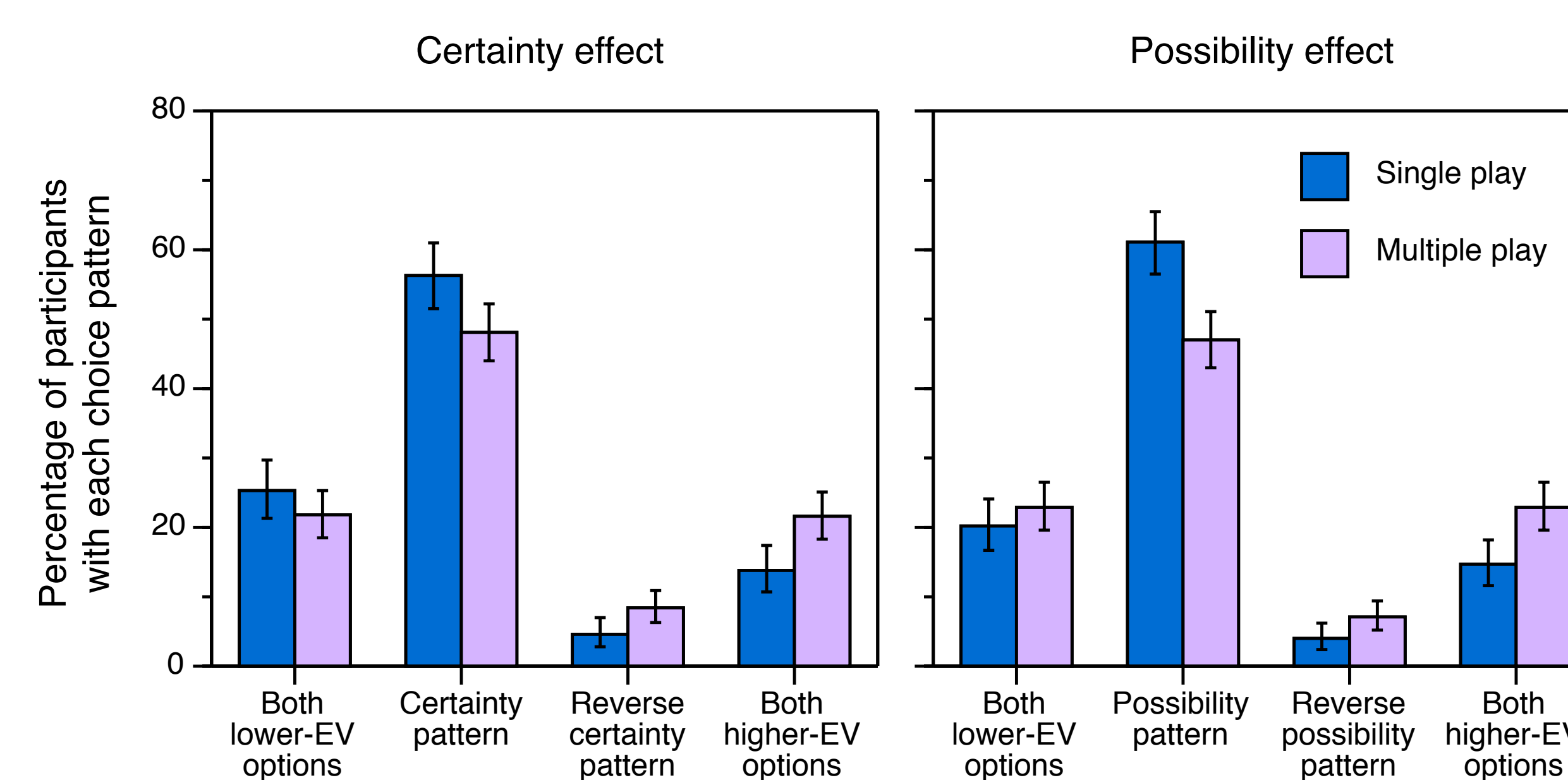
Persistence of effects

- ◆ In our studies, **common-ratio effects persisted in multiple-play decisions**. In the figures below, compare the previous studies (top row) to our new studies (bottom row).



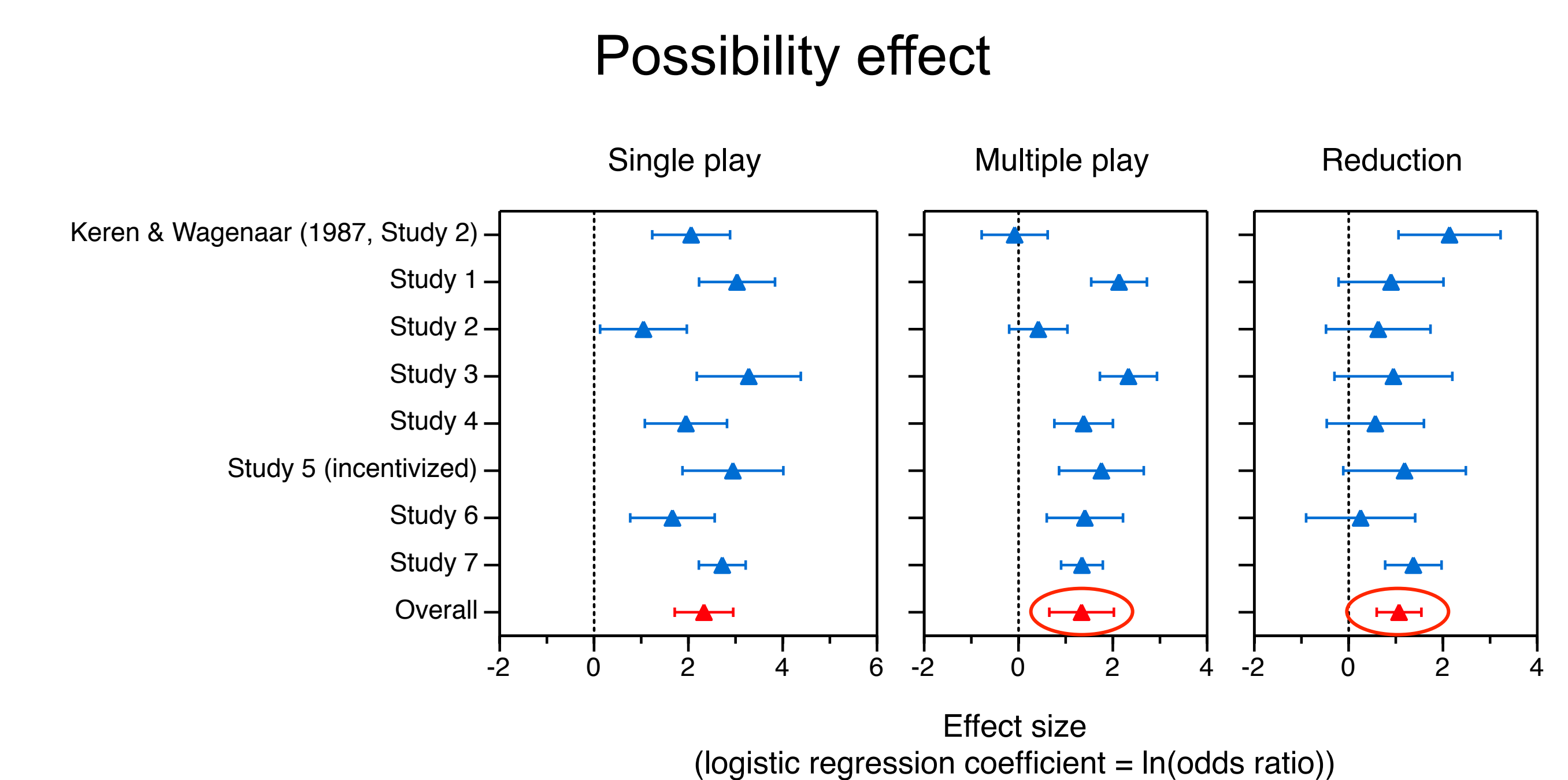
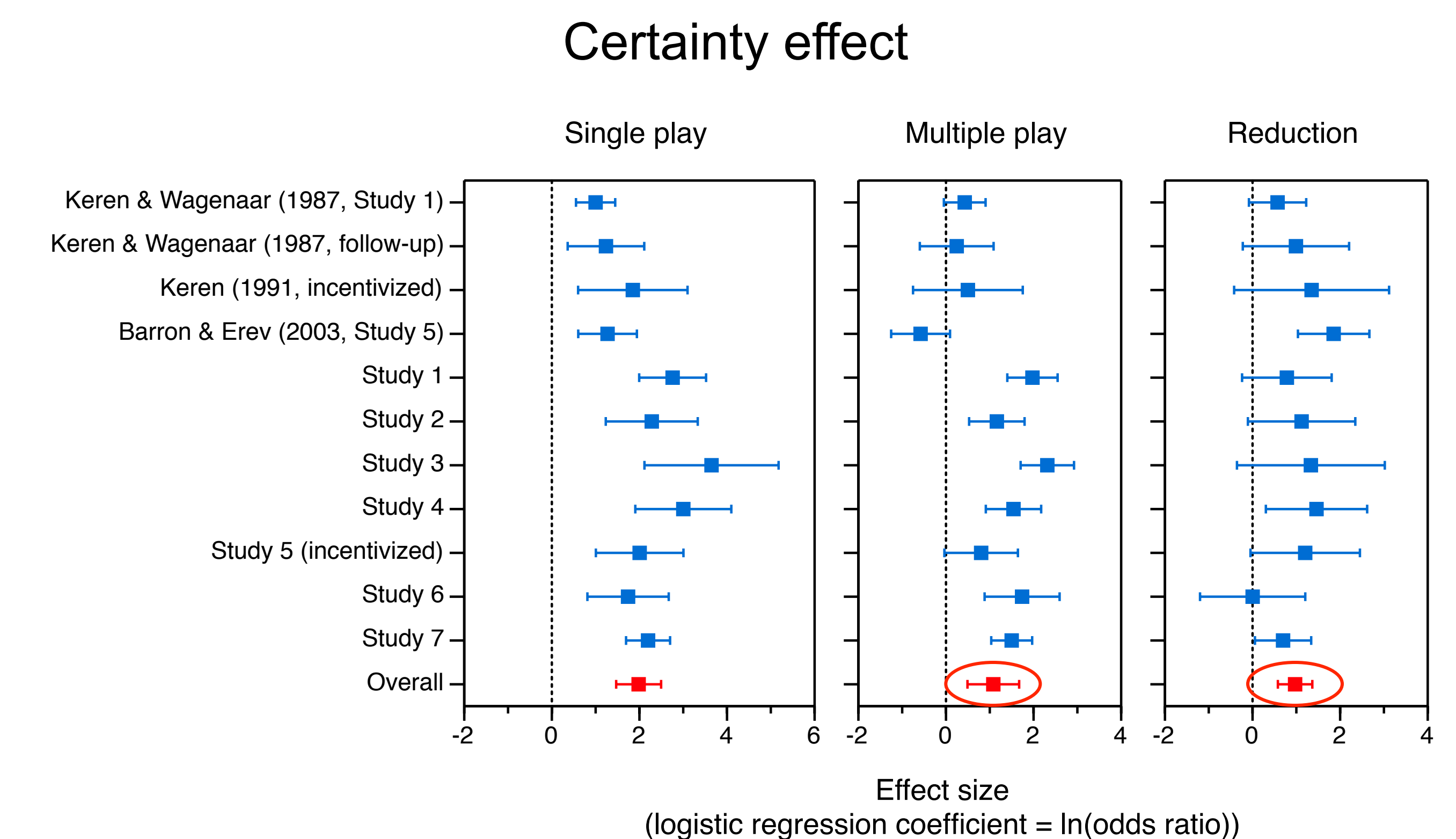
Within-participant choice patterns

- ◆ In our six within-participants studies, common-ratio choice patterns almost always **remained the modal or majority patterns**.



Meta-analyses of old and new studies

- ◆ On average, common-ratio effects are **reduced** in multiple-play decisions (right panels below), but they are **not eliminated** (middle panels).



Generality of results

- ◆ Our primary results were **not significantly moderated** by (a) prompts that encouraged a long-run perspective, (b) participants' insight into long-run payoffs, or (c) participants' numeracy.
- ◆ Upon close inspection, **other EU violations** (e.g., preference reversals) are also reduced but not eliminated in multiple-play decisions.

References

1. Keren, G., & Wagenaar, W. A. (1987). Violation of expected utility theory in unique and repeated gambles. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 13, 387–391.
2. Keren, G. (1991). Additional tests of utility theory in unique and repeated gambles. *Journal of Behavioral Decision Making*, 4, 297–304.
3. Barron, G., & Erev, I. (2003). Small feedback-based decisions and their limited correspondence to description-based decisions. *Journal of Behavioral Decision Making*, 16, 215–233.
4. DeKay, M. L., Schley, D. R., Miller, S. A., Erford, B. M., Sun, J., Karim, M. N., & Lanyon, M. B. (2016). The persistence of common-ratio effects in multiple-play decisions. *Judgment and Decision Making*, 11, 361–379.
5. Wedell, D. H. (2011). Evaluations of single- and repeated-play gambles. In J. J. Cochran (Ed.), *Wiley encyclopedia of operations research and management science*. John Wiley & Sons.