CORRESPONDENCE: REPLY TO 'Systematic Overestimation of Reflection Impulsivity in the Information Sampling Task'

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In our first publication on the Information Sampling Task (IST), published ten years ago, we provided a simple equation (readily calculated in MS Excel) for estimating the level of uncertainty that a participant is willing to tolerate at the point when they commit to their decision (1). As noted by Bennett et al (2) as well as others (3,4), estimating this level of uncertainty (termed P(correct)) is non-trivial, and is a problem well-suited to a Bayesian approach. Their new calculation incorporates valid information that is present in the ratio of colours in already-opened boxes. It is debatable whether our original formula is technically incorrect, but their Bayesian calculation is clearly an improved formula. In an era of computational psychiatry, this is a welcome contribution to the literature.

Bennett and colleagues go one step further. By re-analysing data from a PhD thesis using the IST in patients with opioid dependence (4), they argue that our original formula systematically underestimates P(correct), particularly at lower levels of box opening (see their Figure 1). It is worth noting that based upon typical levels of box opening in our experiments (e.g. stimulant users: M = 8.7 (SD = 4.2); healthy subjects M = 13.1 (SD = 5.0), based on 1), we assume that Bennett et al have scant data in the 0-7 range of figure 1, where the over-estimation appears greatest.

Critically, as Bennett and colleagues acknowledge, P(correct) values from the IST should always be interpreted in the context of the trial-by-trial number of boxes opened. In the PhD dissertation describing the experiment in opioid dependence, we were disappointed to see that P(Correct) is reported in isolation, without even descriptive statistics for boxes opened. Boxes opened provides an unequivocal (albeit coarse) measure of reflection impulsivity, and for a neuropsychologist, this variable provides a necessary sanity check for P(Correct). P(Correct) is an inferred computational parameter and we do not know for certain that humans iteratively

maintain a representation of each probability when they complete tasks of this kind. We do know for certain how many boxes the participant opened. Our past papers with the IST report statistics on both P(Correct) and boxes opened; indeed, the variables correlate $r > 0.9$ and also correlate highly with errors on the task that arise from insufficient sampling. Our significant group differences on boxes opened in substance use disorders (1,6) clearly confirm that our results for P(Correct) cannot be discarded as Type II errors. Nevertheless, we encourage other investigators working with the IST to make use of the Matlab code provided by Bennett et al for estimating what may prove to be a sensitive variable in interpreting data obtained from the IST, and which may enhance its value as a useful clinical test of reflection impulsivity and decision-making cognition.

Disclosures

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