Making the Most of Science, In and Out of the Classroom

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In 1995, a man named Ronald Cotton provided a blood sample intended to prove his guilt. By all accounts, he was culpable for breaking into the homes of two young women, stealing their belongings, and raping them on a humid July night in 1984. One of the victims, Jennifer Thompson, was sure he was the attacker. She identified him in a photograph. She picked him out of a police lineup. She was sure he was the man.

Except that he wasn't the man. Someone named Bobby Poole was the true offender. He was proven guilty by a DNA test and was subsequently shut away under lock and key. After more than a decade behind bars, an innocent man was finally released. He is one of hundreds of people who have been wrongly convicted, exonerated only by the conclusive evidence of their genetic code.

But well before that July night — before the conviction and the controversy and the DNA tests — psychological scientists understood that eyewitness testimony is imperfect. Despite every effort to understand the features of a face, to remember a gait or a voice, studies have shown that crime-scene witnesses can be wrong. In the more than 3 decades of research aimed at understanding this phenomenon, we have seen clear inroads to practical implementation of these psychological science findings in the justice system — but progress has been slow.

The legal arena is only one of many where psychological science bumps up against real, pressing problems. And while every societal issue we face is masked under a different context, the same critical question is at work in each of them: How can we use scientific findings to chip away at seemingly intractable problems?

Although a wealth of research yields potential solutions to various pressing issues directly — to promote

healthier eating, to improve the education system, to boost donations to charity — it's rarely a smooth route between an empirical research finding and a tangible outcome.

But to be sure, translation from the lab to practical use does happen, and in every branch of science. Advances in robotics have led to improved prosthetics, quantum theory to faster computing, and an understanding of biological processes to the development of self-repairing materials. Psychological science is aptly positioned for applicative purposes. But for all the translations the field has made, there are countless others to be addressed.

In an article published several years ago in *Perspectives on Psychological Science*, APS Treasurer Roberta Klatzky outlined a strategy for solving this conundrum: devoting entire undergraduate courses to the applications of science. That idea has gained traction.

Klatzky believes students are an underutilized and pivotal piece of infrastructure in the effort to create useful applications. They're impressionable. They're curious. And their interests, especially in introductory courses, are geared heavily toward how theoretical classroom knowledge applies to their lives. While there are numerous courses in industrial/organizational or human factors psychology, these are subject-specific applications. In short supply, Klatzky believes, are courses that put basic psychological phenomena and their far-reaching applications under the lens.

In her popular class at Carnegie Mellon University, Klatzky teaches the fundamental concepts in cognitive psychology, and then gears the rest of the course toward how those concepts are applied. These concepts — perception, cognition, memory, learning, language, and emotions — all have significant bearing on subjects far afield from psychology itself, and by encouraging students to search for and imagine applications themselves, Klatzky inspires these future innovators to internalize the arc between laboratory research, practical application, and interdisciplinary thinking.

Applications That Keep Giving

In seeing how basic research findings *could* be applied to a critical societal issue, students begin to generate ideas to make the application a reality — going a step further than the scientists themselves. Boosting charitable giving is a particularly ripe field for applying recent research, and some of our more irrational behaviors and decisions can be harnessed in a way that increases donations to those in need.

In a 2013 *Psychological Science* paper, Christopher Hsee and colleagues performed several experiments to reveal a psychological trick that increases donations: When potential donors are first asked to propose a hypothetical amount to give to one person, they are much more generous when deciding how much to actually donate to a group of needy people.

"A subtle manipulation based on psychological science can make a substantial difference in real life," wrote Hsee, of the Booth School of Business at the University of Chicago. For philanthropic organizations and fundraising groups, envisioning a route from data to application seems clear enough — but how do we implement such a finding?

This, Klatzky says, is where students are key.

"Learning about the pathways to application gives them a heads-up about the effort involved and the barriers they may encounter, and they get an appreciation for what translational science really means," she says.

Another recent paper revealed a human habit that contributes to misallocated donations. Researchers found that, when deciding how much to donate to natural disaster relief, people tend to pay more attention to the number of people killed than the number affected. This tendency results in donations going disproportionately toward the disasters with the most deaths, instead of the ones with the most people in desperate need of medical assistance, food, or shelter.

But there are several potential solutions to this imbalance, according to Ioannis Evangelidis and Bram Van den Bergh of Erasmus University Rotterdam. Simply swapping the ambiguous term "affected" with more concrete terms like "homeless" seems to reduce the disproportionate donations, putting more money in the pockets of those still suffering.

Moreover, there are basic psychological phenomena associated with donating that hit much closer to home. George E. Newman and Daylian Cain of Yale University demonstrated that we tend to perceive a person's charitable giving as less moral if the do-gooder reaps any rewards from the effort — say, a percentage of the proceeds from a fundraiser. In fact, the experiments suggest that this kind of "tainted altruism" is perceived as less moral than doing no good at all — a troubling finding for any profiting philanthropist. But the researchers also found a way to fix the problem: Participants realized the inconsistency in this logic when they were reminded that, even though the do-gooders were rewarded for their effort, they chose to give time or money but weren't required to donate at all.

Newman and Cain believe that finding ways to reduce the "tainted altruism" bias might lead to more charitable donations and less stigma against those who make a career out of giving time and money.

These findings, while preliminary, point to several critical potential applications for basic psychological science. Armed with that knowledge and moving into the workforce, it is the students Klatzky teaches who could put these findings to good use.

Steps in a Healthy Direction

While students in business or economics might be most interested in applied research on charitable giving, psychological science has pragmatic bearing on other fields as well. As several recent papers have revealed, there are also potential applications in the medical arena.

Roberta Klatzky encourages students to identify applications for psychological research findings.

The US healthcare system is a complex machine. Wading through its intricacies as a patient is a daunting task, and with money on the line and more than 300 million people deciding on health insurance, preventative care, and medications, understanding how individuals make choices about their health is a financial imperative for the country as a whole.

This is where basic psychological findings can be taught to students early on, and their use exploited through innovation. These studies lend insight into how we make decisions about medical procedures, how we understand medical risk, and how we can compel ourselves to lead healthier lives.

In one compelling example, Gaurav Suri and colleagues from Stanford and Tel Aviv University found that patients tend to stick with the status quo when making decisions about their own health — even when the status quo is objectively worse. In one study, participants were first told they would receive short electric shocks. They were then given two options and were forced to choose: They could press a button to reduce the time until the shock, or they could press another button to keep the time the same. Not surprisingly, most participants pressed the button that got the shock over and done with quickly.

But when participants were later given a choice to press the time-decrease button only "if they wanted to," they tended to stick with the status quo. That is, they didn't *voluntarily* take the action to reduce their own anxiety about the shock. But the researchers also found a way to combat this status-quo bias: Simply requiring participants to reduce the shock-time on an early trial made them much more likely to hit that button on later trials. It only took a nudge in the right direction for them to make productive choices about their own health.

Ideal for Klatzky's application course, these findings give students a new perspective on the psychological factors hidden beneath medical treatments. Not only is an awareness of the status-quo bias important for patients choosing between options, but it can also serve as the impetus for meaningful changes in how health professionals switch treatment plans.

For some individuals, the difficulty in choosing treatment options stems from a misunderstanding of the risk/benefit probabilities — statistics that are far from intuitive (e.g., you can test your skills at RiskLiteracy.org). In a 2013 paper published in *Current Directions in Psychological Science*, Rocio Garcia-Retamero and Edward Cokely explained that how visual aids are designed has significant bearing on a patient's understanding of the potential risks and benefits. Interdisciplinary by nature, this research stands at the crux of psychology and usability (or user-centered design) — exposing students to the crucial fusion between fields that is necessary for solving complicated problems.

Another study found that prompting people to actively contemplate their reasons for seeking or avoiding health information — say, a diabetes risk score or their HIV status — actually makes them more likely to seek out that information from their doctor, even when they would have avoided it initially for fear of worrying about the future or having to change their behaviors. Implementing infrastructure to apply findings like these may make people more likely to follow up with their doctors, thus improving preventative care and perhaps lessening the public health burden for chronic diseases.

But there are numerous potential applications outside the doctor's office as well. One recent study found that people are more likely to choose healthy options at the grocery store if they use the risk of losing their insurer-subsidized monthly healthy food discount as a motivational tool. This experiment — with grocery-shopping data from over 6,500 households who opted into the program — forced participants to forfeit their discount unless they increased their healthy food purchases by 5% each month. While many participants didn't achieve that benchmark — the average increase in healthy foods was 3.5% — that didn't deflate their spirits.

"Those who failed the task — who did not get the discount — nevertheless wanted to stay in the program," explains psychological scientist and study coauthor Dan Ariely of Duke University. "These were people that tried to use the financial penalty to improve their own behavior and failed to do so. But they did not blame anyone else, and they did not stop trying."

These studies reveal specific psychological subtleties that, if taught to students early and then harnessed appropriately, may provide effective foundations for tangible, problem-specific outcomes. They will have the opportunity to bring these potential applications to light — a feat that many psychological scientists often stop short of.

Barriers to Implementation

Though not lacking in relevant material — new studies are published every day — a course focused on applied science wouldn't be complete without an understanding of the roadblocks. As Klatzky points out, there is an "unfortunate potential for slippage between the psychological science that has relevance to application and the applied world." That is, even if a study addresses a critical need and finds a solution, there is no guarantee that effective policy or innovation will emerge on a larger scale. And while reducing this disconnect is critically important for maximizing the usefulness of psychological science, it is by no means a straightforward problem.

Most effective applications of science have required scientists to provide the outreach. This strategy, while occasionally successful, is less than ideal. "They become involved, they perturb their research careers, and they end up banging on doors," Klatzky writes. More often, however, the opposite is true:

Scientists look to publication as an end point, and assume that others will make the jump to useful application. Not surprisingly, the applications rarely materialize.

One of the most pernicious barriers to application stems from an aspect of the science itself: the inherent uncertainty that comes from scientific statistics. Statistical inference, a robust tool for understanding populations, cannot predict what any given individual will do. This may be why companies or policy-makers are wary of moving forward with ideas. At a time when budgets are tight across the board, uncertainty and risk are the enemies of implementation.

But this is precisely why students must begin to generate useful ideas by means of a course on applications, Klatzky contends. It arms them with the tools to tackle real problems with the science as support.

"Whether they are psychology majors or only passing through, students who study applications come away with a sense that the basic science we do really matters," she says. "Understanding the interdisciplinary nature of applied cognitive science is invaluable for students entering related careers, where they are likely to work in teams with people from diverse backgrounds."

And with so much at stake — hundreds of people unjustly convicted, an increasing gap between the rich and poor, an aging and ailing populace — there is a critical need for innovative and concrete solutions. œ

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