Study finds small groups demonstrate distinctive 'collective intelligence' when facing difficult tasks

September 30 2010, by Peter Dizikes

Thomas W. Malone, the Patrick J. McGovern Professor of Management at the MIT Sloan School of Management. Photo: Patrick Gillooly

When it comes to intelligence, the whole can indeed be greater than the sum of its parts. A new study co-authored by MIT, Carnegie Mellon University, and Union College researchers documents the existence of collective intelligence among groups of people who cooperate well, showing that such intelligence extends beyond the cognitive abilities of the groups' individual members, and that the tendency to cooperate effectively is linked to the number of women in a group.

Many social scientists have long contended that the ability of individuals to fare well on diverse cognitive tasks demonstrates the existence of a measurable level of intelligence in each person. In a study published

Thursday, Sept. 30, in the advance online issue of the journal *Science*, the researchers applied a similar principle to small teams of people. They discovered that groups featuring the right kind of internal dynamics perform well on a wide range of assignments, a finding with potential applications for businesses and other organizations.

"We set out to test the hypothesis that groups, like individuals, have a consistent ability to perform across different kinds of tasks," says Anita Williams Woolley, the paper's lead author and an assistant professor at Carnegie Mellon's Tepper School of Business. "Our hypothesis was confirmed," continues Thomas W. Malone, a co-author and Patrick J. McGovern Professor of Management at the MIT Sloan School of Management. "We found that there is a general effectiveness, a group collective intelligence, which predicts a group's performance in many situations."

That collective intelligence, the researchers believe, stems from how well the group works together. For instance, groups whose members had higher levels of "social sensitivity" were more collectively intelligent. "Social sensitivity has to do with how well group members perceive each other's emotions," says Christopher Chabris, a co-author and assistant professor of psychology at Union College in New York. "Also, in groups where one person dominated, the group was less collectively intelligent than in groups where the conversational turns were more evenly distributed," adds Woolley. And teams containing more women demonstrated greater social sensitivity and in turn greater collective intelligence compared to teams containing fewer women.

To arrive at their conclusions, the researchers conducted studies at MIT's Center for Collective Intelligence and Carnegie Mellon, in which 699 people were placed in groups of two to five. The groups worked together on tasks that ranged from visual puzzles to negotiations, brainstorming, games and complex rule-based design assignments. The researchers

concluded that a group's collective intelligence accounted for about 40 percent of the variation in performance on this wide range of tasks.

Moreover, the researchers found that the performance of groups was not primarily due to the individual abilities of the group's members. For instance, the average and maximum intelligence of individual group members did not significantly predict the performance of their groups overall.

Only when analyzing the data did the co-authors suspect that the number of women in a group had significant predictive power. "We didn't design this study to focus on the gender effect," Malone says. "That was a surprise to us." However, further analysis revealed that the effect seemed to be explained by the higher social sensitivity exhibited by females, on average. "So having group members with higher social sensitivity is better regardless of whether they are male or female," Woolley explains.

Malone believes the study applies to many kinds of organizations. "Imagine if you could give a one-hour test to a top management team or a product development team that would allow you to predict how flexibly that group of people would respond to a wide range of problems that might arise," he says. "That would be a pretty interesting application. We also think it's possible to improve the intelligence of a group by changing the members of a group, teaching them better ways of interacting or giving them better electronic collaboration tools."

Woolley and Malone say they and their co-authors "definitely intend to continue research on this topic," including studies on the ways groups interact online, and they are "considering further studies on the gender question." Still, they believe their research has already identified a general principle indicating how the whole adds up to something more than the sum of its parts. As Woolley explains, "It really calls into question our whole notion of what intelligence is. What individuals can

do all by themselves is becoming less important; what matters more is what they can do with others and by using technology."

"Having a bunch of smart people in a group doesn't necessarily make the group smart," concludes Malone.

More information: "Evidence for a collective intelligence factor in the performance of human groups" by Anita Williams Woolley, Christopher F. Chabris, Alexander Pentland, Nada Hashmi, and Thomas W. Malone. Science, 30 September, 2010.

Provided by Massachusetts Institute of Technology