

How did our minds evolve?

• CECILIA HEYES •
COGNITIVE GADGETS

What makes human minds different from those of other animals? Visiting IAST in May, Professor of Psychology (All Souls College, Oxford) Cecilia Heyes argued that small tweaks to our genetic starter kit allowed a much greater role for cultural evolution than previously thought. Drawing on new evidence from the rapidly developing field of social cognitive neuroscience, she believes that culture-rich human environments play a crucial role in teaching children not only what to think, but how to think it.

Construing the mind as the software running on the brain, Cecilia studies the development of distinctively human cognitive abilities such as language, imitation, and the capacity to conceive of mental states in other minds, to reconstruct the past, imagine the future, and to understand the way the physical world works.

A widely held view, put forward by evolutionary psychologists such as Steven Pinker, is that these mechanisms are cognitive instincts that we are born with. If we are able to read the minds of others, and reason about cheating and causation, it is largely thanks to genetic evolution. Experience, in this view, plays only a triggering or tuning role.



Cecilia argues that evolutionary analysis should be refocused from genetic to cultural evolution. Rather than fully formed cognitive instincts inherited at birth via DNA, she suggests that during childhood we download "cognitive gadgets" from the social environment.

These ways of thinking are culturally inherited, says Cecilia, a bit like simple physical technologies such as spinning wheels or canoes. "A canoe doesn't do its job well thanks to genetic evolution. It's also unlikely that it's been designed. A good canoe is more likely to be a consequence of many bad ones in the past. The good canoes didn't sink and were therefore more likely to be available for copying when new canoes were needed."

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At the same time, she insists, a newborn human mind is no blank slate. "The lion's share of human behavior is controlled by psychological mechanisms which, although much changed by experience, are originally genetically inherited. Most of our cognitive machinery is shared with other animals but genetic evolution has made small tweaks to our starter kit that allow us to upload from other people these new pieces of cognitive kit. The mental mechanisms that distinguish us from other animals are small additional fittings, gadgets; they're not heavy machinery. They're little extras with big effects."

Some of the most important modifications to our genetic starter kit relate to changes in our temperament, attention and multi-purpose cognitive mechanisms. At birth,



the minds of baby humans are very similar to those of baby chimpanzees. But humans are more motivated for social reward and less mutually aggressive, enabling the young to learn from a much broader range of adult models.

Another important tweak is human infants' genetically inherited bias to look at faces. "That initial bias quickly becomes converted into gaze cueing, a tendency to look where another individual is looking. Then with even greater specificity, if another individual has looked you in the eye, you are more likely to turn to where they are now looking. This sequence enables adults to direct the flow of information to infants by controlling their attention." Humans are also better than newborn chimpanzees at associative learning, memory and resisting temptation."

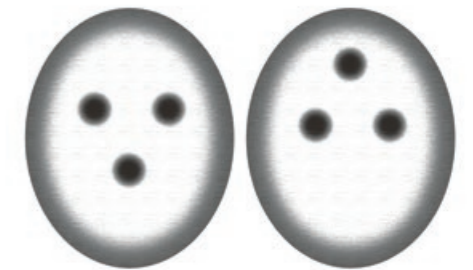
Sifting the evidence, Cecilia finds that the case for the cognitive instincts view has been steadily eroded over the past 25 years. Print reading is perhaps the clearest

example of a culturally inherited cognitive gadget. "Nobody doubts that reading is distinctively human cognitive mechanism. And there is no print or script older than 6,000 years so reading has to be because of cultural evolution; there hasn't been enough time for genetic evolution."

Just as we learn print reading through social interaction, Cecilia points to evidence that parents also provide children with explicit instruction in mind reading (that is, ascribing thoughts and feelings to others). Similarly, research into the spontaneous emergence of a new sign language in Nicaragua in the 1970s suggests that the ability to communicate with others is crucial for learning to read minds.

If Cecilia's theory is true, human cognition is at risk of falling down a ravine. "The cognitive instincts view suggests that human nature is relatively invulnerable. In the cognitive gadgets view, we don't just lose knowhow, facts and techniques after a catastrophic war or epidemic, we would also lose the cognitive mechanisms that enable us to learn from others. We would be in a better position than chimpanzees to culturally evolve them again, but they wouldn't be restored with each birth."

On the bright side, Cecilia suggests that human cognition is more agile than previously thought, constantly adapting to new social and physical environments. "We need not fear that our minds will be stretched too



Starter Kit - Humans appear to have a genetically inherited attentional bias towards faces. Newborns and fetuses look longer at the face-like triangle on the left, than at the triangle on the right (see Johnson, 2005; and Reid, 2017).

far by living conditions that depart from those of hunter-gatherer societies. Rather than taxing a Stone Age mind, new technologies – social media, robotics, virtual reality – provide the stimulus for further cultural evolution." ■



FIND OUT MORE
Cecilia's book 'Cognitive Gadgets' (2018) is available from Harvard University Press.