

*The Chronicle Review*

<http://chronicle.com/weekly/v55/i15/15b00501.htm>

From the issue dated December 5, 2008

## The Search for Self

### Can neuroscience revive the field of personality psychology?

By THOMAS BARTLETT

In the 19th century, personality was determined by bumps on the head. Caliper-wielding phrenologists measured qualities like inhabitiveness (love of home), adhesiveness (love of friends), and philoprogenitiveness (love of children). The pseudoscience stuck around for decades, fueling a mini-industry of practitioners and publications.

Personality in the 20th century was mostly about questionnaires. One of the first, the Minnesota Multiphasic Personality Inventory, contains wonderfully oddball true-false statements such as "I have never had any black, tarry-looking bowel movements" and "I would like to belong to a motorcycle club." Later personality tests, like the Myers-Briggs Type Indicator, label and categorize subjects — introvert or extrovert, thinking or feeling, sensing or intuition.

The problem with phrenology is that it's bogus. The problem with questionnaires is that they depend on accurate answers, which does not mean they are worthless, just imperfect. New tests and new theories have attempted to deal with that drawback, but self-report, as psychologists call it, remains troublesome.

Imagine, though, if you could peek inside the brain. Flip open the hood, grab a flashlight, and see how the thing works. That's the promise of personality neuroscience, which takes advantage of techniques like functional magnetic-resonance imaging to explore perennial questions about who we are and how we differ from one another. Some researchers believe that the study of personality, long relegated to the margins of psychology, is finally coming to the fore.

Not everyone is so sure. Critics argue that the gee-whiz appeal of neuroscience has blinded personality scholars to its inherent flaws, and that the new field is little more than phrenology redux.

Colin DeYoung is one of the optimists. He was an introspective kid who developed a teenager's fascination with existentialism. The undergraduate philosophy courses at Harvard, however, left him cold. Then, by chance, he took a psychology course called "Personality and Its Transformations" and was hooked. "One of the things that discouraged me from doing philosophy full time is that it was all about whose words are going to win," he says. "I like being constrained by actual data."

Now an assistant professor of psychology at the University of Minnesota-Twin Cities, DeYoung focuses his research on the "neurobiological underpinnings of individual difference," or how our brains make us who we are. His hope is that the kinds of questions that first interested him in philosophy can be answered using the theories of personality psychology combined with the technology of neuroscience.

DeYoung is interested in developing what he calls a "psychobiological framework" for personality

neuroscience. He espouses a theory known as the Big Five, which divides personality into these general aspects: neuroticism, agreeableness, conscientiousness, extraversion, and openness/intellect. Using the Big Five as his starting point, he wants to find the sources of those traits in the brain. It is an awesomely ambitious goal, one that would have seemed like science fiction before the advent of brain-imaging technology. But it doesn't seem quite so outlandish anymore.

In one study, DeYoung and his colleagues looked at the connection between self-control and intelligence. They asked subjects such questions as whether they wanted, say, \$50 now or \$200 in six months.

Those who rated higher on intelligence tests were also more able to delay gratification — which wasn't a surprise (previous research had suggested that was the case). But interestingly, the researchers also found, using functional MRI's, that those subjects who could delay gratification had higher neural activity levels in the anterior prefrontal cortex portion of the brain when performing a difficult cognitive task -- suggesting that this brain region contributes to the overlap between self-control and intelligence.

In DeYoung's view, embracing neuroscience does not mean rejecting personality theory. His research walks a line between the two. Now, the thinking goes, researchers can observe what the brain is actually doing while people are thinking certain thoughts or feeling particular emotions. It's a new tool, but it's more than that: DeYoung and others believe it can reinvigorate the field of personality studies.

And, frankly, the field could use a jump-start. Personality psychology has long been hamstrung by arguments over what makes up personality, how to define it, even whether it actually exists. In 1968, Walter Mischel, in the now-classic monograph *Personality and Assessment*, argued that personality was less consistent than previously assumed, and that it relied heavily on situational cues. That critique shook the field and, 40 years hence, its reverberations are still being felt.

So can neuroscience really help settle those decades-old debates?

In some cases, it already has. For example, the nature of self is a well-worn topic in psychology. Is there a self? And how, exactly, do we define it? Not long ago, Todd F. Heatherton, a professor of psychology and brain sciences at Dartmouth College, and some colleagues wanted to determine whether people think about themselves differently than they think about, say, the president of the United States. The research — which tested 24 men and women from the Dartmouth community — showed that a region of the medial prefrontal cortex was activated when people were asked questions about themselves.

We think we're special. Or at least our brains do.

That doesn't mean researchers now understand how or why the brain treats data that way. Plenty of questions still have to be answered, including whether the results are the same in other cultures. But, in this one case, Heatherton et al. have, perhaps, with the help of neuroscience, laid an issue to rest.

Not all researchers pursuing such questions with brain imaging are eager to embrace the tag "personality neuroscience." Ahmad R. Hariri, an associate professor of psychiatry at the University of Pittsburgh and director of the Developmental Imaging Genetics Program there, doesn't think of his work as personality neuroscience. And yet his research is often cited by those who study personality as among the most cutting-edge, exciting stuff out there.

In one study, Hariri and his fellow researchers examined the part of the brain known as the amygdala to see how subjects responded when shown photographs of angry and fearful faces. The same group of subjects was brought back a year later and shown the same faces. The researchers found that the reactions remained the same: Those whose amygdalas lit up the first time lit up again a year later, suggesting that this aspect of personality is stable over time.

That might not sound like a groundbreaking discovery, but it might be a partial counterargument to the notion that personality is not consistent. While Hariri is interested mainly in the clinical uses of his research — how it might be employed, for instance, to treat anxiety and depression — he understands that it may also resolve some of the field's most persistent conflicts. "Psychologists have long been interested in these issues," he says, "and it's only very recently that neuroscience has begun to fall in line and to complement."

The sense you get, from talking with Hariri and others, is that the field is on the cusp of enormous insights into the nature of personality, and that in coming years, as researchers begin to pin down how the brain functions, some of the deepest mysteries about what makes us individuals will be solved.

William R. Uttal, for one, isn't buying it. "Any psychologist who thinks they have insights into things that go beyond what we know from behavioral studies is teasing himself," says Mr. Uttal, a professor emeritus of engineering at Arizona State University.

Uttal, perhaps the loudest, most vehement academic critic of neuroscience, has, over the years, written a shelf full of books knocking it as nonsense. One of those books is tellingly titled *The New Phrenology: The Limits of Localizing Cognitive Processes in the Brain*. Psychology, he says, has a history of trumpeting whatever new technology happens along as the key to understanding ourselves. Neuroscience is only the latest such trend.

His main criticism is that researchers are divining significance where none exists. Assuming that measuring blood flow in areas of the brain reveals anything about the sophisticated processes going on at a neurobiological level is preposterous, according to Uttal. This line of criticism hasn't made him popular among some neuroscientists. "They've all made huge investments in fMRI machines and PET scanners," he says. "It's where the money is, and so the criticism is not well received."

Daniel P. Cervone wouldn't go that far. Cervone, a professor of psychology at the University of Illinois at Chicago, studies personality architecture and coherence. He reads a fair amount of neuroscience research and thinks it can be valuable, provided that the value isn't overstated. "It's unquestionably a tool, and you're learning things from it," he says.

The danger, though, is in interpreting those results in a way that gives them more weight than they deserve. Researchers may be able to discover how the brain processes information, but that's not the same as understanding the reasons for behavior. "It's like saying the legs are the cause of walking to the 5:15 train," says Cervone.

Even psychologists who make use of neuroscience are cautious about drawing grand conclusions. Russell A. Poldrack, a professor of psychology at the University of California at Los Angeles who runs a neuroscience laboratory, does research on how people practice "executive control" over thoughts and actions. Last year Poldrack and 16 other psychologists wrote a letter to *The New York Times* to protest an article about a brain-imaging study. In the study, the brains of potential voters were observed while they were shown photos of presidential candidates. The study's conclusions included statements like "Mitt Romney has potential" and "Emotions about Hillary Clinton are mixed." The article ran alongside nifty brain images from the study.

But the letter writers thought the science was questionable, to say the least. The article asserted that heightened levels of activity in the amygdala indicated anxiety. But that activity, Poldrack and his colleagues wrote, can indicate other emotions as well: "One-to-one mapping between a brain region and a mental state is not possible."

So he is sympathetic with Uttal, up to a point. "A few of his criticisms are right on," Poldrack says. "But some of them reflect that he doesn't understand neuroimaging when it's by the people who play it well."

Heatherly, too, understands the criticism. He's associate editor of the *Journal of Cognitive Neuroscience* and, along with good manuscripts, some less-than-stellar work has crossed his desk. "So you found some part of the brain lights up when you think of your mother — so what?" he says.

The good neuroscience research, he says, has a strong theoretical framework. Actual questions are being asked and answered. Early neuroscience research tended to be more descriptive (of the Mom-lights-up-your-brain variety), but as the field has matured, the research has gotten stronger, according to Heatherly.

In addition, he says, researchers are beginning to realize that, in order to do personality neuroscience, they need to have a grounding in psychology. "There's more of an interdisciplinary approach now. People recognize that it's not sufficient to march in and not know the literature."

Like Heatherly, DeYoung believes the key is understanding both personality psychology and neuroscience. And, also like Heatherly, he doesn't think brain imaging will ever completely supplant old-fashioned testing. "At some level," he says, "you're always going to be stuck with a questionnaire."

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