

Multi-Heuristic Strategy Choice: Response to Krueger

Andrew M. Colman and Briony D. Pulford
University of Leicester
Catherine L. Lawrence
Bangor University

Author Note

Andrew M. Colman and Briony D. Pulford, School of Psychology, University of Leicester; Catherine L. Lawrence, School of Psychology, Bangor University.

We are grateful to the Leicester Judgment and Decision Making Endowment Fund (Grant RM43G0176) for support in the preparation of this article.

Correspondence concerning this article should be addressed to Andrew M. Colman, School of Psychology, University of Leicester, Leicester LE1 7RH, United Kingdom. E-mail: amc@le.ac.uk

Abstract

Social projection cannot adequately explain coordination in common interest games, and nothing resembling social projection underlies team reasoning or strong Stackelberg reasoning. Although our experiments suggest that cognitive hierarchy Level-1 reasoning was most influential in the games that we investigated, strong Stackelberg reasoning and team reasoning were also used quite frequently by the players.

Keywords: cognitive hierarchy theory; coordination; social projection theory; strong Stackelberg reasoning; team reasoning

Our experiments provided evidence that players used cognitive hierarchy Level-1 reasoning, strong Stackelberg reasoning, and team reasoning across a wide range of experimental games (Colman, Pulford, & Lawrence, 2014). Krueger (2014) agrees that players probably approach games with multiple heuristics, but he believes that our criticism of social projection theory was unjustified, that strong Stackelberg reasoning and team reasoning rely on social projection, and that we underestimated the level of cognitive hierarchy Level-1 reasoning in our own data. Given space restrictions, we can respond only briefly to these points.

Social projection theory arose out of attempts to explain the false consensus effect, originally interpreted as an egocentric cognitive bias causing people to overestimate the degree to which others share their attitudes, beliefs, and actions (Ross, Greene, & House, 1977). The key point at issue is whether social projection can adequately explain coordination in common interest games such as the Hi-Lo game (Figure 1 in our article). Our most serious objection was that it makes no sense for a player to contemplate the consequences of choosing *H* and *L*, assuming that either choice will be mirrored by the co-player's choice, and then choose *H* on the ground that it would yield a better payoff given that assumption. The point is that, according to the Bayesian logic behind social projection, a strategy that is actually played provides evidence of how a co-player is likely to choose, but until it is chosen and played it provides no basis for prediction, and once it has been played, it is too late to use the fact that it was chosen as a basis for choosing it.

The following example clarifies this temporal structure objection. Suppose that you habitually donate 1% of your income to charity. If you have literally no other evidence about what others donate, you may reasonably (according to Bayesian inference) estimate that others probably also donate about 1%. If, on the other hand, you merely *contemplate* donating 10% but decide not to do so, perhaps because it seems far too much, then you are not justified in inferring that, if you had indeed donated 10%—although you did not—then others would probably also have donated 10%, thereby eliminating world poverty at a stroke. If you truly believed that, then you would have an overwhelming moral argument for donating 10%. But back in the real world, a consistent interpretation of social projection theory suggests that you should expect others *not* to choose what you yourself have not chosen.

Strong Stackelberg reasoning and team reasoning do not rely on anything resembling social projection. Krueger (2014) claims that "Stackelberg reasoning has players expect each other to choose as they themselves do. Social projection theory arrives at the same conclusion but describes how players arrive at probabilistic predictions" (p. xx). Stackelberg theory does not assume that players expect their co-player to choose as they do, but that players choose strategies that would maximize their payoffs if their co-players could anticipate their choices and invariably respond with counterstrategies that were best for the co-players. There is no circularity in this. In our asymmetric experimental games, players could not choose the same options as each other because, by definition of asymmetry, they faced different options. The notion of social projection, and expecting others to act as we do, is meaningful only when we face similar choices. Social projection causes us to expect others to act as we do when they are in similar circumstances to ourselves. The notion of others acting as we do is simply incoherent when we face options that yield different patterns of payoffs, as in our experimental games.

In the case of team reasoning, Krueger (2014) is right in pointing out that players are likely to adopt this reasoning mode only when they expect their co-players to do likewise. This is very different from social projection, although Krueger claims that we "do not say how" (p. xx). The difference is that social projection theory rests on a core assumption that people expect others to act as they do, whereas team reasoning theory makes no such assumption.

Finally, Krueger (2014) claims that our data provide stronger support for cognitive hierarchy Level-1 reasoning than we acknowledge. He refers to Table 1 in our article, in which "Level-1 reasoning predicts the results in 9 out of 12 cases," and comments: "Although it appears that only Level-1 reasoning beat chance, verbal protocols suggested that some players reasoned for the team or like Stackelberg." This is very misleading, because Table 1 shows only modal choices, and we pointed out that this is a "crude criterion" (p. xx). Analogously, a political party could win 9 out of 12 elections against rival parties with almost as much overall support, and the crude 9/12 score would exaggerate the relative support for one party.

A more precise indication of the frequencies with which players used the various reasoning processes is provided by counts of their actual strategy choices, shown in Table 2. In 3×3 games, converting to percentages, players chose cognitive hierarchy Level-1 strategies significantly more frequently (37% of strategy choices) than team reasoning strategies (20%), but not significantly more frequently than strong Stackelberg strategies (31%). In 4×4 games, they chose cognitive hierarchy Level-1 strategies significantly more frequently (31%) than both team reasoning (18%) and strong Stackelberg reasoning (13%). These findings were closely replicated in Experiment 2. In both 3×3 and 4×4 games, all three of these reasoning processes were chosen quite frequently, and cognitive hierarchy Level-2 reasoning was chosen significantly less frequently. In conclusion, it was the players' strategy choices, not their verbal protocols, that led us to this inference, although the verbal protocols corroborated the choice data and also revealed that most players considered two or more reasoning processes before making their strategy choices.

References

Colman, A. M., Pulford, B. D., & Lawrence, C. L. (2014). Explaining strategic coordination: Cognitive hierarchy theory, strong Stackelberg reasoning, and team reasoning. *Decision, 1,* xxx–xxx.

Krueger, J. I. (2014). Heuristic game theory. *Decision, 1,* xxx–xxx.
Ross, L., Greene, D, & House, P. (1977). The “false consensus effect”: An egocentric bias in social perception and attribution processes. *Journal of Experimental Social Psychology, 13,* 279–301. doi: 10.1016/0022-1031(77)90049-X