

The Effect of Oxytocin in Collective Decision Making

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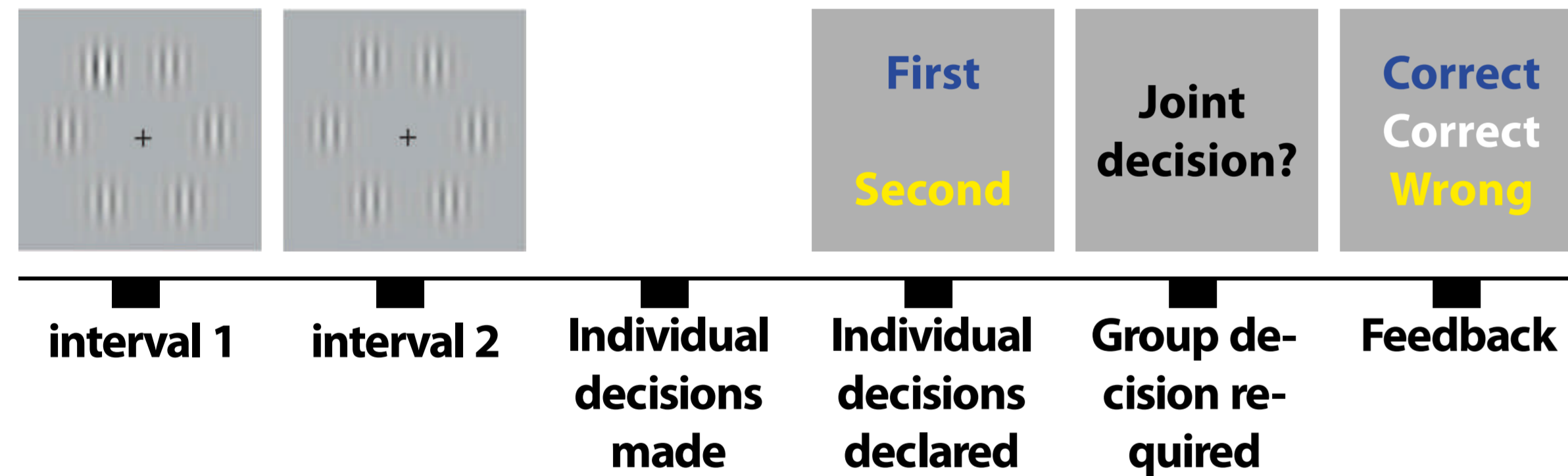
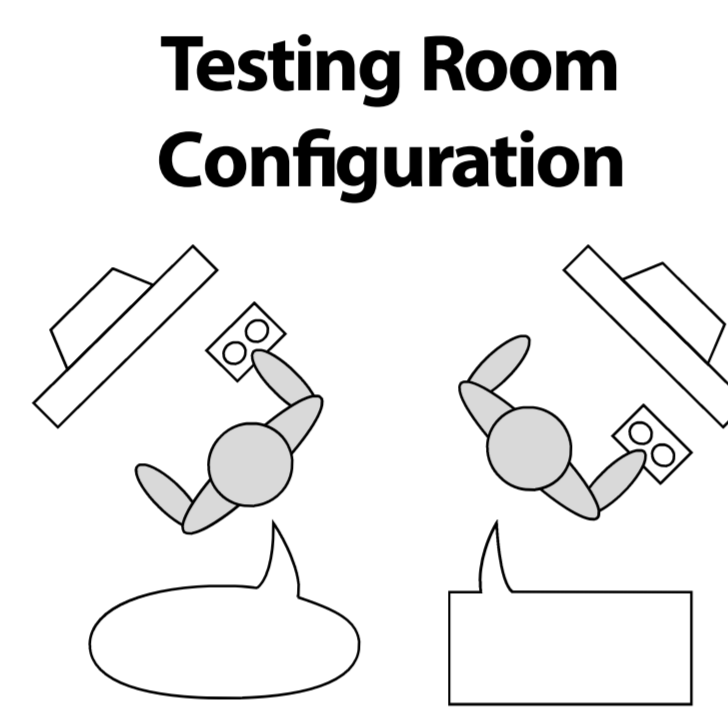


Introduction

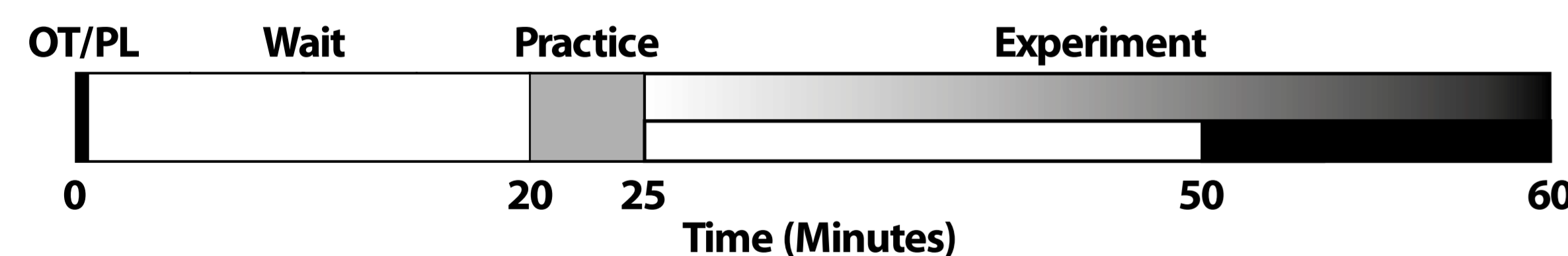
Collaboration benefits both the individual and the group in a variety of contexts, including simple perceptual decision making. However, cooperation is not always the chosen (or indeed the rational) strategy. Self-interest often trumps common interest, as group members make decisions aimed at maximizing their personal gain regardless of, and sometimes against, the group's interests. Collective decisions can also be suboptimal when participants fail to calibrate their contribution to the group with their own performance, with bad performers tending to be overconfident and good performers tending to be underconfident. Hormones such as oxytocin promote trust, within-group altruism and attention to social cues.

Methods

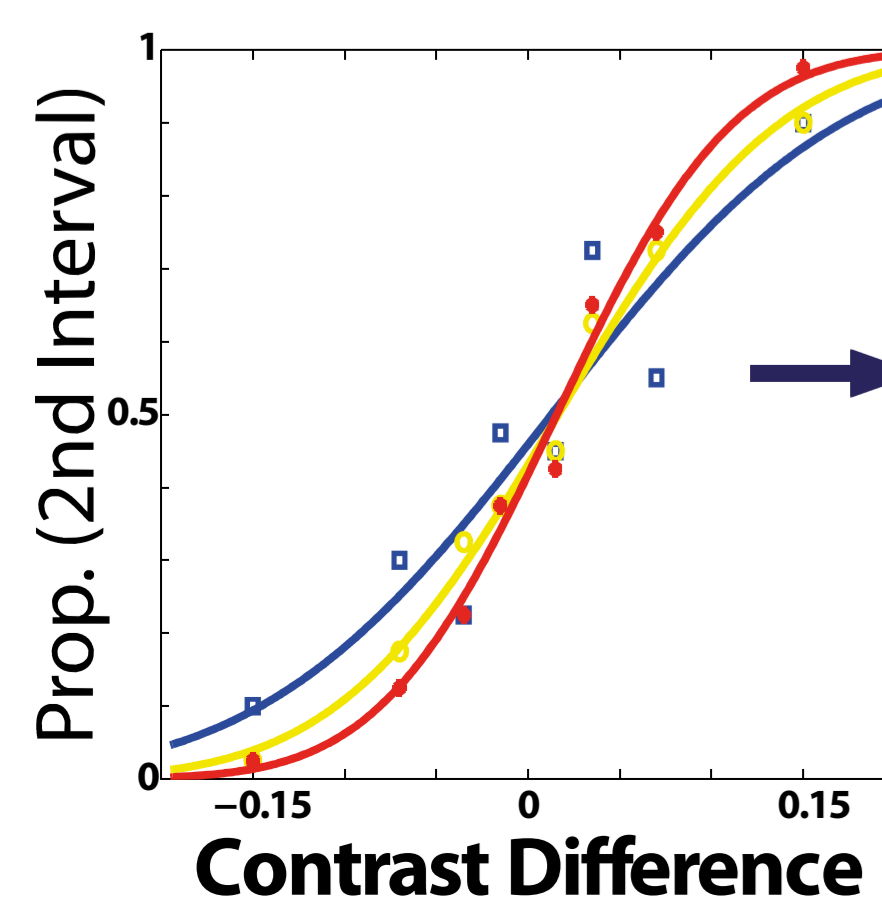
Dyad members sat in a room and performed a 2-alternative forced choice task (visual odd ball detection) together. On each trial, there were two intervals and participants had to decide in which interval a target (a higher contrast grating) appeared. In trials in which dyad's initial responses diverged a collaborative decision was reached after free discussion. Joint decision announcement arbitrated between dyad member. One Feedback was given after each trial.



Data was collected from 47 pairs of male participants (age 22.5 ± 3, 9 pairs were discarded). We used a double-blind placebo-controlled design. Participants self-administered intra-nasal oxytocin (OT) or placebo (PL), and then waited for 25 minutes before starting a self paced experimental block consist of 320 trials, lasting at least 35 minutes.



Psychometric functions for data from one example dyad relating the individual and group choice to stimulus strength. The proportion of trials on which the observer reported that the target was presented in the second interval is plotted as a function of the target's contrast difference from on targets. The data have been fitted with cumulative Gaussian curves, resulting with slopes reflecting individual (yellow and blue) and collective (black) performance, which exceeds the performance of either individual.

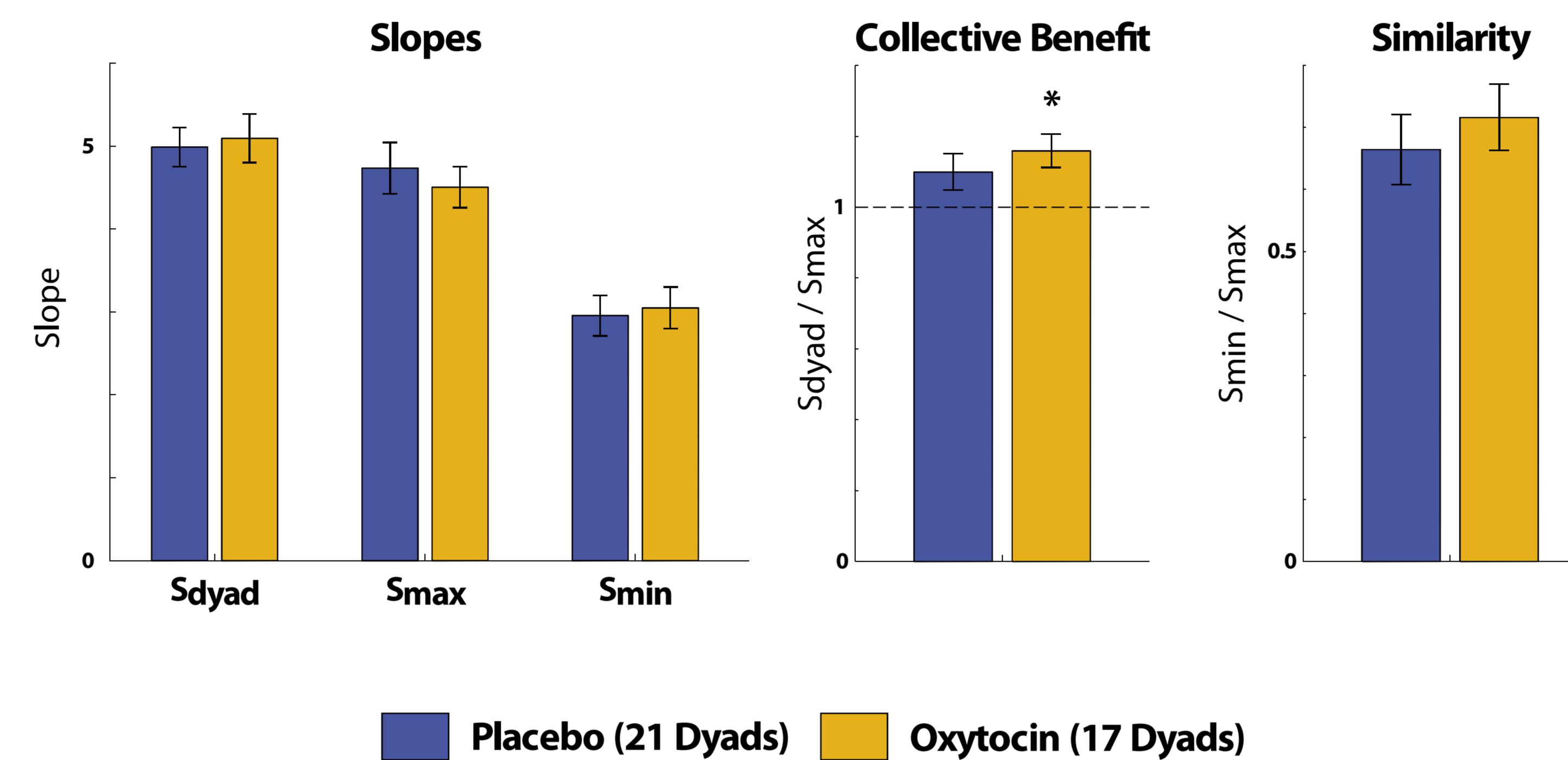


$$\text{Collective Benefit} = \frac{S_{Dyad}}{S_{Max}}$$

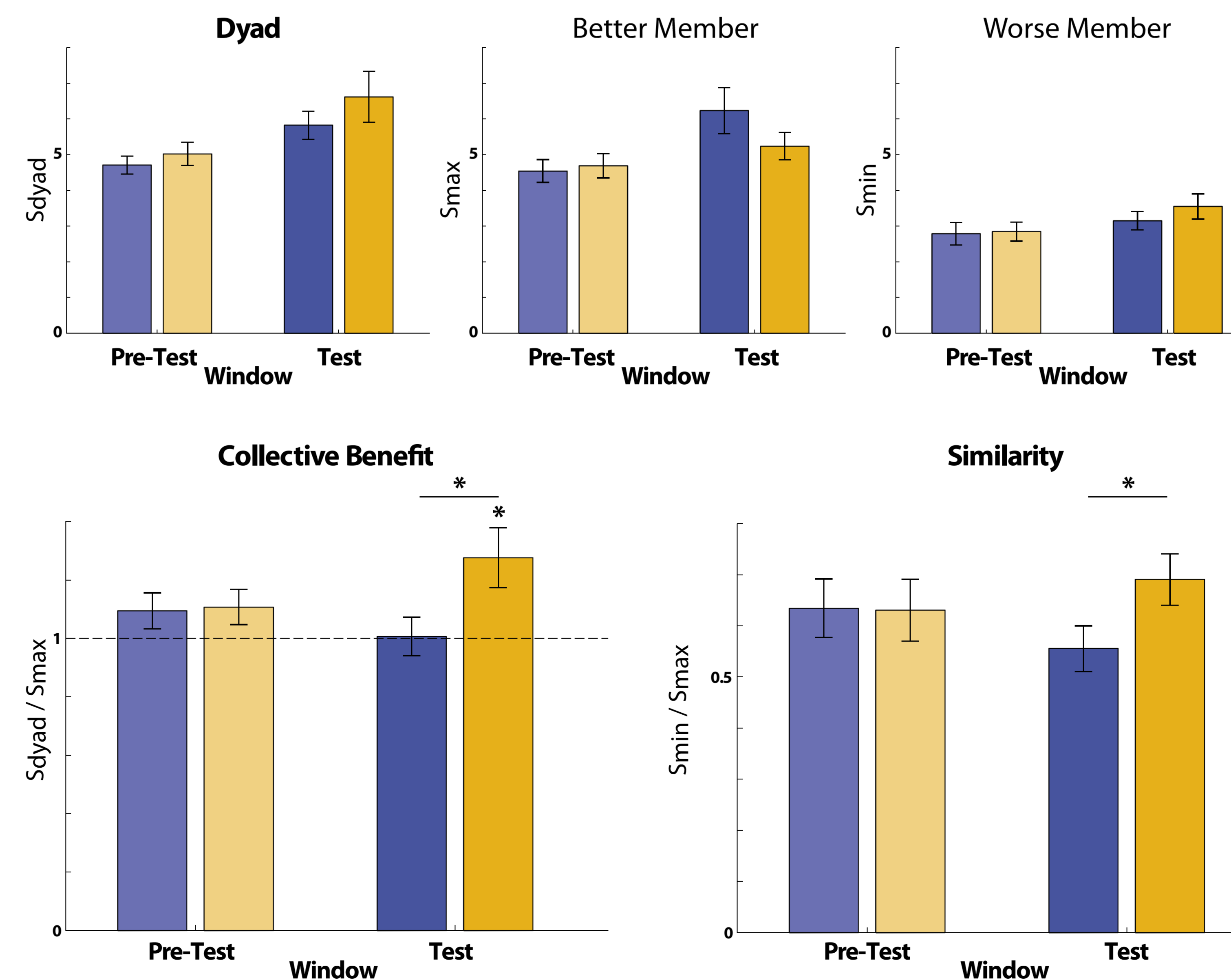
$$\text{Similarity} = \frac{S_{Min}}{S_{Max}}$$

Results

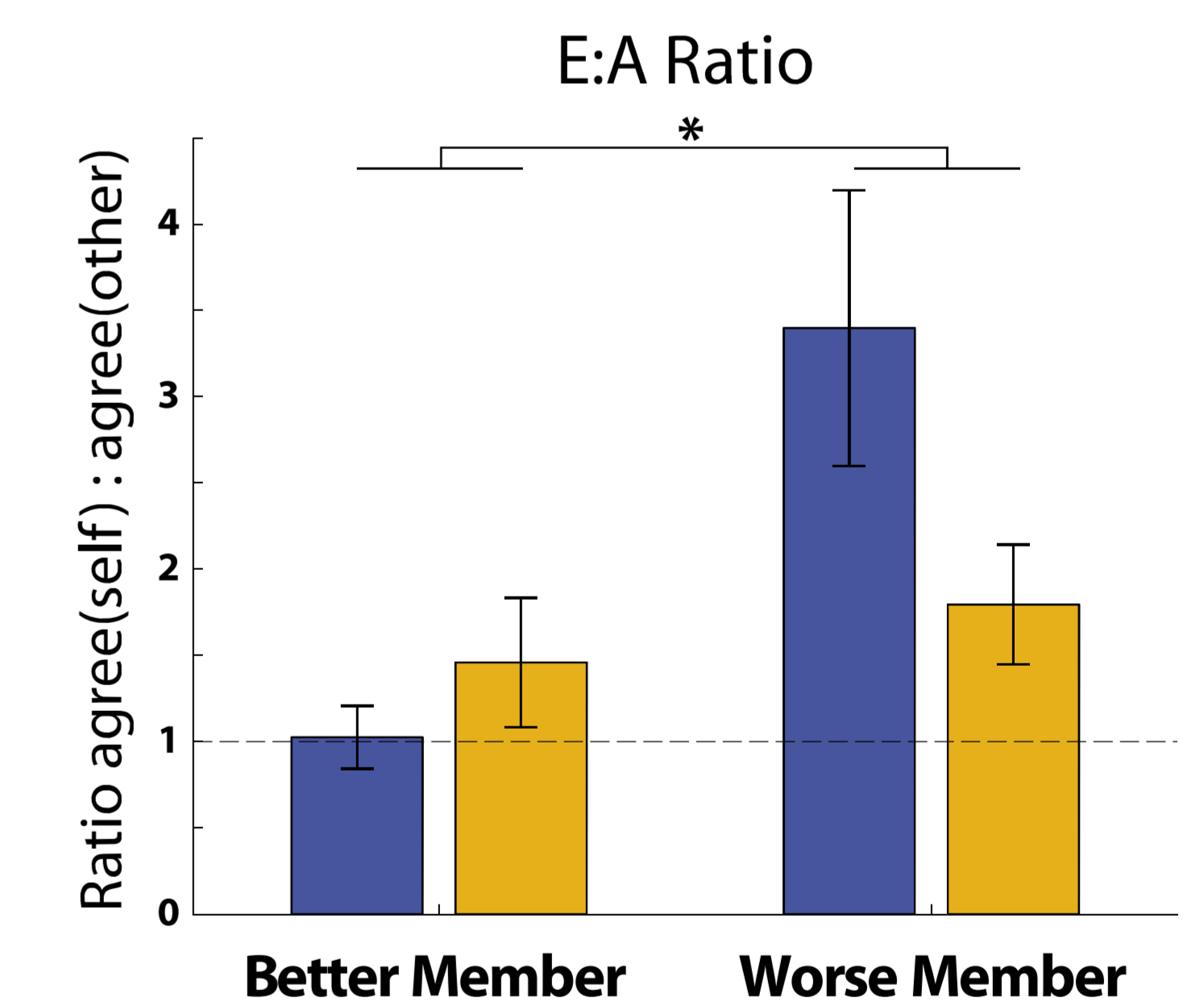
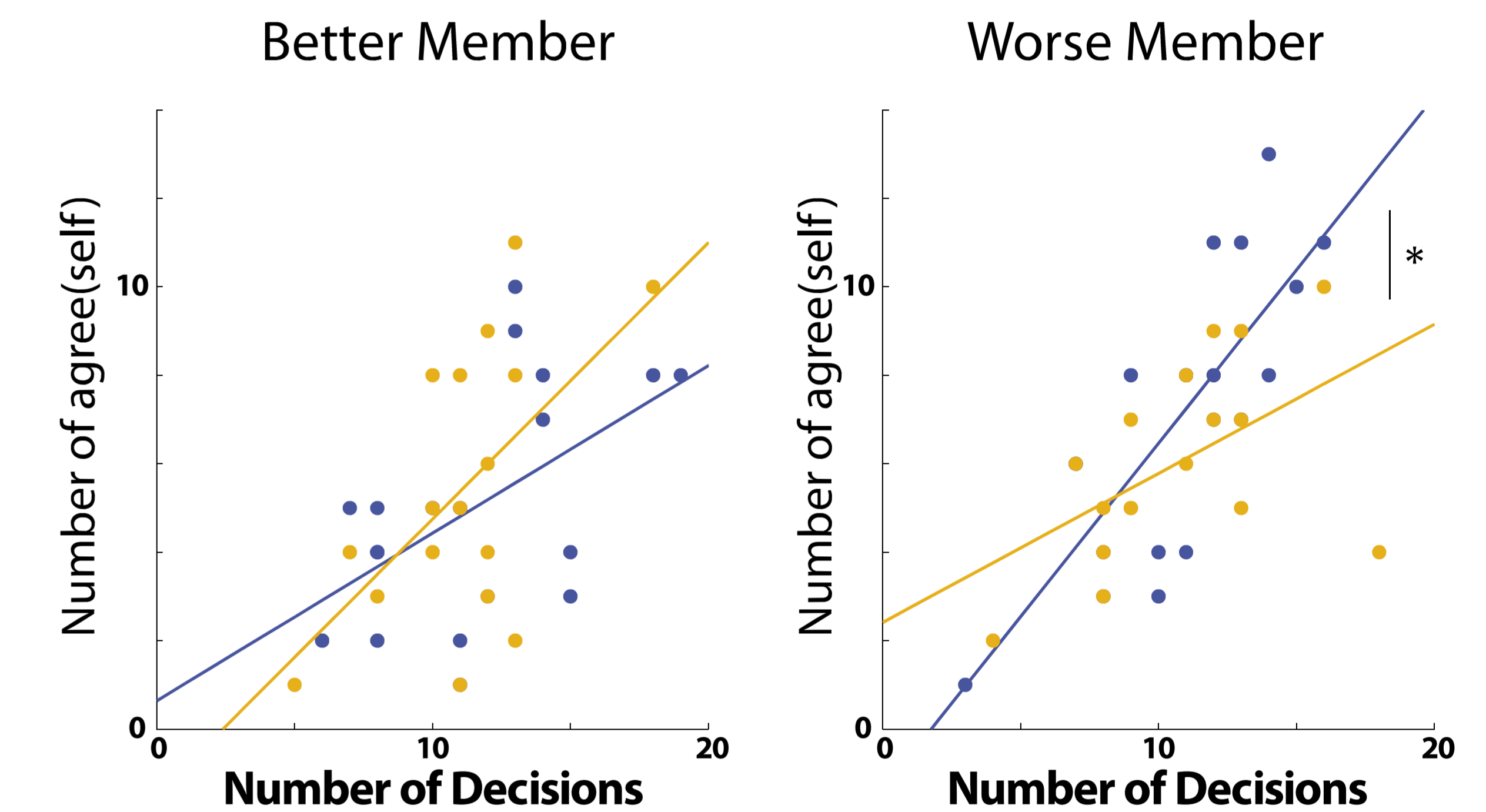
1. Performance in the entire experiment duration - hints for improvement under oxytocin.



2. Delayed effect of oxytocin on collective decision making - increased collective benefit and similarity with oxytocin 50-60 minutes after administration.



3. Egocentric-Allocentric (E-A) ratio of joint decisions during test window - during disagreements oxytocin resulted in a greater commitment in the better performing dyad member to their original decision and a greater tendency for the worse dyad member to change his mind.



Summary

We observed an advantage in collective benefit under oxytocin. A role-dependent effect, whereby the performance of the more accurate dyad member was attenuated over time resulted in an increased within dyad behavioural similarity under oxytocin compared to placebo. Increased similarity resulted in an increased collective benefit. Moreover, during disagreements oxytocin resulted in a greater commitment in the better performing dyad member to their original decision and a greater tendency for the worse dyad member to change his mind. These results are consistent with increased awareness of social cues and preference for a common interest over self-interest following oxytocin administration. More generally the role-dependent effect observed highlights the importance of context for the expression of exogenous oxytocin-induced behavioural effects.