LETTER

Social influence benefits the wisdom of individuals in the crowd

Lorenz et al. (1) claimed that social influence undermines the wisdom of the crowd (WOC) effect (whereby averaging real-world estimates from different individuals often provides a better estimate of the true value than any of the individual estimates). Lorenz et al. asked participants to estimate quantities multiple times and found that making previous estimates public—by presenting either an average or the individual estimates from previous rounds—led to a reduction in variance between individual estimates. Although Lorenz et al. argue that this undermines the WOC effect, their results testify to the usefulness of information sharing to individuals in the crowd.

One recognized advantage of statistical multilevel modeling is the "shrinkage" of the variance of individual estimates when they are informed by group-level knowledge; in particular, more extreme estimates will be reined in (2). Lorenz et al.'s results seem to show a similar benefit of group-level knowledge shrinking the range of individual estimates; indeed, Lorenz et al.'s procedure bears similarities to Monte Carlo Markov chain sampling for multilevel models, in which sampling of group-level and individual-level information is interleaved (3). The benefits obtaining from shrinkage can be shown by calculating the average reward obtained by participants under Lorenz et al.'s different information conditions. Fig. 1 shows a divergence in reward between conditions, with a clear benefit in the full and aggregate conditions after five rounds of estimation. Fig. 1 also plots the increase in confidence in the full and aggregate conditions observed by Lorenz et al. Although Lorenz et al. claim that this reflected a detrimental effect of social information (because the increase in confidence was not linked to an increase in accuracy of the group average), comparison of the two panels suggests that the increase in confidence of participants in their own performance in the information conditions is calibrated to an external metric of performance, reward. These positive benefits of information sharing agree with those from domains such as foraging (4).

Lorenz et al.'s claim also rests on their observation that sharing information increased the probability that the true estimate fell outside the range of median estimates. It should be stressed that this ordinal "bracketing" metric does not reflect an absolute worsening of performance [see Lorenz et al.'s figure 1 (1)]; by implication, social influence does not impair consensus formation in scenarios such as the Intergovernmental

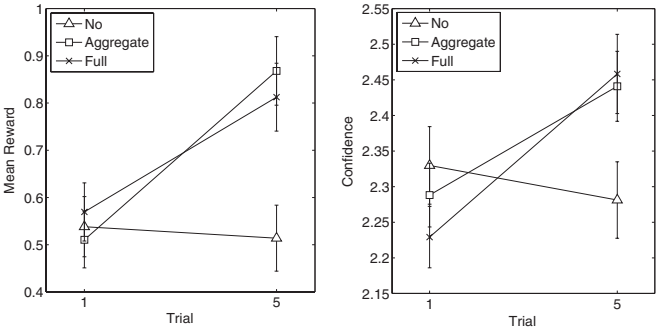

Fig. 1. *Left:* Mean reward per estimate in the three information conditions (separate lines) as a function of trial in the sequence of five estimations. *Right:* Mean confidence ratings. Error bars depict repeated-measures SEs on the plotted means (5).

Panel on Climate Change [an example given by Lorenz et al. (1)]. Instead, the shrinkage shown above to be beneficial to individuals' estimates gives the aggregate WOC measure a tougher baseline to compete against. Indeed, the bracketing metric used by Lorenz et al. blindly rewards excessive variance (that is, inaccuracy) in individuals' estimates, because increasing this variance will tend to increase the distance between the median estimates. The open question is whether the individual estimates in Lorenz et al.'s paradigm are subject to *over*-shrinkage (which Lorenz et al. interpret as over-confidence). This is relevant, for example, in determining SEs on projected changes in global temperature, but can only be determined experimentally by specifying an appropriate amount of variance in estimates against which the observed variance can be measured, which in turn requires quantifying the uncertainty at the level of groups and individuals.

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