Risk-Seeking Attitude Manifested via Overvaluation of Rewards Rather than Biased Weighting of Probability in Sensorimotor Tasks

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Our daily decisions are seldom made in vacuum but heavily rely on explicit and implicit uncertainties. Previous decision-making studies have demonstrated that explicit uncertainty leads to risk-averse tendency, while implicit sensorimotor uncertainty results in risk-seeking tendency. A hypothetical account for this discrepancy is that the overconfidence on one's own motor performance inflates the subjective estimate of success. Here we compared participants' decisions for a traditional lottery versus two novel sensorimotor lotteries of which reward probability was calibrated from individual's performance on the corresponding sensorimotor task: The keyboard task required the participant to intercept a moving object by pressing a keyboard button when it passed a central circular region on a computer display, whereas the touch-screen task required direct reach-to-touch interception at the same region. Participants had to choose between a risky bet and a sure bet. The risk attitude was assessed under the framework of cumulative prospective theory (CPT) which separately estimates parameters for probability weighting and outcome valuation. Intriguingly, and somewhat counter-intuitively, participants showed a significant tendency to overvalue the reward of the touch-screen lottery but undervalue it in the traditional lottery, whereas the bias of valuation for the keyboard lottery was in-between but also significantly different from the other conditions. By contrast, there was no significant difference in the probability parameter was found among conditions. We suggest that personal efforts may alter the subjective valuation of outcome rather than weighting of probability, with a few caveats awaiting future investigations.

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