

# Diversity Powers Innovation

**By Scott Page**

**January 26, 2007**

Most people believe that innovation requires smarter people, better ideas. That premise, though intuitive, omits what may be the most powerful but least understood force for innovation: Diversity.

Diversity usually calls to mind differences in race, gender, ethnicity, physical capabilities, and sexual orientation—social or political differences that at first glance have little to do with innovation. Yet the key to innovation, in economic terms, resides inside the heads of people, the more diverse the better. That link may not be immediately apparent, yet any understanding of innovation's role in economic growth must focus on diversity as well as ability.

In the stark, crude mathematics of economics, production depends on capital and labor; increases in either raises economic output, but at a decreasing rate. Increases in per capita economic output, or economic growth, therefore depends on raising the level or quality of capital, or increasing the quality of labor, or ideally doing both simultaneously. This basic formula explains why macroeconomic theorists advise governments and companies alike to boost spending on research and development and education, with perhaps a nod to targeted venture capital as an additional qualitative spur to economic growth.

Dig deeper into the causes of growth, however, and this simple explanation comes up short. No increases in the level or quality of capital or labor map neatly into the invention of the steamboat, the car, electricity, the vacuum tube, or the iPod. To understand innovation, we need nuanced, micro-level models that enable us to unpack its causes.

Let's start with what we know. The macroeconomic approach to the problem of innovation considers innovative ability as an asset. This construction lies at the core of modern endogenous growth theory, in which the stock of knowledge—like the level of capital or the amount of labor—can be influenced by individuals, companies, or policymakers. Optimal growth paths require balancing investments in innovative ability with investments in capital and labor.

Not only do economies struggle to achieve this proper balance, so do ecosystems, species, companies, and people. Yet for all the success of

endogenous growth theory, it still leaves us with the micro-level question of the source of innovations. Countries cannot just throw money into an innovation fund and expect to reap dividends. In fact, constructing organizational and institutional structures that encourage innovative activity has been one of the most vexing problems for businesses and countries over the past half century.

To understand innovation, we must focus on diversity as well as ability. A scan of the intellectual landscape as well as of the policies of successful companies reveals a tacit understanding of diversity's role in innovation. George Mason University professor Richard Florida's work on the creative class, *The Rise of the Creative Class* and *The Flight of the Creative Class*, touches on the link between diversity and innovation, as do Yale University's Barry Nalebuff and Ian Ayres in their book and accompanying website *Why Not?* and [whynot.net](http://whynot.net). Some of the innovation policies of Toyota Motor Corp. and Google Inc. illustrate a similar understanding that differences in the composition of their work forces boosts their bottom lines.

To appreciate the full potential of the power of difference, however, requires opening up the pumpkins. What we find inside people's heads is that people possess ways of seeing problems and solutions—oftentimes different perspectives depending on the kinds of people viewing particular problems and solutions. People's perspectives are accompanied by ways of searching for solutions to problems, something scientists call heuristics. When confronted with a problem, people encode their (often quite different) perspectives and then apply their particular heuristics to locate new, possibly better, solutions.

A person whom we think of as smart is generally someone who has lots of interesting perspectives and many effective heuristics. A smart person performs well, and often innovates, because of the many tools she possesses. Yet most of these tools won't work on a given problem, which is why innovation is 99 percent perspiration. That's why Edison once claimed that he knew "a thousand ways not to make a light bulb."

But how would several dozen Edisons, or several dozen Edisons from different social, racial and educational backgrounds, approach the making of a light bulb? To answer that question requires a fuller grasp of the pitfalls and idiosyncrasies of innovation and the power of diversity, which in turn requires a slight detour into theory.

First, for any problem there exists a perspective that makes it easy to grasp a solution, though that may mean waiting for a person as unique as Edison to come along. Second, across all problems no perspective or no heuristic is any better than any other. In plain English, any approach may be just as good as any other until it is tested.

Third, teams of problem solvers—viewed as bundles of perspectives and heuristics brought together to solve a particular problem—do better when the diversity of perspectives and heuristics is greater than the overall ability or talent of the team’s members. In other words, diverse teams outperform teams composed of the very best individuals. Diversity trumps ability.

This last result requires further explanation. A team, a group, or even an entire society innovates through iterative application of perspectives and heuristics. Individuals who perform best obviously possess good perspectives and heuristics (think Edison), yet 30 Edisons each may have 20 useful heuristics while collectively possessing a mere 25. In contrast, the diverse team’s individual members may on average only know 15 heuristics apiece but collectively know 40.

When the diverse team applies those diverse heuristics, the effects can be super-additive. Watson plus Crick were far more impressive than either in isolation. On a far larger scale, Silicon Valley’s breadth of bright engineers from different academic disciplines and from almost every corner of the globe out-innovates other technology hotspots with equal brainpower but less diversity.

Innovation provides the seeds for economic growth, and for that innovation to happen depends as much on collective difference as on aggregate ability. If people think alike then no matter how smart they are they most likely will get stuck at the same locally optimal solutions. Finding new and better solutions, innovating, requires thinking differently. That’s why diversity powers innovation.

--

Scott E. Page is Professor of Complex Systems, Political Science, and Economics at the University of Michigan and external faculty at the Santa Fe Institute. He is author of **The Difference: How the Power of Diversity Creates Better Groups, Teams, Schools, and Societies.**

© Center for American Progress | [Privacy Policy](#) | [Reuse Policy](#)

**URL:**

[http://www.americanprogress.org/issues/2007/01/diversity\\_powers\\_innovation.htm](http://www.americanprogress.org/issues/2007/01/diversity_powers_innovation.htm)  
|