Ants more rational than humans

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Ants are more rational collective decision makers than humans. Credit: Stephen Pratt/Arizona State University

In a study released online on July 22 in the journal *Proceedings of the Royal Society: Biological Sciences*, researchers at Arizona State University and Princeton University show that ants can accomplish a task more rationally than our - multimodal, egg-headed, tool-using, bipedal, opposing-thumbed - selves.

This is not the case of humans being "stupider" than ants. Humans and animals simply often make irrational choices when faced with very challenging decisions, note the study's architects Stephen Pratt and Susan Edwards.

"This paradoxical outcome is based on apparent constraint: most individual ants know of only a single option, and the colony's collective choice self-organizes from interactions among many poorly-informed ants," says Pratt, an assistant professor in the School of Life Sciences in ASU's College of Liberal Arts and Sciences.

The authors' insights arose from an examination of the process of nest selection in the ant, Temnothorax curvispinosus. These ant colonies live in small cavities, as small as an acorn, and are skillful in finding new places to roost. The challenge before the colony was to "choose" a nest, when offered two options with very similar advantages.

What the authors found is that in collective decision-making in ants, the lack of individual options translated into more accurate outcomes by minimizing the chances for individuals to make mistakes. A "wisdom of crowds" approach emerges, Pratt believes.

"Rationality in this case should be thought of as meaning that a decision-maker, who is trying to maximize something, should simply be consistent in its preferences." Pratt says. "For animals trying to maximize their fitness, for example, they should always rank options, whether these are food sources, mates, or nest sites, according to their fitness contribution."

"Which means that it would be irrational to prefer choice 'A' to 'B' on Tuesday and then to prefer 'B' to 'A' on Wednesday, if the fitness returns of the two options have not changed."

"Typically we think having many individual options, strategies and approaches are beneficial," Pratt adds, "but irrational errors are more likely to arise when individuals make direct comparisons among options."

Studies of how or why irrationality arises can give insight into cognitive mechanisms and constraints, as well as how collective decision making occurs. Insights such as Pratt's and Edward's could also translate into new approaches in the development of artificial intelligence.

"A key idea in collective robotics is that the individual robots can be relatively simple and unsophisticated, but you can still get a complex, intelligent result out of the whole group," says Pratt. "The ability to function without complex central control is really desirable in an artificial system and the idea that limitations at the individual level can actually help at the group level is potentially very useful." Pratt is a member of Heterogeneous Unmanned Networked Team (HUNT), a project funded by the Office of Naval Research (ONR) to enable to development of bio-inspired solutions to engineering problems.

What do these findings potentially say about understanding human social systems?

"It is hard to say. But it's at least worth entertaining the possibility that some strategic limitation on individual knowledge could improve the performance of a large and complex group that is trying to accomplish something collectively," Pratt says.

Source: Arizona State University (news : web)