Solving problems in social groups

Jeroen Bruggeman

Humans live and work in groups where they face similar, and often shared, problems, ranging from finding resources to avoiding external threats. To solve a problem at hand, they have to make sense of it and develop an accurate idea of a solution. The wisdom of crowds means that the average of a variety of inaccurate ideas, arrived at independently, is often very accurate, whereas social influence results in convergence to a single inaccurate idea, called groupthink.

Interestingly, Becker et al. (1) show that if people interact, rather than think independently, both individuals’ ideas and the group’s consensus can become more accurate—provided that knowledgeable individuals are more self-confident than others, as in animal groups (2). However, human self-confidence tends to be noisy, with self-deceivers among the self-confident (3). Are we bound to be stuck in groupthink after all?

This problem can be overcome if individuals know their group members’ expertise and adjust their ties or tie strengths accordingly. Because reputations of expertise are based on others’ judgments, they tend to be less biased than self-judged expertise. For the duration of the current problem, individuals then shift their strongest ties to the most knowledgeable group members, by whom they will be more strongly influenced (4). In the group network, weighted ties $0 \leq w_{ij} \leq 1$ connecting $i$ to $j$ are in a row-stochastic adjacency matrix, and hence increasing tie strength here implies reducing tie strength there. Because the ideas of communicating individuals approach each other (1, 5, 6), and thus pairwise differences between ideas $x_i$ and $x_j$ decrease, an individual’s change of opinion between $t_0$ and $t_1$ can be written as (6)

$$x_i(t_1) - x_i(t_0) = s_i \sum_{ij} w_{ij} [x_j(t_0) - x_i(t_0)],$$

where $0 \leq s_i \leq 1$ is $i$’s susceptibility to social influence by the group as a whole, and $1 - s_i$ indicates self-confidence.

It can now be easily seen, or calculated, that if individuals’ tie strengths correlate with their alters’ reputations or expertise correlates with $1 - s_i$, both individual and group outcomes are better than those of independent individuals. The wisdom of crowds is best when both hold true, and there is an availability of diverse expertise in various problems that a group may encounter (7).