

WHY WE CHEAT

Scientists are unraveling the causes of fraud and dishonesty and devising new strategies for rooting them out

BY FERRIC C. FANG AND ARTURO CASADEVALL

Photoillustration by Aaron Goodman

Cyclist Lance Armstrong has apologized for using performance-enhancing drugs to win seven Tour de France titles. He attributed his cheating to a determination to “win at all costs.” Psychologist Marc Hauser of Harvard University, who once wrote an article entitled “Costs of Deception: Cheaters Are Punished...,” is now out of a job after the U.S. Office of Research Integrity concluded that he “fabricated data, manipulated results in multiple experiments, and described how studies were conducted in factually incorrect ways.” Sixteen banks have agreed to settlements or are under investigation for manipulation of the Libor, an interest rate at which banks may borrow from other banks, in what is said to be the largest financial scam in the history of markets.

These cases are only part of a seemingly unending stream of cheating scandals in the news, affecting sports, science, education, finance and other realms. Although it is comforting to think that most people are essentially honest, cheating—defined as acting dishonestly to gain an advantage—is actually astoundingly common. In a 1997

survey, management professor Donald McCabe of Rutgers University and Linda Klebe Treviño, a professor of organizational behavior at the Pennsylvania State University, revealed that about three fourths of 1,800 students at nine state universities admitted to cheating on tests or written assignments. In 2005 sociologist Brian Martinson of the



HealthPartners Research Foundation in Bloomington, Minn., and his colleagues reported that one third of scientists confessed to engaging in questionable research practices during the previous three years.

Cheating is not limited to humans; it has been documented throughout the living world, wherever there is competition for limited resources. Despite its ubiquity, cheating can be quite detrimental to individuals and to society. Cheaters are stigmatized and may lose their jobs. Resources are squandered on fraudulent work. Individuals who play by the rules are deprived of rewards that they deserve. There is also collateral damage. Armstrong’s cycling teammates were coerced into going along with the doping scheme and bullied when they tried to come clean. Dishonest scientific research can misdirect other investigators, lead to misguided public policy and harm patients when clinical decisions are based on faulty information.

Such problems have led to many effective constraints on cheating—but existing controls in human society may be in need of refinement. In an effort to better understand cheating, scientists have discovered that creativity, fear of loss and the observation of dishonest behavior can motivate cheating or make it more likely. These triggers, along with an increasing appreciation that cheating can be contagious, may help explain the recent “epidemic” of deceit in academia and point to strategies to reduce the spread of dishonest behavior. The scientific enterprise is

FAST FACTS

Decoding Dishonesty

1» Cheating is astoundingly common. One survey revealed that about three fourths of 1,800 students at nine universities admitted to cheating on tests or assignments.

2» Fraudulent work squanders resources. It may also harm patients and misdirect scientists or public policy makers.

3» Researchers are trying to better understand cheating in hopes of minimizing its impact on society. So far they have discovered that creativity, fear of loss and observing dishonest behavior can motivate cheating or make it more likely to happen.

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far from immune to cheating, but it can help us understand why people cheat and what can be done about it.

Origins of Deception

In nature, cheating has evolved as a way for organisms to gain advantage over others without incurring the cost of effort. For an individual, the calculus is simple: Can I get something for nothing without being caught and punished? At every level, some critters take the risk. Microbiologist E. Peter Greenberg of the University of Washington has found that some *Pseudomonas* bacteria exploit public goods generated by other cooperating bacteria without sharing in production. Similarly, systems biologist Alexander van Oudenaarden of the Massachusetts Institute of Technology has found that some *Saccharomyces* yeast

by the parrotfish's skin. When a cleaner fish snags mucus rather than parasites, it cheats the parrotfish of its benefit in the arrangement. Biologist Redouan Bshary of the University of Neuchâtel in Switzerland and his colleagues have observed that parrotfish frequently respond to such behavior by fleeing, so that both the cheater and its straitlaced companion lose out on the food. In retribution, the wronged cleaner fish will sometimes chase its partner. The dilemma appears to discourage cheating by cleaner fish, given that cleaners are more likely to cheat when feeding alone.

Yet simply balancing costs and benefits, as these fish do, cannot account for the psychology of the phenomenon in humans. For a closer approximation, we must look to other primates, which have large and deeply convoluted neo-

SUSPICIOUS SHENANIGANS: Lance Armstrong (left) admitted to doping to win seven Tour de France titles. Law-enforcement officials speak at a press conference at The Hague after police busted a network suspected of fixing soccer matches (middle). At Harvard University (right), 125 students were investigated for cheating on a final exam.

intelligence is the ability to deceive [see “The Social Genius of Animals,” by Katherine Harmon; *SCIENTIFIC AMERICAN MIND*, November/December 2012]. Tactical deception is widespread among primates. Ethologist Hans Kummer of the University of Zurich vividly described cheating behavior in hamadryas baboons in Ethiopia: female juveniles mate with juvenile males while concealing their actions from the alpha male by hiding behind rocks. Primatolo-

The bigger a species' neocortex, the more members of that society use dishonest tactics to manipulate others.

cells cheat by using the products of a sugar-metabolizing enzyme made through the labor of other cells.

Moving up the food chain, the diminutive cleaner fish also are known to abuse relationships for personal gain. The cleaner fish species *Labroides*, for example, feast on the parasites that attach themselves to the parrotfish *Chlorurus*, often servicing the larger fish as cooperating male-female pairs. Cleaner fish, however, prefer to eat the mucus secreted

cortices (the outer layers of the brain responsible for conscious thought and language). In contrast, this structure is small and smooth in small mammals and absent in other animals. Primatologists, psychologists and neuroscientists have long suspected that the challenges posed by social primate groups have led to the impressive evolution of the primate neocortex that is responsible for the great leap forward in intelligence.

One major manifestation of social

gist Frans de Waal of Emory University has documented examples of deception by chimpanzees living in captivity. In 2004 psychologists Richard W. Byrne of the University of St. Andrews in Scotland and Nadia Corp, now at Keele University in England, showed that neocortex size predicts the degree to which primates practice deception. The bigger the neocortex in a species, the more individuals in that society use dishonest tactics for social manipulation.



Everyone Cheats—A Little

Humans are surprisingly quick to cheat when the circumstances are conducive. In 2008 behavioral economist Dan Ariely of Duke University and his colleagues described what happened when they asked college students to solve math puzzles for cash rewards. When the researchers changed the experimental conditions such that the students assumed the examiner could not detect cheating, the average self-reported test score rose significantly. The researchers determined that the scores were not inflated by a few students who cheated a lot but rather by many students cheating a little.

It may seem self-evident that people, as with other animals, are motivated to cheat by the potential benefits. If cheat-

ing increased the cash reward, the amount of cheating actually declined. Ariely suggests that the students felt guilty when they cheated more or received larger amounts of cash through dishonest behavior. That is, a person's conscience places a lid on the amount of cheating he or she will engage in. Another possibility is that the students thought they would be less likely to attract attention if they cheated only a little.

Not everyone is equally likely to cheat, however. In 2011 Ariely and behavioral economist Francesca Gino of Harvard Business School reported that people who score higher on psychological tests of creativity are more apt to engage in dishonesty—a connection that is perhaps not surprising considering that creativity and tactical deception are

NATURAL-BORN CHEATERS: Some yeast cells (left) unfairly nab the chemicals produced from the labor of other cells. Cleaner fish (small fish, center) may steal the mucus of parrotfish (not shown) for supper instead of helpfully consuming their parasites. Among baboons (right), young females cheat the alpha males out of the action by mating with younger guys while hiding behind rocks.

ber 2012]. As Proust observed in *Remembrance of Things Past*, “It is not only by dint of lying to others, but also of lying to ourselves, that we cease to notice that we are lying.” Or as George told Jerry on *Seinfeld* 75 years later, “It’s not a lie if you believe it.” Ironically, the creativity and intelligence that we regard as distinctly human might have arisen alongside our ability to deceive. We are who we are because we cheat.

When the researchers raised the cash reward for right answers, the amount of cheating actually declined.

ers used a simple cost-benefit calculation, one might predict that people would cheat as much as possible, not just a little bit. Yet in Ariely's study, students on average reported six correct answers when they got only four right, even though they could have raised their scores to a maximum of 20. In addition, no simple relation exists between the magnitude of the reward and the likelihood of cheating. When Ariely's team

both products of the neocortex. Yet Gino and Ariely believe the two are not just anatomically correlated but causally connected. They submit that creative individuals are better at self-deception: they come up with more inventive rationalizations for cheating as a way of making themselves feel better about doing it [see “Unveiling the Real Evil Genius,” by Ingrid Wickelgren; *SCIENTIFIC AMERICAN MIND*, November/Decem-

Gender, too, plays a role in determining who bamboozles his or her peers. Along with plant pathologist Joan W. Bennett of Rutgers University, we have recently observed that among researchers in the life sciences, males are more likely to cheat. Misconduct is seen among those at all levels of the academic hierarchy, from student to professor, but men are overrepresented among the culprits. Just as they commit more crimes in

society at large, males appear more likely to become charlatans in academia. Although we do not yet know precisely why men are more likely to veer off the moral path, scientists have gained insight into what motivates cheating generally.

In addition to potential gain, fear of loss may drive dishonesty. In fact, marketing researcher Scott Rick, now at the University of Michigan, and behavioral economist George F. Loewenstein, now at Carnegie Mellon University, have not-

2,000 retracted scientific papers, mostly in the life sciences. Last year we reported that the majority of retractions arose from research misconduct, most commonly fraud. Even after correcting for the rapidly rising number of scientific publications, we found that the rate of retractions for fraud has increased nearly 10-fold over the past two decades. This trend parallels the increasing pressure and competition for research grants and academic jobs. The well-known

was “very, very concerned” about his ability to support the researchers in his laboratory. “I was on a treadmill, and I couldn’t get off,” he told the federal judge at his sentencing hearing in June 2006. In a study published last year psychiatrist Donald Kornfeld, an emeritus professor at the Columbia University College of Physicians and Surgeons, concluded that a major impetus for misconduct by research trainees is a fear that they will fail to advance in their career. The potential for loss creates what Rick and Loewenstein call a “hypermotivation” to cheat, which may lead people to overcome their usual ethical constraints.

Deception Gone Wild

Cheating can breed more of the same if nothing puts a brake on the process. Once someone has overcome the initial barrier to cheating, subsequent hurdles to dishonest behavior may seem smaller and trivial to surmount. Ariely calls this response the “what the hell” effect, as in “what the hell, I already blew my diet, so I may as well have the dessert.” In our study of retracted papers, we observed serial misconduct by scientists for whom fraud had become a habit. The most extreme example so far is anesthesiologist Yoshitaka Fujii, formerly at Toho University in Tokyo, who is said to have fabricated data in as many as 183 scientific articles.

Another way that cheating can spread is through copycat behavior. Seeing someone else cheat without apparent consequences strongly encourages others to do the same. One need only watch pedestrians waiting at a crosswalk or passengers jumping a queue at a bus stop to observe examples of this phenome-



DO YOUR OWN WORK: Cheating on tests is surprisingly common. Targeting self-image is the best deterrent. People will not copy their neighbor’s paper if it makes them feel bad about themselves. A verbal reminder of the honor code just before an exam begins might prevent a lot of peeking.

ed that dread is an even more powerful motivator than the desire for reward. In a commentary on the 2008 paper by Ariely and his colleagues, Rick and Loewenstein observed that many instances of dishonesty in the real world result when people find themselves in a situation in which they face losing money, reputation or their career.

We believe that anxiety over loss is a principal driver of cheating in science. Along with neuroscientist and medical writer R. Grant Steen of Medical Communications Consultants in Chapel Hill, N.C., we surveyed more than

publish-or-perish environment of academia dictates that faculty with insufficient publications or funding may lose their research space, status and jobs. As a result, much of the cheating in academia probably stems from concern over the potential demise of a career rather than the prestige of publication.

Physiologist Eric Poehlman of the University of Vermont, one of the rare scientists who actually spent time in jail for research misconduct, stated that he

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non. In 2011 psychologists Agata Blachnio and Malgorzata Weremko of Catholic University of Lublin in Poland described an experiment in which students took a spelling test in a room secretly fitted with a one-way mirror. A dictionary and a thesaurus were in the room, but the students were asked not to use them. Subjects were three times as likely to cheat when an assistant posing as a cheating student was also present. In fact, unchecked dishonesty can promote the perception that one must cheat to remain competitive.

Such observations have led Ariely to refer to cheating as “infectious.” As physicians who specialize in infectious

in females. A more plausible explanation is contagion. The widespread bending of the rules probably led students to conclude that collaborating with other students was okay. (The class was called “Introduction to Congress,” so perhaps the students were simply identifying too much with the material.)

Just as an untreated minor infection may progress to a more serious condition, minor acts of dishonesty that pass without consequences may be followed by more egregious misconduct. Luk Van Parijs was once a promising young postdoctoral trainee in the lab of Nobel laureate David Baltimore at the California Institute of Technology. According to an

drew Wakefield, a gastroenterology researcher at Royal Free Hospital in London, that suggested a link among autism, bowel disease and vaccination. That study, later referred to by editors of the *BMJ* as “an elaborate fraud,” helped to fuel the modern antivaccine movement that even today erodes public confidence in vaccines and leads to cases of infection that could have been prevented.

Inoculated for Honesty

Psychologist Leda Cosmides and anthropologist John Tooby of the University of California, Santa Barbara, suggest that humans have both the ability to deceive and a specific talent for detecting cheaters. For more than two decades they have argued that people look for social rule violations to identify cheaters specifically in settings in which cheating is most likely to occur, as when a 17-year-old enters a liquor store or attends a party at which alcohol is served. Part of that talent for policing dishonesty is our ability to conduct research that can be used to devise more effective strategies to reduce it. Although there is a natural tendency to resort to stricter penalties to discourage cheating, little evidence supports the notion that harsher penalties are more effective than moderate ones. Instead education to instill and reinforce personal barriers to dishonesty is a more attractive approach.

According to Ariely, self-image is an important constraint on dishonesty. People do not cheat when it makes them feel bad about themselves. When they do cheat, they may construct elaborate rationalizations to make themselves feel better. Thus, reminders about an honor code or having people sign a statement attesting that they will not cheat has a measurable impact on reducing cheating. Ariely suggests that moving the signature line from the bottom to the top of the tax

JAYWALKING

JOCKEYS: Crossing against the light can become contagious.

If one person ventures into traffic, you might do the same. Otherwise, he'll be on time and you, the rule follower, will be late.

Too bad for the cars that have to stop for you. Or for you, if they don't.



diseases, we find his metaphor intriguing. This kind of social contagion may help explain the high prevalence of cheating in relatively small groups of people. For example, 125 Harvard students were recently under investigation for cheating on the final examination in an introductory government course. (More than half these students were told to withdraw from school for up to a year as punishment.) It is statistically unlikely that nearly half the 279 students in that class are sociopaths given the low prevalence of sociopathy—about 3 percent in males and 1 percent

interview with Baltimore published in 2010, Van Parijs had been cutting some corners at Caltech, but Baltimore was unaware of the behavior at the time. After Van Parijs started his own lab at M.I.T., the dishonest behavior escalated. In 2009 the Office of Research Integrity found that he had falsified data in numerous grants, publications and research presentations. Five publications were retracted, and Van Parijs lost his job.

Even single acts of dishonesty can have serious and lasting consequences for society. One famous example is a retracted 1998 article in the *Lancet* by An-



NOT SO FAST: Radar speed signs encourage drivers to heed the speed limit because they shame violators by advertising how fast they are going to anyone in the vicinity. Reminders to obey the rules are effective tactics for curtailing cheating.

form might prompt taxpayers to be honest. Signs displaying radar speed are effective in modifying behavior because they shame drivers into observing the speed limit by advertising any violation.

To reduce the hypermotivation to cheat arising from the fear of loss, we need reward systems that improve an individual's sense of security in settings where cheating is problematic. In academia, reducing the dependence of faculty members on funds from research grants may decrease the temptation to enhance or make up results. Recognizing successful teams rather than individuals may also lessen the incentives for misconduct.

Ethics instruction, where it exists in graduate schools and workplaces, should emphasize the costs of cheating and its damaging effects. In 2006 the Commission on Public Relations Education recommended that colleges and universities provide dedicated ethics courses, but most are not yet doing so. Such instruction might reduce the prevalence of cheating in college and clear up confusion among many students about what constitutes plagiarism.

Surveillance and enforcement of penalties for cheaters are critical tools for limiting the spread of the behavior. Just as diagnostic tests reveal infections, sophisticated technology can detect doping by athletes, and careful scrutiny of data, along with statistical tools, may reveal cheating by scientists. In addition, whistle-blowers can act like sentinel ani-

mals in disease epidemics to spot the earliest signs of cheating. Armstrong, Hauser, Poehlman and Van Parijs were each turned in by people from their inner circles. Supreme Court Justice Louis Brandeis once remarked, "Sunlight is said to be the best of disinfectants; electric light the most efficient policeman." Accordingly, the problem of misconduct must be openly acknowledged and discussed.

In epidemiology, an individual can be protected from disease by "herd immunity," whereby most members of a community are resistant to an infectious agent. Thus, parents who vaccinate their children are also protecting unvaccinated children. Similarly, people in settings in which cheating is problematic might be inoculated against cheating by reminders of ethical codes and of instances

in which cheaters have been caught and punished.

Because minor misconduct may lead to more egregious behavior, even small acts of dishonesty must be taken seriously. This is the basis of the late James Q. Wilson's famous 1982 "broken windows" theory of crime. Attending to lesser infractions such as vandalism may deter petty offenders from developing into hardened criminals, just as treatment of local skin infections may prevent them from progressing to life-threatening septicemia. Perhaps if Van Parijs's penchant for cutting corners had been recognized and addressed while he was a postdoctoral trainee, he might still be in academia today.

Ultimately, combating cheating most likely will require a multifaceted approach to promote a more ethical culture. These elements might include modifying reward systems to recognize teamwork and cooperation, penalizing wrongdoers in a consistent manner, setting up robust protections for whistle-blowers and improving methods to detect cheating. Although cheating may have short-term benefits for the person, such as financial rewards and prestige, it can be costly for both individuals and society. Armstrong was stripped of his titles and banned from sports for life. Hauser was dismissed from his Harvard professorship. As they and so many others have learned to their sorrow, deception has its costs. **M**

(Further Reading)

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