



The Power of Many

As one wag remarked, "If you want to kill the snake, don't form a committee; just go do it..." Yet we are ever reliant on committee decisions in our daily business life (and this includes ECS business also). How effective and optimal are group decisions relative to those made by individuals? It turns out there is a considerable amount of research on this topic and we can learn much from ants, bees, fish, and birds, in that colonies are smarter than individuals. For example, an individual ant cannot optimize the shortest path to the best food source,

allocate workers to different tasks, or even defend a territory from neighbors; but ant colonies routinely accomplish these tasks via a fascinating phenomenon known as "swarm intelligence." Where this collective intelligence comes from has fascinated behavioral biologists and psychologists for many years. How do the simple actions of individual ants, fish, or bees and birds add up to the complex behavior of that particular group? How do a herd of wildebeest or a school of fish react *in tandem* to the sudden presence in their midst of a predator and often leave the latter bereft of a good meal?

Even for us humans, there is now considerable evidence that collective wisdom works and collective decisions can be every bit as effective and authoritative as individual judgments. This may be counterintuitive in that one may be tempted to think that the well-informed may be outweighed by the poorly-informed within a group with the unfortunate result that the group's decision will be worse than that of even the average individual. In his best-selling book, "The Wisdom of Crowds," James Surowiecki analyzes the factors that render group decisions to be optimal. The Internet has had a profound influence in the notion of collective wisdom, and in Surowiecki's thinking, the ethos of the Net is fundamentally respectful and invested in the idea of collective wisdom. In fact, he opines that the anti-hierarchical structure of the Net is even hostile to the idea that power and authority should be vested in a select few individuals. In this regard, it is important to note that the ideas discussed here are distinctly different from those embodied in the "groupthink" paradigm (a word coined by the social psychologist, Irving Janis, in 1972). According to Janis, groupthink ignores other alternatives and leads to irrational decisions that dehumanize other groups.

A tradition in the history and sociology of science is the role of the individual genius in scientific discovery—a tradition reinforced by the accomplishments of Newton, Einstein, and the like. In fact, there has been a tendency to equate great ideas with individual names such as the Heisenberg uncertainty principle. However, recent research has shown evidence for an increasing propensity in the effectiveness of teamwork for the production of knowledge (see, for example, a recent paper by Wuchty *et al.*, *Science* **316**, 1036 (2007) and references therein). Does this shift to teamwork promote low-impact science while the highest-impact ideas (e.g., relativity) remain the domain of great minds working alone? From a sampling of 19.9 million papers over 5 decades and 2.3 million patents, the above authors argue that teams increasingly outperform solo authors in the production of knowledge. On the other hand, the *translation* of fundamental ideas to useful products and processes has always remained the hallmark of teams. This is something that industry and national laboratories/government agencies have always done well, i.e., mobilize the best combination of scientists and engineers to accomplish a given task.

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Editor

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