SCIENCE & TECHNOLOGY

No Method for Madness

THE SOURCE: "Current Status and Future Prospects of Clinical Psychology: Toward a Scientifically Principled Approach to Mental and Behavioral Health Care" by Timothy B. Baker, Richard M. McFall, and Varda Shoham, in ***Psychological Science in the Public Interest***, Nov. 2008.

WOULD YOU GO TO A DOCTOR who was ignorant of the medical advances made since Harry Truman was president? No way. But the average clinical psychologist's practice today doesn't look much different than it did 60 years ago, and the patients keep coming.

It's not for lack of scientific progress, write professors of psychology Timothy B. Baker of the University of Wisconsin School of Medicine and Public Health, Richard M. McFall of Indiana University, and Varda Shoham of the University of Arizona. Many newer psychological treatments have proven to be highly effective. For example, multiple clinical trials have shown that cognitive therapy and cognitive behavioral therapy provide more lasting benefits to people who suffer from depression than antidepressant medication. (In cognitive behavioral therapy, therapists help patients think through emotional patterns and work to change them so as to avoid fear or depression.) These and other recent-vintage psychological therapies have also proven effective for treating addiction, bulimia, schizophrenia, and post-traumatic stress disorder.

Moreover, these treatments are "scientifically plausible"—they are a good fit with our knowledge about how the brain works. But many of the country's 93,000 psychologists don't use these methods and, what's more, don't understand the science behind them. Baker and colleagues write, "Considerable evidence indicates that many, if not most, clinicians view science or research as having relatively little relevance to their practice activities. . . . They privilege their intuition and informal problem solving over what the research literature has to offer."

Aspiring clinical psychologists can get their credentials by completing one of two degrees—a doctorate of psychology (Psy.D.) or a doctorate of philosophy (Ph.D.). Psy.D. programs tend to be much less selective; furthermore, their graduates do not perform as well on the national licensing exam, and students and faculty are much less likely to engage in scholarly research. Yet the number of degrees awarded by Psy.D. programs grew by 170 percent between 1988 and 2001, while the number of Ph.D.'s remained the same.

Increasingly, many people suffering from psychological disorders—a population said to have doubled in size over the last 20 years—are turning to primary-care practitioners. These physicians do what they're trained to do—prescribe pharmaceuticals (something psychologists for the most part cannot do, since they are not M.D.'s). If psychologists continue to neglect science and fail to make an evidence-based case for their care, many health care plans won't cover their services in the future, the authors warn.

The history of medicine provides an example of how psychologists can reform their profession. In the early 20th century, the American Medical Association began rigorously grading medical schools on how their students performed on science-based licensing exams. The number of medical schools fell from 162 in 1906 to 95 in 1915, but the quality of medical education markedly improved. Rigorous new accreditation standards are just the therapy psychology needs now.

SCIENCE & TECHNOLOGY

Great Expectations

THE SOURCE: "Promises, Promises" by Stuart Blackman, in ***The Scientist***, Nov. 2009.

MORE THAN 20 YEARS AGO, AN editorial in *Science* magazine called on the federal government to boost spending on the effort to sequence the human genome, which the author said could lead to a cure for mental illness and thus prevent many from joining the ranks of the homeless.

Clearly, this hope has not come to fruition, and that's no great surprise, says Stuart Blackman, a science writer based in Edinburgh. A tendency to

promise more than they can deliver has long been a feature of scientists' work, but in recent decades overly bold promise-making has become more central to the scientific process.

It's easy to blame a media culture that demands "uncomplicated, definitive, and sensational statements" to drive stories, but scientists often have their own reasons for hyping their research, glossing over challenges they face, or laying out unrealistic timelines. After *The New York Times* ran a story in 1980 urging readers not to expect immediate miracles from research on cancer-fighting interferons, researchers complained that such public expressions of doubt would undermine their ability to get funding for their work.

And there's the rub. Intense competition for research dollars encourages scientists to overstate the importance of their research and the immediacy of the expected benefits. Moreover, a growing focus on scientific research as an engine of economic growth means that science must produce not only knowledge, but products that can be sold at a profit. Funders now customarily ask applicants for an estimate of their work's economic impact. Intense competition for publication in prominent journals adds further momentum to the cycle of scientists trying to "rhetorically overbid" each other.

More pressure comes from the fact that "politics is becoming more reliant on science to provide predictions to guide policy," Blackman writes. Last year, then–prime minister Anders Fogh Rasmussen of Denmark appealed to a gathering of climate scientists, saying, "I need fixed targets and certain figures, and not too many considerations on uncertainty and risk." Recognizing uncertainty and risk, however, is central to good science.

Cures for diseases such as Alzheimer's, cystic fibrosis, and Parkinson's have seemed to be just around the corner for years. If the only thing that comes down the pike in the near term is more disappointment, the public's current high esteem for science may erode. Blackman cautions that scientists (and the journalists who cover them) need to be more guarded in describing what the public can expect from their research, and when to expect it. As the eminent physicist Niels Bohr quipped, "Predictions can be very difficult—especially about the future."

SCIENCE & TECHNOLOGY

Nuclear Power Goes Global

THE SOURCE: "The Growth of Nuclear Power: Drivers and Constraints" by Richard K. Lester and Robert Rosner, "Nuclear Energy and Climate Change" by Robert H. Socolow and Alexander Glaser, and "Nuclear Power Without Nuclear Proliferation?" by Steven E. Miller and Scott D. Sagan, in ***Daedalus***, Fall 2009.

The rising specter of global warming, along with expected increases in the price of oil, is reviving the fortunes of nuclear power around the world. Today's critics are talking less about the accidents at Three Mile Island (1979) and Chernobyl (1986) than about the threat of nuclear weapons proliferation exemplified by North Korea and Iran.

Today, 30 countries operate 436 commercial nuclear reactors, producing about 16 percent of the world's electricity with minimal emissions of greenhouse gases. Another 44 units are under construction, and, according to the World Nuclear Association, ground may be broken for an additional 70 in the next 15 years. There is also a larger and more indefinite "proposed" category. Some 50 countries have declared an interest in exploring nuclear power.

That sounds like a lot of activity, but it will take a much bigger surge of construction to make a dent in emissions of greenhouse gasses. Richard K. Lester and Robert Rosner, of MIT and the University of Chicago, respectively, report that the world would need to at least double the amount of electricity derived from nuclear power in order to eliminate just a quarter of the increase in carbon dioxide emissions expected between now and 2050.

The writers in this issue of *Daedalus*, which is devoted exclusively to nuclear power, are less concerned with technological problems than political ones. Lester and Rosner say there are two possible paths into a nuclear future. One is to continue the long-term trend toward standardization of everything from reactor design to training and regulatory procedures. Pioneered by France with its 58 reactors and increasingly embraced in the United States, which has 104, this strategy has produced an excellent record of safety and efficiency. But as developing countries seek nuclear power, smaller, more customized plants with more built-in passive safety features might be required.

What about the radioactive spent fuel? Reprocessing in "breeder" reactions creates byproducts needed in making weapons, but the more com-