

INTRODUCTION

Unpacking Our Differences

You see, wire telegraph is a kind of a very, very long cat. You pull his tail in New York and his head is meowing in Los Angeles. Do you understand this? And radio operates exactly the same way: you send signals here, they receive them there. The only difference is that there is no cat.

—ALBERT EINSTEIN

ALPH'S WANTED POSTER

IN the summer of 2001, Alpheus (Alph) Bingham, a vice president of Eli Lilly, created a Web site for seekers—not Quidditch-playing adolescents in pursuit of golden snitches à la J. K. Rowling's Harry Potter series—but large pharmaceutical companies in pursuit of solutions to scientific problems. These problems ran the gamut from tracing metal impurities to assessing the risks of breast cancer to detecting organic chemical vapors. Seekers posted their problems on Alph's site along with an award of up to one hundred thousand dollars that they would pay for successful solutions. Anyone willing to register could be a solver. Solvers included dentists from the Far East and physicists from the Midwest. Only the people running Alph's site knew the identities of both seekers and solvers. In the parlance of the Web, the participants were double blind.

Alph called his site InnoCentive. With it, he created a modern-day version of the Wild West wanted poster. But rather than

nailing his posters to trees all over the Dakota Territory, Alph pasted his on the Internet. He built it, and they came: by 2005, more than eighty thousand solvers had registered. They hail from more than 170 countries and span the scientific disciplines. And best of all, they've proven themselves up to the task. A study of InnoCentive revealed that solvers found solutions to nearly one-third of the posted problems.¹ A slight majority of these problems required reduction to practice—the solutions had to be demonstrable in the laboratory. For the remaining 40-some percent, pencil-and-paper solutions sufficed. One-third may seem a low success rate, but keep in mind that the typical seeker is not a seventh grader stuck on a chemistry problem, but a company like Proctor and Gamble, which has nine thousand people as its R&D staff and spends nearly two billion dollars a year on research and development. Suddenly, one-third looks good.

How could these individuals and small teams of scientists find solutions that Proctor and Gamble, with its vast and focused resources, could not? In their study, Karim Lakhani, Lars Bo Jeppeson, Peter Lohse, and Jill Panetta discovered that postings that are solved successfully tend to attract a diverse and differentiated pool of solvers. If a problem attracted a physical chemist, a molecular biologist, and a biophysicist, it was far more likely to be solved than if it attracted only chemists. In other words, InnoCentive works because it exploits diversity.

It's not information diversity that the seekers are after—for that they can Google or Ask Jeeves—it's problem solving diversity they seek. Consider this posting:

INNOCENTIVE 3084200:

Reduction of Chemical Vapor Emissions

POSTED: NOV 04, 2005

DEADLINE: DEC 07, 2005

\$5,000 USD

The Seeker is looking for creative ideas for reduction of chemical vapor emissions in a specific industry setting. You do not need to be a chemist to work on this problem. What matters most is your creative and practical mind as a scientist.

InnoCentive takes advantage of new technology to exploit an old idea: the use of diverse, talented people to solve problems. We have to be careful here. Alph is not trying to exploit the wisdom of crowds. He's not averaging anything. He's trying to find a needle in a haystack. He's looking for a person or team who can solve the problem or part of the problem.

InnoCentive therefore, differs from Bletchley Park, the famous British code-breaking organization. At Bletchley Park people worked together—not necessarily in peace and harmony either; some of these people had sharp edges. Like InnoCentive, the Bletchley Park idea was to cast a wide net. Unlike InnoCentive, the idea was to have all the diverse fishes swim together.

To see how this worked, we need some background: during World War II, the British brought together twelve thousand people in Bletchley Park, about fifty miles northwest of London, to crack the Nazi Enigma code. The Nazis had distributed ingenious machines, smaller than manual typewriters, among their forces to create random ciphers that allowed them to communicate secretly with one another. Breaking the code was a priority for the Allies, since it allowed the Nazis to coordinate attacks both on land and at sea, deliver needed supplies, and generally coordinate their far-flung military might. The German navy was especially adept at using the Enigma code and sank, on average, sixty supply ships a month.

Many of the people brought to Bletchley Park—Brits, Americans, Poles, Aussies—had training we might think appropriate for code breaking. These included mathematicians (most notably Alan Turing), engineers, and cryptographers. But other people working in secrecy in the James Bond-like trappings of Room 40 and Hut 8 had been trained as language experts, moral philosophers, classicists, ancient historians, and even crossword puzzle experts. Imagine the drama as it unfolded:

CRYPTOGRAPHER: Quick, we need a five-letter German word,
second letter is an *o*, that means explosive device!

CROSSWORD PUZZLE EXPERT: Bombe. B-o-m-b-e, bombe.

LINGUIST: It's pronounced BOM-bah!

Bletchley Park cracked the Enigma code (twice). Churchill called it “the goose that laid the golden egg and never cackled.” Like the solvers at InnoCentive, the goose consisted of many diverse parts.

As captivating as these examples may be, they do not show the full range of diversity’s benefits. Yes, diversity can contribute to problem solving, but it can also enable collections of people to make accurate predictions. Collections of people, none of whom count as experts, none of whom can predict well alone, have proven able to make accurate predictions, not just once in a blue moon, but consistently, as has been shown in analyses of stock prices, betting lines, and information markets, such as the Iowa Electronic Markets. James Surowiecki calls this “the wisdom of crowds.”

The existence of smart mobs like those created by InnoCentive and of wise crowds like those described by Surowiecki is not in dispute. Without collective intelligence, decentralized markets and democracies would have little hope of functioning effectively. Yet we do not fully understand the causes of successful collective performance. We tend to think that it rests in ability, that if we make the individuals smarter, we make the group (or mob) smarter, the crowd wiser, and the team more effective. That logic certainly holds true (with some caveats). But here I show that if we make the individuals more diverse, we get the same effects: better teams, smarter groups, wiser crowds. Unpacking this second, subtler logic takes up the bulk of what follows.

THE DIVERSITY CONJECTURE

One place to start our analysis is with the *Diversity Conjecture*. A conjecture is a guess. And to many, that’s what this is.

The Diversity Conjecture: *Diversity leads to better outcomes.*

The diversity conjecture, as stated, suffers from vagueness and imprecision. For us, it’s a great jumping-off point. We can refine it and identify conditions so that it is no longer a conjecture,

but a conditional statement. Clearly, the conjecture fails to hold universally. That's why we will proceed slowly, defining our terms along the way. Speaking of defining our terms, notice that in the conjecture, not only is the term *diversity* not defined, neither are the tasks for which it supposedly produces better outcomes. So our first steps will be to define diversity and to identify those tasks for which we expect it to be beneficial. For instance, if a loved one requires open-heart surgery, we do not want a collection of butchers, bakers, and candlestick makers carving open the chest cavity. We'd much prefer a trained heart surgeon, and for good reason. But in other circumstances, such as constructing a welfare policy, designing a physics experiment, cracking a secret code, or evaluating post-heart attack treatment, we'd want diversity. Understanding when, and why, diversity proves beneficial is the purpose of this book. We learn that often, diversity merits equal standing with ability and that sometimes, although not every time, it even trumps ability.

I show these benefits of diversity by using simple models and frameworks. I do this because simple models can be powerful drivers and clarifiers of intuition. For a glimpse of their power in clarifying thinking, consider these two seemingly conflicting sayings: "Two heads are better than one," and "Too many cooks spoil the broth." Let's construct a model of cooking. Cooking requires a recipe, which lists the ingredients and how we combine them. Most recipes consist of an irreversible sequence of instructions: *simmer the onions until brown specks form around the edges and then add two teaspoons of cayenne pepper*. In cooking, as in life, we cannot go backward. We can't uncook an onion; we cannot remove the cayenne pepper. These irreversible actions require a single course of action, a single recipe. Following multiple recipes simultaneously spoils the broth (so to speak). Too many cooks, as it turns out, aren't a problem at all. Most great restaurants employ more than one cook, but those cooks work from a single set of recipes. Moreover, even though once we have fired up the grill, we want a single plan, we may, in developing that plan, want lots of cooks. Even Julia Child didn't work alone. She had Simone Beck. Thus, it might be better to draw on the expertise

of a variety of cooks—before we uncork the wine and tie on our aprons.

This little digression has shown the value of careful, logical thinking. By constructing a skeletal verbal model, we reveal a condition—the presence of irreversible actions—for the saying about the cooks to be true. We know now when to apply it and when to invoke the other pithy saying—the one about two heads being better than one. As Ayn Rand wrote, “Contradictions do not exist. Whenever you think you are facing a contradiction, check your premises. You will find that one of them is wrong.”²

The main results on the benefits of diversity may strike some as counterintuitive. Common sense suggests that ability should matter more than difference. That intuition holds only if we picture people working in isolation, like our heart surgeon. The image of the lone worker toiling away at his or her craft makes a nice subject for a Norman Rockwell *Saturday Evening Post* cover illustration but increasingly misrepresents the modern economy. Pa Ingalls cleared the field all by himself one hundred thirty years ago. His descendants now interact in groups and with networks of other people. The same is true for most of us. We make partial contributions to larger and more complex tasks. We change a few lines of code in a computer program or a few lines of dialogue in a movie. We pass ideas, proposals, and solutions back and forth with people who possess diverse cognitive skills. We work in Bletchley Parks. And more and more often, we see InnoCentive-style opportunities.

AN OUTLINE OF THE BOOK

The remainder of this book contains two long parts followed by three short parts. In the first part, I define frameworks for modeling diversity, what I call *the diverse toolbox*. In the second part, I analyze if, when, and how diversity produces better outcomes. In the third part, I discuss the problems created by diverse values. In part four, I summarize and interpret the empirical evidence of diversity’s benefits. And in the final part, I (briefly and sweepingly) discuss the implications for teams,

organizations, markets, and democracies. In the epilogue, I wax philosophic about ketchup.

Part I: Unpacking the Toolbox

In part I, I unpack the first component of the *Diversity Conjecture*, diversity itself. Without that unpacking, we would be left to wander about in a land of catch phrases and vague metaphors. We cannot say whether diversity is good or bad unless we first know what diversity is. By *diversity*, I mean cognitive differences.³ The unpacking consists of four formal frameworks.

DIVERSITY: UNPACKED

Diverse Perspectives: ways of representing situations and problems

Diverse Interpretations: ways of categorizing or partitioning perspectives

Diverse Heuristics: ways of generating solutions to problems

Diverse Predictive Models: ways of inferring cause and effect

The first framework captures the idea that people have diverse *perspectives*. Informally speaking, perspectives represent solutions to a problem. When we say that people have diverse perspectives, we mean that they see or envision the set of possibilities differently.

Perspectives embed knowledge: what we know is a function of how we represent things.⁴ To provide just one example, Isabelle, an Ann Arbor resident, might represent a location relative to her home—“To get to Zingerman’s, go down State Street and take a left in front of the big Catholic Church.” Her brother, Nicky, might represent those same locations using a mental map of city streets—“Zingerman’s sits on the corner of Kingsley and Detroit.” Given their perspectives, Nicky would prove far more capable of telling a visitor how to get from Zingerman’s to the Brown Jug, another Ann Arbor landmark. Isabelle might resort to directions that pass by her house. (Or, like the old New Englander, tell you, “You can’t get there from here.”)

Perspectives provide one framework for how people see the world differently. A second framework, *interpretations*, highlights the different categories people use to classify events, outcomes, and situations. For example, one financial analyst might categorize companies by their equity value, while another might categorize them by industry. One voter might categorize senators by their ideology. Another might categorize them by their home state. The first refers to Olympia Snowe as a Republican. The second refers to her as a Mainer. Formally speaking, interpretations create many-to-one mappings from the set of alternatives that form categories. Informally speaking, interpretations lump things together.

A third framework captures the different tools people use to solve problems. I call these *heuristics*. These can range in sophistication from simple rules of thumb—if it's bleeding put a bandage on it; no blood, no foul—to sophisticated analytic techniques such as Fourier analysis or wavelet transforms.⁵ Heuristics must be applied with respect to a particular representation of a problem, a perspective, so I'll often speak of perspective/heuristic pairs. Because people often apply heuristics in combination, a person who knows two heuristics often knows three—the third being the combination of the first two. Often these combined heuristics prove far more powerful than the individual heuristics that form them.

The fourth framework for capturing cognitive diversity, *predictive models*, describes causal relationships between objects or events. Predictive models serve as a shorthand to make sense of the world. When someone says Nebraskans are nice people or Ford trucks are durable, they map categories—Nebraskans and Ford trucks—onto the categories nice people and durable machines. Predictive models can differ: Ben Franklin believed that “cheese and salty meat should be sparingly eat.” Doctor Atkins believed differently. Both sold lots of books.

If we combine perspectives, interpretations, heuristics, and predictive models, we create *cognitive toolboxes*.⁶ These toolboxes provide a new way to think about intelligence and ability. We often think of people as having a level of intelligence as measured by an IQ test—where they fall on a scale that starts at zero and goes up (way up, in some cases). IQ provides us with a convenient

measuring stick. The move from measuring sticks to toolboxes obliges more than a switch of metaphors. Toolboxes change how we conceive of intelligences and how we compare them. Ranking people, as we shall see, can be a dubious exercise in the world of toolboxes.

Part II: The Benefits of Diverse Tools

In part II, I'll demonstrate *how* diversity produces collective benefits. This idea is not new. Plato said it a couple of thousand years ago. The scholar T. C. Chamberlain stated it in the scientific context more than one hundred years ago.⁷ When we say that diversity leads to better outcomes, what do we mean? Do we mean better solutions to hydraulic engineering problems? Do we mean better weather forecasts? Do we mean better government welfare policies? Yes, yes, and yes.

We consider two main types of tasks: *problem solving* and *prediction*. These tasks encompass much of what collections of people do: we generate alternatives and we evaluate possibilities. Who performs these tasks? Small work teams, large organizations, and entire societies do. Teams of civil engineers solve water-flow problems (problem solving). Financial analysts predict the stock price of Kodak (prediction). University hiring committees choose a new employee (problem solving—what kind of scholar do we need?—and prediction—can this person do good research?).

If we hope to reap diversity's benefits, we need this logical connection. We need to understand the conditions under which diversity produces benefits. We cannot convene diverse groups and expect an instant utopia bursting with ice cream, ponies, and cedar plank-grilled salmon soaking in a black truffle oil and white wine reduction, but it will help.⁸

In analyzing problem solving, I focus on the roles played by diverse perspectives and heuristics. Diverse perspectives increase the number of solutions that a collection of people can find by creating different connections among the possible solutions. What one person sees as a small step—attaching our mittens to a string

of yarn running through our coat sleeves—may seem a giant leap for another. Diverse heuristics have similar effects. Given a solution, more heuristics allow problem solvers to explore more potential improvements.

The analysis of problem solving culminates in two main results. First, I state a claim that *diversity trumps homogeneity*: collections of people with diverse perspectives and heuristics outperform collections of people who rely on homogeneous perspectives and heuristics. Second, I state a conditional claim that *diversity trumps ability*: random collections of intelligent problem solvers can outperform collections of the best individual problem solvers. This result relies on four conditions: (1) The problem must be difficult; (2) the perspectives and heuristics that the problem solvers possess must be diverse; (3) the set of problem solvers from which we choose our collections from must be large; and (4) the collections of problem solvers must not be too small.

I then consider predictive tasks. People might want to predict any number of outcomes: the price of a stock, the winner of an election, the box office receipts of a movie, the winner of a sporting event, or the sales of a new product. In making predictions, people rely on predictive models. Aggregating predictive models differs from aggregating information (where some people know the answer and others do not). Models of incomplete information are commonplace in economics and political science, but those models rely on signals. The predictive model framework provides a plausible source of these signals and, in doing so, establishes a central role for cognitive diversity in the smooth functioning of democracies and markets.

In the chapter on prediction, I show two main results: that diversity and accuracy contribute equally to collective predictive performance, and that a crowd's collective prediction must always be at least as good as the average prediction of a member of the crowd. I call these the *Diversity Prediction Theorem* and the *Crowds Beat Averages Law*. The first result implies that we should not think of predictive ability as of paramount importance and predictive diversity as something that contributes only around the margins. Ability and diversity enter the equation equally. This

result is not a political statement but a mathematical one, like the Pythagorean Theorem. In this chapter, I also compare crowds against experts as well as information markets against polls. I show how information markets create incentives for both accuracy and diversity, which may explain why they work better than polls.

Part III: Diverse Values: A Conflict of Interests
(Or Is It?)

Up to this point, the results should bring joy and happiness. We might all think diversity is a wonderful thing. That's because we've ignored *diverse preferences*, differences in what we value. Preference diversity differs from toolbox diversity: Toolbox differences do not create conflict. Preference diversity can and does. For this reason, management books stress agreeing on a common goal—a common *fundamental* preference. If people disagree about what they're trying to accomplish, they function poorly as a collective.

Common fundamental preferences need not imply agreement. People can also have diverse *instrumental* preferences. They can differ on how they think it best to cross a particular finish line. In other words, people can disagree over means as well as ends. Instrumental preferences are preferences about means, so they implicitly contain predictive models. We like (or don't like) a policy of a higher minimum wage because we think it helps (hurts) workers. This distinction between fundamental and instrumental allows two people to agree over the destination—a romantic dinner at Charlie Trotter's restaurant in Chicago—but to disagree over how to get there—cab or train.⁹

My treatment of the potential problems created by preference diversity is at best a flyover of the relevant results—"Look, there's the Grand Canyon." The first result, Arrow's Theorem, gives conditions under which individual preferences do not aggregate into a collective preference. The second result, proved by Charles Plott, states that with majority rule voting, any proposed

alternative can be defeated by some other alternative. The third result, proved by Richard McKelvey and Norman Schofield, states that if people vote sincerely, then a sequence of majority rule choices could lead anywhere. We could even have action figure governors! The final result, proved simultaneously by Mark Satterthwaite, an economist, and Allan Gibbard, a philosopher, states that people have incentives to misrepresent their preferences.

These four results paint a bleak picture only if we believe preference differences to be fundamental. In many organizations and communities, members all pull for the same goal. What preference diversity does exist is instrumental. If so, I'll argue that the negative results aren't so bad after all.

I complete this third part of the book with a brief analysis of how toolbox and preference diversity interact. In doing so, I turn some of the intuitions from the previous chapters on their heads. Diverse perspectives, which we touted as a panacea, have a dark side—they lead to the discovery of lots of possible alternatives. If people have diverse fundamental preferences, they less likely agree when they have more possible choices. On the flip side, diverse fundamental preferences, which cause so many problems when making choices, prove beneficial for problem solving. What we desire influences how we look at problems, the perspectives we choose. Thus, collections of people with diverse preferences often prove better at problem solving than collections of people who agree. Difference of opinion not only makes a horse race, it also makes for effective, albeit sometimes contentious, teams.¹⁰

Part IV: Does Diversity Produce Benefits? The Pudding

The first three parts of the book present a logic of diversity. They explain how diversity produces benefits. Yet, many people care about “facts.” These people want to know whether the logic has empirical support, if evidence fits the theory. In the fourth part of the book, I take on that question. I do so with some trepidation. If we do not know how something works, demands for empirical support are premature. If we don't understand how

or why diversity creates benefits, we may not realize those benefits. Consider the width of the space between knowing that atoms contain enormous power and building a nuclear reactor to harness that power. It is huge. An analogous (though smaller) gap may exist for diversity. The benefits may be there, but we may not know how to unlock them. If we don't, we shouldn't expect empirical evidence. We may as well wonder why people living in the dark ages didn't use electric lights.

This book makes three core claims: (1) *Diverse perspectives and tools enable collections of people to find more and better solutions and contribute to overall productivity*; (2) *Diverse predictive models enable crowds of people to predict values accurately*, and (3) *Diverse fundamental preferences frustrate the process of making choices*.

Reducing the whole book into three claims paints a picture in rather broad strokes. Some may accuse me of making Bob Ross appear to be a pointillist, but so be it. Here's the evidence: whether we look at countries, cities, or teams, the bulk of evidence supports all three claims.¹¹ This evidence is strong in places and weak in others. No matter; it does not hold this book on its shoulders. It merely reassures us that the insights apply in the real world.

A second empirical question, one that some readers may believe to be a giant elephant sitting in the middle of the page, relates to identity diversity, that is, to differences in race, ethnicity, gender, social status, and the like. We can phrase the question as follows: Do identity diverse groups prove better at solving problems and making predictions? The short answer: yes, they do. But, identity diversity produces better outcomes indirectly. Any claim that identity diversity creates collective benefits requires two links. The first link connects identity diversity to cognitive diversity. The second link connects these diverse talents to relevant problems. Any number of corporate advertisements, university brochures, and organization Web sites contain what we might call the diversity mantra: *diverse identities bring diverse perspectives*.¹² Oddly, this mantra leaves implicit the conjecture that diverse perspectives create benefits. Presumably, the people who write those brochures believe that it does.

And yet, we can take the connection between identity and cognition too far. Identity diverse people can think alike. And people belonging the same race, age, gender, religion, and social class can also think differently. George Bush and Howard Dean, the early leader for the Democratic Party's 2004 presidential nomination, both grew up in wealthy families, went to elite prep schools, and then attended Yale, with Bush graduating three years before Dean. Yet they think about the world and its problems differently. And let's be honest, Bletchley Park was hardly a rainbow gathering. Yet these groups were cognitively diverse (though perhaps not as diverse as they could have been had they included people of diverse identities).

As for the second link, we shouldn't expect diverse teams to be better at eating donuts or mopping floors. Identity difference can contribute to better outcomes only if the task is appropriate—if we're designing a building—but it cannot have much to add if the task doesn't require problem solving or prediction (if we're digging the hole to put the building in)!

If we look at the evidence on whether identity diverse collections of people perform better than more homogeneous collections, we see mixed results at every level. At the country level, we find that in advanced economies, ethnic diversity proves beneficial. In poorer countries, it causes problems. In cities, we see similar effects. Diversity has the same pluses and minuses. Cognitive diversity increases innovation. Preference diversity leads to squabbles.

If we look at groups, the results become even messier and more confusing. Recent, careful, awarding-winning studies show little effect. Even claims that diverse groups are needed to market to diverse customers do not hold up to close scrutiny.¹³ One reason for the mangle of outcomes is that group dynamics can create no end of problems. People prefer to hang with people like themselves and tend to stereotype others.¹⁴ In addition, when studying groups, we can test identity effects more finely, which confuses more than it clarifies. We can compare teams with 80 percent men and teams with 75 percent women. We can find groups that consist almost entirely of men between the ages of fifty and seventy. (Hint: they're running a country near you.)

Overall, the group-level findings are similar to what has been found at the city and country level. If well managed, identity diversity can create benefits, provided it correlates with cognitive differences and provided the task is one in which diversity matters.

Summing all this up, yes, race, gender, and ethnicity matter, but so do our *experiences*: the friendships, road trips, chance meetings, and pancake breakfasts that combine to form a life. *Education* and *training* also influence our collections of cognitive tools. Diversity has many causes. That's good.

Part V: Going on the Offensive

Part V takes the logic out into the real world. I show how to go on the offensive, how to leverage diversity to produce better outcomes. Length considerations preclude this part of the book from reaching greater depths. What I cover, though preliminary, provides a useful start. (Given the power of diversity, I'm also guessing that others out there will see even more applications.)

My advice tends to be more general than specific—how organizations might best leverage diversity, how the models might be applied to hiring decisions as well as college admissions. Some of the advice is intuitive—bring in outsiders—but other bits of advice are less so: encourage preference diversity, avoid lumping, and distinguish aggregation from compromise. My final piece of advice is to maintain humility and embrace the mysteries of diversity. We cannot expect to understand the mysterious origins of new ideas and breakthroughs.

THE LOGIC IN CONTEXT

Before continuing, let's stop and situate the contributions in three larger contexts. First, the logic points to potential benefits from globalization beyond great food, awesome music, and amazing art. Yes, cultural awareness prevents boneheaded actions.¹⁵

But the logic suggests that the benefits of a globalized workforce extend far beyond better understandings of local markets. People with different life experiences and training, people from different cultural backgrounds, likely see the world differently. And those differences—differences in perspectives—can be valuable when solving problems or making predictions.

Second, the logic can and should be read as supportive of interdisciplinary research. People with different disciplinary training naturally bring diverse understandings and tools to problems. That diversity of tools can lead to breakthroughs that would not occur, or would occur more slowly without interdisciplinary research. Many university administrators preach interdisciplinary research. This book provides a logic for continuing to break down the barriers that separate the disciplines.

Finally, the logic applies to recent defenses of affirmative action policies. Affirmative action policies take many forms. The reasons for affirmative action have shifted over time, at least in the eyes of the courts. Initially, affirmative action policies were motivated by the desire to redress past and current discrimination. Later, following rioting in the 1960s, some saw affirmative action policies as a way to hold society together. Police departments were allowed to have racial goals so that their officers reflected the communities they served. Schools have also attempted to have teachers match their communities' demographics, but the courts have not always supported those policies.

The logic in this book can be used to support an *instrumental* argument for affirmative action. If diversity produces benefits, then schools, firms, and organizations should be able to give a leg up to underrepresented people. The instrumental defense has become central in recent court decisions.¹⁶ The extent to which this logic supports race-based affirmative action depends on empirical facts: *either identity diversity correlates with cognitive diversity or it does not.*

Not all advocates of affirmative action view the instrumental argument positively. Some fear that it covers historical injustices and current discrimination under a large multicolored rug.¹⁷ This book helps us to think through when it would and would not

hold. It helps us sort the logical from the illogical. For example, in his dissenting opinion on the cases involving the University of Michigan's law school admissions policies, Supreme Court Associate Justice Antonin Scalia wrote that Michigan was suffering from logical dissonance. On the one hand, Michigan wanted a "super-duper" law school (that's legalese meaning "really good"). On the other, it wanted to be diverse. Justice Scalia presented these two facts as contradictory.

They are not. Diversity and super-duperness can go hand in hand: a great law school may require a diversity of perspectives, interpretations, heuristics, and predictive models. A great law school benefits from including people with diverse preferences (law students like to argue, even more so than lawyers). So if we believe that differences in race, gender, ethnicity, physical ability, religion, sexual orientation, and so on correlate with cognitive diversity, then being super-duper *may* require some identity diversity. And, moreover, super-duperness may *always* require identity diversity, long after discrimination ends.

That same logic does not necessarily translate to every sector of the corporate world. Universities have different goals than companies. Despite their reputation as EMOs (endowment maintenance organizations), universities seek to do research, educate, and serve. In a university classroom, students and faculty learn from one another. Far less cross-fertilization of ideas takes place in a firm that employs traveling salespeople.

AND AWAY WE GO

With the requisite captivating example, background, overview, and contextualization in place, we can now turn to the fun part—the frameworks and models. Once built, they allow us to demonstrate that when confronted with a difficult task, be it solving a problem, predicting the future, or making a choice, we benefit by including diverse people. In such situations, we might think about gathering together the best and brightest minds, but that's a flawed approach. We also need to pay attention to the

diversity of those minds, all the more so if the old saying that “great minds think alike” holds true.

As a note of warning, what follows contains a little bit of mathematics. Anything difficult has been relegated to the notes. What the editors allowed to remain should be accessible to almost everyone. If you can handle equations like “force equals mass times acceleration” ($F = MA$) and the Pythagorean Theorem ($A^2 + B^2 = C^2$), you’ll be fine.¹⁸

For those more mathematically inclined readers (hint: my professional colleagues), accept in advance this apology for the necessary overgeneralizations. Many of the claims in the book can be stated with greater clarity and precision. Those who want the details in more detail can peruse the academic papers that Lu Hong, Jenna Bednar, and I have written in the stark, cold language of the academy.¹⁹ These papers (all available on my Web site) contain the mathematical chest thumping—the epsilons and sigma algebras—that one expects from a card-carrying mathematical social scientist.

Churchill called Bletchley Park “the goose that laid the golden egg,” and so it was. Someday, InnoCentive-inspired organizations may well become gaggles that produce golden eggs by the truckload. We can hope. But we must keep in mind that as plastic as our brains may be, they’re individually limited. Collectively, they’re less limited, but only if they’re constructed differently. One light bulb, even the one over Edison’s head, is not as bright or as interesting as a string of multicolored lights. Those Apple Corporation ads give sound advice: Think different. In difference lies the potential to contribute.