

## +Emotions are the Necessary Foundation of Thought

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From: Saul H. Chapman, Ph.D.  
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Subject: [npsych] Hearts and Minds a nice article from the Globe

Hearts & Minds Since Plato, scholars have drawn a clear distinction between thinking and feeling. Now science suggests that our emotions are what make thought possible.  
By Jonah Lehrer April 29, 2007

Boston Globe

Just over 50 years ago, a group of brash young scholars at an MIT symposium introduced a series of ideas that would forever alter the way we think about how we think.

In three groundbreaking papers, including one on grammar by a 27-year-old linguist named Noam Chomsky, the scholars ignited what is now known as the cognitive revolution, which was built on the radical notion that it is possible to study, with scientific precision, the actual processes of thought. The movement eventually freed psychology from the grip of behaviorism, a scientific movement popular in America that studied behavior as a proxy for understanding the mind. Cognitive psychology has fueled a generation of productive research, yielding deep insights into many aspects of thought, including memory, language, and perception.

Tomorrow, Harvard University is celebrating this intellectual achievement with a discussion featuring Chomsky and other luminaries of the revolution. But even as Harvard, and the field, celebrates the 50th anniversary of a true paradigm shift, another revolution is underway.

Ever since Plato, scholars have drawn a clear distinction between thinking and feeling. Cognitive psychology tended to reinforce this divide: emotions were seen as interfering with cognition; they were the antagonists of reason. Now, building on more than a decade of mounting work, researchers have discovered that it is impossible to understand how we think without understanding how we feel.

"Because we subscribed to this false ideal of rational, logical thought, we diminished the importance of everything else," said Marvin Minsky, a professor at MIT and pioneer of artificial intelligence. **"Seeing our emotions as distinct from thinking was really quite disastrous."**

This new scientific appreciation of emotion is profoundly altering the field. The top journals are now filled with research on the connections between emotion and cognition. New academic stars have emerged, such as Antonio Damasio of USC, Joseph LeDoux of NYU, and Joshua Greene, a rising scholar at Harvard. At the same time, the influx of neuroscientists into the field, armed with powerful brain-scanning technology, has underscored the thinking-feeling connection.

"When you look at the actual anatomy of the brain you quickly see that everything is connected," said Elizabeth Phelps, a cognitive neuroscientist at NYU. "The brain is a category buster."

The field has largely welcomed the new emotion studies, according to scientists. They have yielded discoveries that are widely acknowledged as important. In addition, they have even generated enthusiasm among the leaders of the cognitive revolution, as emotion studies have helped ground cognitive psychology, which has had a penchant for the abstract -- in the real world, uncovering important science behind everything from how people decide what to buy in a supermarket to how they make weighty moral decisions.

"People were coming up with all these lovely theories that don't relate to anything that's going on in the real world," said Jerome Bruner, a psychologist at NYU and luminary of the cognitive revolution who will speak at the Harvard symposium. "If we can get back to a sense of cognition that's more grounded in reality, then that's a good thing."

From its inception, the cognitive revolution was guided by a metaphor: the mind is like a computer. We are a set of software programs running on 3 pounds of neural hardware. Moreover, cognitive psychologists were interested in the software. The computer metaphor helped stimulate some crucial scientific breakthroughs. It led to the birth of artificial intelligence and helped make our inner life a subject suitable for science.

For the first time, cognitive psychologists were able to simulate aspects of human thought. At the seminal MIT symposium, held on Sept. 11, 1956, Herbert Simon and Allen Newell announced that they had invented a "thinking machine", basically a room full of vacuum tubes -- capable of solving difficult logical problems. (In one instance, the machine even improved on the work of Bertrand Russell.)

Over time, these simulations grew increasingly sophisticated. By "reverse-engineering" the mind, cognitive psychologists gained important insights into how some basic mental processes, like learning and memory, might actually function. Much of the work developing the field was done at the Harvard Center for Cognitive Studies, which was founded in 1960 by Bruner and George Miller, who is now an emeritus professor of psychology at Princeton.

Speaking at that same 1956 symposium, Miller described how, at any given moment, our working memory could contain only about seven bits of information. According to Miller, the mind dealt with this limited "channel capacity" by constantly grouping our sensations into "chunks." This suggested that crucial aspects of cognition were done, without our awareness, by the unconscious brain.

However, the computer metaphor was misleading, at least in one crucial respect. Computers do not have feelings. Feelings did not fit into the preferred language of thought. Because our emotions were not reducible to bits of information or logical structures, cognitive psychologists diminished their importance.

"They regarded emotions as an artifact of subjective experience, and thus not worthy of investigation," said Joseph LeDoux, a neuroscientist at NYU.

In part, this was a necessary omission. Behaviorists attacked cognitive psychology as lacking rigor. Because our inner mental processes could not be measured, the behaviorists, eager to expunge anything that smacked of Freud or introspection, disregarded them as irrelevant and unscientific. Although cognitive psychologists aggressively defended their approach -- Chomsky quipped that defining psychology as the science of behavior was like defining physics as the science of meter reading, they were inevitably forced to focus on the facets of cognition they could best understand. At the time, emotions just seemed too mysterious.

"These were nerdy guys interested in the nerdy aspects of cognition," said Steven Pinker, a psychologist at Harvard and moderator of tomorrow's panel. "It's not that our emotions aren't interesting topics of study, but these weren't the topics that they were interested in." Instead, early cognitive psychologists focused on the features of mind that seemed most machine-like, such as the construction of grammatical sentences.

Antonio Damasio, a neuroscientist at USC, has played a pivotal role in challenging the old assumptions and establishing emotions as an important scientific subject. When Damasio first published his results in the early 1990s, most cognitive scientists assumed that emotions interfered with rational thought. A person without any emotions should be a better thinker, since their cortical computer could process information without any distractions.

Nevertheless, Damasio sought out patients who had suffered brain injuries that prevented them from perceiving their own feelings, and put this idea to the test. The lives of these patients quickly fell apart, he found, because they could not make effective decisions. Some made terrible investments and ended up bankrupt; most just spent hours deliberating over irrelevant details, such as where to eat lunch. These results suggest that proper thinking requires feeling. Pure reason is a disease.

Scientists are now finding more examples of emotional processing almost everywhere they look. A study led by Brian Knutson of Stanford University, published last January,

demonstrated that our daily shopping decisions depend on the relative activity of various emotional brain regions. What we end up buying is largely dictated by these instant feelings, and not by some rational calculation.

In 2004, Harvard psychologist Joshua Greene used brain imaging to demonstrate that our emotions play an essential role in ordinary moral decision-making. Whenever we contemplate hurting someone else, our brain automatically generates a negative emotion. This visceral signal discourages violence. Greene's data builds on evidence suggesting that **psychopaths suffer from a severe emotional disorder. They cannot think properly because they cannot feel properly.**

"**This lack of emotion is what causes the dangerous behavior,**" said James Blair, a cognitive psychologist at the National Institute of Mental Health.

This new science of emotion has brought a new conception of what it means to think, and, in some sense, a rediscovery of the unconscious. In the five decades since the cognitive revolution began, scientists have developed ways of measuring the brain that could not have been imagined at the time. Researchers can make maps of the brain at work, and literally monitor emotions as they unfold, measuring the interplay of feeling and thinking in colorful snapshots. Although we are not aware of this mental activity -- much of it occurs unconsciously -- it plays a crucial role in governing all aspects of thought. The black box of the mind has been flung wide open.

The increasing use of sophisticated imaging is clearly the direction in which the field is moving, scientists say. Yet, some cognitive psychologists worry that this "trend to integrate with neuroscience" means that some aspects of cognition will be neglected.

"Everybody is now looking at these very big mental processes, like attention or emotion," said Pinker. "But I think that one of the great things about the cognitive revolution is that it went all the way down to the detailed rules and algorithms used by the mind. I hope we don't lose that."

Pinker hopes the Harvard commemoration will lead people to reflect on the cognitive revolution, to think about "what it got right and what it got wrong."

The lasting influence of the cognitive revolution is apparent in the language used by neuroscientists when describing the mind. For example, the unconscious is often described as a massive computer, processing millions of bits of information per second. **Emotions** emerge from this activity. Feelings can be seen as responses to facts and sensations that exist beyond the tight horizon of awareness. They can also be thought of as messages from the unconscious, as conclusions it has reached after considering a wide range of information -- **they are the necessary foundation of thought.**

As Jonathan Haidt, a social psychologist at the University of Virginia, recently wrote, "It is only because our emotional brains work so well that our reasoning can work at all."

Tomorrow's event at Harvard is from 4 p.m. to 6 p.m. in the Science Center, Hall B. It is free and open to the public.

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