

The Wisdom of Groups

By Clyde Freeman Herreid

One day in the fall of 1906, the British scientist Francis Galton left his home in the town of Plymouth and headed for a country fair. Galton was 85-years-old and beginning to feel his age, but he was still brimming with curiosity that had won him renown—and notoriety—for his work on statistics and the science of heredity. And on that particular day, what Galton was curious about was live stock.

So begins the first paragraph of a fascinating book, *The Wisdom of Crowds*, by James Surowiecki (2005).

As we learn in the following pages, Galton, in his visit to the fair, was captivated by a weight-judging competition. A fat ox was on display, and the crowd of onlookers could buy a ticket to guess the weight of the animal after it had been slaughtered and dressed. Farmers, butchers, and just plain folks were among the 800 souls who tried their luck. The best guessers would win prizes. Galton's interest in democracy suggested to him an experiment. After the contest was over, he collected the tickets from the event organizers, tallied up the values of the guesses, and took their average, suspecting that they would be rather off the mark. Nothing could be further from the truth. The average guess was 1,197 pounds and the true weight of the slaughtered and dressed ox was 1,198 pounds. Galton (1907) wrote in his paper in *Nature*, "The result seems more credible to the trustworthiness of a democratic judgment than might have been expected."



Surowiecki piles on example after example of how intelligent crowds can be smarter than the most knowledgeable individual. The average guess of the crowd that estimates the number of jelly beans in a jar is almost always close to perfect. This, Surowiecki argues, is the reason for such unexpected successes as Wikipedia and Google. Who could imagine that Wikipedia would be so accurate given that it permits anyone to edit everything? The answer turns out to be that when people in a crowd make independent estimates, individual errors and bias are quickly compensated for by contrary opinions. This system is self-correcting. Actually, so is the scientific enterprise. No one person controls the outcome. It shares this characteristic with Wikipedia—it is not the wisdom of an individual that counts so much as the wisdom of the crowd. Evolution

works the same way. Populations shift their genotype because of the average success of certain phenotypes that carry beneficial alleles.

The wisdom of case studies

All of this brings me to the subject of case studies and how they can be taught. Many instructors use small groups. They use cooperative- or collaborative-learning strategies that have made a major impact on education in the last 20 years. One of these methods is problem-based learning, formally introduced into medical education about 35 years ago at McMaster University in Ontario, Canada. Its use has broadened into undergraduate education throughout the world. In medical schools, groups of about 10 students along with a faculty facilitator try to diagnose a patient's problem based on fragmen-

tary data that are progressively disclosed to them over several classes; meanwhile, they look up and share information that might be useful. In undergraduate classes, the method has morphed a bit; group sizes are frequently smaller, and one faculty member may supervise multiple groups. But the same strategy applies: Individuals within teams pool their information in order to solve a problem.

What is it about small groups that makes them so powerful? The answer is straightforward: Groups tend to solve problems better than even the brightest individuals because “many hands make light work,” and “two heads are better than one.” This is especially true when the groups are diverse and individuals act somewhat independently.

Groups don't always make good decisions, of course. Jury trials such as the O.J. Simpson case come to mind. When groups go awry, it is often because the members do not represent a diverse collection of opinions, or one person, often a putative leader, has an undue influence on the group. Thus, the other members are not allowed to voice contrary opinions because of coercion or intimidation. “Group think” predominates. We have situations such as the war room for the Bay of Pigs fiasco in which John F. Kennedy's team was swept along a disastrous path without contrary advice being given a fair hearing. Similarly, it appears that the George W. Bush team's approach to the invasion of Iraq may have suffered from the same myopia.

One essential lesson to be learned by those of us creating small groups in our classrooms is this: We should not allow individuals to choose their own groups if we want diversity and creativity. When people self-select,

they tend to choose companions that are much like themselves. Hence, random groups of students are better. Even better, the instructor should create the groups.

My approach to this problem is simple: On the first day of any cooperative learning class, I hand out small 3×5 index cards for students to list certain specific information. I ask them to write the following information: their name, email address, major field of interest, the courses they have taken in science, hobby, and grade-point average. Clearly, I can gather the latter from their records, but I prefer asking them to provide it voluntarily, if they wouldn't mind. I use this information and their gender and ethnicity (which I can either see or guess from their names) to sort them into groups of six students. (Groups of six are the largest that I arrange because larger groups have a hard time in discussion; an individual is relatively more inhibited in large groups, and they have less “air time” to explain their ideas.)

Why this focus on diversity? Once again, it is to seek the broadest possible “landscape” for solutions. All of this is well-known to folks in the field of group dynamics. Larry Michaelsen, the creator of the small-group learning method called Team Learning, writes in *Team-Based Learning: A Transformative Use of Small Groups* (Michaelsen, Knight, and Fink 2002) that group test scores are typically better than the best individual scores. And Surowiecki (2005), writing in the *Wisdom of Crowds*, reminds us that on the TV show *Who Wants to Be a Millionaire?*, when a contestant asked the audience to help choose the correct answer to a question, they were right 91% of the time, whereas “experts” were only right 61% of the time. Groups are not just better than

expert individuals at choosing among possible alternative solutions (say, guessing who will win the Super Bowl or determining who will be the next U.S. president), but they are also better at generating possible solutions to problems (i.e., brainstorming). This is a major argument for a democratic government rather than a dictatorship or oligarchy.

When we look at case study teaching, we find the wisdom of groups is also evident, especially if vigorous discussion is involved. When students voice their positions, they improve the chances that they will remember the key information. But more to the point, discussions are a participatory form of teaching; new ideas may emerge that no one, not even the instructor, has thought of before.

Voting with clickers

This brings me to the notion of clickers. One of the most promising technological breakthroughs in teaching in the past 20 years is personal response systems, better known as “clickers.” These devices, which look like TV remote controls, allow an instructor to survey the thoughts of a class at any moment. Thus, a lecturer can present material for 15 minutes and then ask a multiple-choice question to see if students have followed the presentation. A computer receiver picks up student responses and the results are displayed in a histogram on the projector screen in the front of the class. Made famous by the producers of the TV quiz show *Who Wants to Be a Millionaire?*, clickers have made rapid inroads into the nation's classrooms. They are especially useful in large classes in which it is hard to engage students and as a consequence, attendance can be miserable. Clickers provide a dramatic antidote to apathy, particularly

when students are awarded points every day if they answer questions correctly. Students say that they are empowered by clickers and feel like they are being asked to participate in the learning process.

The point that I wish to emphasize here is simple. With clickers, when the instructor asks a question, he or she receives immediate feedback about what the crowd of students is thinking. Instructors can gather instant data and see where the problems in understanding lie. But more to the thrust of this essay, I am impressed over and over again by the wisdom of the crowd. The average class response to a multiple-choice question is almost always correct. And if it isn't spot on, you know it right away. You don't have to wait for the dismal results on a test. Instead,

you can fix it by doing some swift backtracking.

Finally, let me reinforce a statement I made earlier: There are times that groups don't function well. They don't paint the *Mona Lisa*, score the opera *Carmen*, or write *War and Peace*. But they are terrific at collecting data, sifting through them, looking for trends in global climate change, making predictions, and generating unexpected solutions to problems.

Groups are even good at designing camels. Remember the disparaging comment that some wag stated about committees: "A camel is a horse that was designed by a committee." But hold on: The design of the camel is no small accomplishment. After all, a camel is perfectly adapted for conditions where a horse wouldn't stand a chance.

References

- Galton, F. 1907. Vox populi. *Nature* 75 (1949): 450–452.
- Michaelsen, L., A. Knight, and L.D. Fink, eds. 2002. *Team-based learning: A transformative use of small groups*. Westport, CT: Praeger.
- Surowiecki, J. 2005. *The Wisdom of crowds*. New York: Anchor Books.

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