MedicalXpress

Can scientists agree on a definition of curiosity?

November 4 2015

Credit: Human Brain Project

Philosopher Thomas Hobbes called it "the lust of the mind." Former first lady Eleanor Roosevelt said it was "the most useful gift." And, yes, we all know what killed the cat. But ask a group of scientists to define curiosity and you'll get a rousing debate, and a lot of unanswered questions about its biology. No more, argue two University of Rochester

researchers in a review of curiosity science published November 4 in *Neuron*. They propose that it's time for researchers to organize and focus on curiosity's function, evolution, mechanism, and development.

"Curiosity is a long-standing problem that is fascinating but has been difficult to approach scientifically," says co-author Benjamin Hayden, an assistant professor of brain and cognitive sciences. "But we felt that the field has recently managed to develop new formal and quantifiable techniques for studying curiosity and that it's worth getting the word out. There are several people, working in several different disciplines, who may not be aware of each other's work, but who should be".

It's not uncommon for neuroscientists to study something (e.g., attention, reward, self-control, etc.) for which there is no agreed upon definition. "Fighting over the proper definition is a big part of figuring out how they work," says co-author Celeste Kidd of the Rochester Baby Lab and Rochester Kid Lab. "We have to be comfortable with that kind of basic uncertainty."

Scientists have been taking notes about curiosity since the 19th century. In humans, psychologists used biographies from mothers to study how children were drawn toward new objects or experiences. Animal curiosity also became a fascination for well-known researchers like Ivan Pavlov and Harry Harlow, who saw this "What-is-it?" reflex as a basic drive.

Over time, studies have tried to differentiate curiosity by saying it is entirely intrinsically motivated (compared to information-seeking and risk-seeking), but this type of definition runs into problems when determining the intrinsic motivation of babies, primates, and other organisms that cannot communicate their inner world. For their Review, the authors used a working definition of curiosity "as a drive state for information," which can be observed in organisms as simple as nematode

worms.

"When the information-seeking becomes active, it's reasonable to start talking about it as a minimal form of curiosity," Hayden says. "This definition, and the idea that roundworms may be curious, will be hard for some people to swallow. But by looking at it from an evolutionary perspective—the benefits of information-seeking in general—scientists can make rapid progress; but by sitting around and arguing about what is and is not curiosity, progress will be much slower."

One question still up for debate is whether curiosity always carries benefits—whether immediately or in the future. A popular notion in education literature is that the function of curiosity is to facilitate learning and thus success increases with the degree of one's curiosity. It's agreed that information allows for better choices, but curiosity can lead animals to pursue stimuli that aren't necessarily useful. While increasing curiosity reduces uncertainty and makes for better choices on what to explore, the animals' brains are also wired to reward us for learning new information, which can put us at different risks.

"Everything in life involves trade-offs," Kidd says. "If we spend time watching a TV show because we are curious about what happened, then we spend less time working on our jobs. So there is definitely a balance, and too much curiosity can be harmful."

While not covered in-depth in their Review, the authors also note that the study of curiosity overlaps with ADHD and other attentional disorders. Most of us devote our attention or curiosity to learning things with personal relevance (e.g., Why is traffic slowing down? Who are my ancestors? What's my beau's favorite color?), but these disorders could impair attention in a way that prompts interest in non-ideal information.

Hayden and Kidd hope that in addition to the understanding how

curiosity is affected by disease, the future will bring new information about how curiosity is controlled, how it differs between childhood and adulthood, and the link between curiosity and learning. Finally, the authors are also optimistic that scientists will eventually agree on a way to classify curiosity.

More information: *Neuron*, Kidd and Hayden: "The psychology and neuroscience of curiosity" dx.doi.org/10.1016/j.neuron.2015.09.010

Provided by Cell Press