How does the human brain tackle problems it did not evolve to solve?

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Online dating, chatty smartphones, and social media played no role in the evolution of our ancestors, yet humans manage to deal with and even exploit these hallmarks of modern living. In the February 25 issue of the Cell Press journal *Trends in Cognitive Sciences*, Dartmouth College researchers review the latest social neuroscience literature and argue that our ability to respond to the challenges of a fast-changing culture comes from our brains' ability to flexibly combine and repurpose the neural resources that evolution provided us.

"This repurposing allows us to do a lot with a little," says co-author Thalia Wheatley, PhD. "Our brains have the flexibility to form new combinations of pre-existing computations and deploy these computations rapidly and flexibly in new contexts."

Dr. Wheatley and her graduate student Carolyn Parkinson, who are both in the Department of Psychological and Brain Sciences at Dartmouth College, describe three kinds of repurposing, each happening at three distinct timescales.

The first—evolutionary repurposing—is exhibited in all animals, and it describes how evolution "uses what's in the room" to solve a novel problem. It happens slowly, across lifetimes, through natural selection. For example, we evolved spatial/distance representation in the brain; however, in modern society we have repurposed this ability and also applied it to our concept of "closeness" to people in our social network.

The other two forms of repurposing that are found in humans rely on social cognitive abilities. Cultural repurposing refers to the process by which cultural inventions—such as reading, musical forms, and belief systems—are acquired in a lifetime by co-opting preexisting brain circuits. "For example, we did not evolve to read. Instead, a growing body of research suggests that we read by repurposing neural machinery that evolved to process faces and objects," explains Parkinson.

Finally, instrumental repurposing happens not only within a lifetime, but on the fly. It is how we intentionally and creatively push our old evolutionary buttons to influence our own and others' behaviors. For example, the most effective way to elicit concern and help for problems that afflict many—such as poverty, hunger, and disease—is not a reasoned presentation of facts, but rather a depiction of a single, vividly identified victim. This may be in part because our social behavior was honed within small hunter-gatherer bands that lived together in close proximity, rather than a huge, anonymous, globally interconnected society. Such information has helped shape charitable donation campaigns and strategies for addressing indifference about issues such as global warming.

Considering these forms of repurposing can have wide-ranging implications for the world around us. "Understanding what is in our cognitive toolbox is a first step to understanding how we can most effectively use these tools to address modern problems that our brains did not evolve to solve," says Dr. Wheatley.

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