

## Shouldering responsibility

Stephen M. Fleming and Dan Bang

Wellcome Centre for Human Neuroimaging, University College London, 12 Queen Square, London WC1N 3BG, UK

Email: [stephen.fleming@ucl.ac.uk](mailto:stephen.fleming@ucl.ac.uk) and [danbang.db@gmail.com](mailto:danbang.db@gmail.com)

A key element of leadership is the decision to shoulder responsibility for the welfare of others, whether they are one's family, a political party, or, as with heads of state, the entire country. In animal groups such as fish shoals or bird flocks, leadership may passively result from simple coordination principles (1, 2). By contrast, human leaders often actively make decisions on behalf of others. Although previous work has identified factors that predict those who will end up as leaders (3), it remains unclear how leaders decide to shoulder responsibility. On page XXX of this issue, Edelson *et al.* (4) provide further understanding on the psychological and neural processes engaged when someone decides to lead. They show that such decisions are intimately linked to our confidence in making decisions for others.

Edelson *et al.* asked volunteers to decide whether to accept or reject a series of risky lotteries for points (such as a 60% chance of winning 50 points set against a 40% chance of losing 30 points) that were converted to a monetary bonus. These types of lottery problems can be used to estimate baseline decision-making such as risk and loss aversion. Participants were then faced with the same lotteries as part of a four-person group, whom they had gotten to know in a series of team-building games. In a clever design, there were two types of scenario in this phase: Half of the decisions only affected the earnings of the participant, whereas the other half also affected the earnings of the other group members. Mimicking a classic leadership dilemma, participants had the opportunity to defer their decision to the other group members instead of taking it on themselves. Perhaps because people were reluctant to shoulder responsibility, deferral rates were highest when decisions had consequences for the earnings of others.

Before the experiment, the same volunteers completed a questionnaire to measure leadership. Furthermore, because the study was conducted in Switzerland, where military service is mandatory for males, the researchers could record the actual military rank attained by some of their participants—a real-world measure of leadership experience. Interestingly, none of the decision-making indicators obtained in the baseline task predicted leadership. Nor did the overall tendency to prefer to take control of whether to accept or reject the lottery. Instead, the best predictor was a change in the rate of deferring when the decision had consequences for others—what Edelson *et al.* call “responsibility aversion.” Responsibility aversion was the lowest in those with the highest leadership scores, indicating that leaders did not change their behavior, despite the additional responsibility for others' welfare.

What mechanisms might underpin responsibility aversion? Recent progress in models of perceptual decision-making provide useful hints. One idea is that the decision to defer to the group is similar to a process of “opting out” of a choice when the evidence is not sufficiently strong (5, 6). This process can be modeled by using signal detection theory (7), a framework in which an individual compares noisy evidence about a stimulus to an internal threshold. When there is insufficient evidence for either choice option – that is, when confidence is low – the model predicts people will tend to opt-out or defer to others. If the threshold becomes more conservative when the decision is being made on behalf of the group, fewer decisions to lead will be taken, despite the subjective value of the gamble remaining constant.

An alternative model is that responsibility aversion is driven by how the value of a gamble is perceived—for instance, we might become more loss averse when the outcome of other group members is at stake, making the choice options seem less attractive. By comparing the fits of different models to their data, Edelson *et al.* found that, while the subjective value of gambles did not change between self and group scenarios, the deferral thresholds did.

It remains unknown what drives this greater demand for certainty when others' welfare is at stake, but several hypotheses suggest a rich seam of future work. One possibility is that a psychological cost of leading directly modulates the thresholds. An alternative account is that estimates of one's own ability, known as metacognitive beliefs, come into play when others' welfare is at stake (8). For instance, individuals might feel less able to make decisions for others, which would manifest as a shift in deferral thresholds. Relating leadership characteristics to other measures of confidence (such as opt-out behavior) could uncover such relationships.

Edelson *et al.* also collected whole-brain functional magnetic resonance imaging data during the deferral task. Although exploratory, this analysis identified a network that helped to predict responsibility aversion and leadership scores across individuals. In particular, a dynamic causal model identified links between medial prefrontal cortex—previously shown to encode both subjective value and confidence (9)—and anterior insula as important regions of the brain that mediate leadership decisions. In turn, this connectivity was modulated by temporal lobe regions commonly implicated in thinking about others. Future studies are now needed to ask how the elements of the signal-detection model relate to activity of the nodes in this network.

Edelson *et al.* found that responsibility aversion was the best predictor of leadership scores. But a question of causality remains. People with low responsibility aversion may be more likely to become leaders; alternatively, leaders may have low responsibility aversion because they have substantial experience making choices on behalf of others. More broadly, the authors found that responsibility aversion did not correlate with the classic “big five” personality traits such as neuroticism or extraversion. However, data-

driven approaches to quantifying personality may prove more informative, particularly given links between psychopathology and metacognitive beliefs (10).

It remains to be seen whether a similar approach can predict variation in leadership style, such as autocratic or democratic leadership, and identify those who will be good leaders (11). In the study of Edelson *et al.*, participants with low responsibility aversion did not earn more money for the group. By using the tools of decision neuroscience, it may be possible to reverse engineer not only leadership decisions, but also the ingredients of good leadership.

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