

Nature? Nurture? Scientists say neither

It's easy to explain why we act a certain way by saying "it's in the genes," but a group of University of Iowa scientists say the world has relied on that simple explanation far too long.

In research to be published today in *Child Development Perspectives*, the UI team calls for tossing out the nature-nurture debate, which they say has prevailed for centuries in part out of convenience and intellectual laziness.

They support evolution -- but not the idea that genes are a one-way path to specific traits and behaviors. Instead, they argue that development involves a complex system in which genes and environmental factors constantly interact.

"You can't break it down and say there's a gene for being jealous, there's a gene for being depressed, there's a gene for being gay. Those types of statements are simplistic and misleading," said UI psychologist Mark Blumberg, a co-author of the paper. "There is no gene for any of those things. At most, one can say there's a system of which that gene and many others are a part that will produce those outcomes."

The UI team believes genes are expressed at every point in development and are affected all along the way by a gamut of environmental factors -- everything from proteins and chemicals to the socioeconomic status of a family. These ideas are unified by a perspective called developmental systems theory.

"The nature-nurture debate has a pervasive influence on our lives, affecting the framework of research in child development, biology, neuroscience, personality and dozens of other fields," said lead author and UI psychologist John Spencer.

"People have tried for centuries to shift the debate one way or the other, and it's just been a pendulum swinging back and forth. We're taking the radical position that the smarter thing is to just say 'neither' -- to throw out the debate as it has been historically framed and embrace the alternative perspective provided by developmental systems theory."

The UI researchers illustrate the inadequacies of the debate by examining recent studies of imprinting, spatial cognition and language development that support the nature point of view.

Imprinting is a rapid form of learning in which animals develop preferences through brief exposure to things early in life. Nativists (researchers who align themselves with the 'nature' perspective) attribute the quick learning to a genetic predisposition, pointing to examples like ducklings following their mother's call as soon as they hatch. But research has shown that embryonic ducks, while still in the egg, are exposed to sounds from their embryonic siblings as well as sounds that they themselves make.

When these so-called 'talking eggs' are deprived of these embryonic experiences, they do not show a preference for their mother's call upon hatching. Clearly, Blumberg said, to say that imprinting in ducks is innate does not come close to capturing the elegance and complexity of the real process.

UI researchers also raised issues with studies proposing that children and animals have a built-in sense of direction as they move through the world around them and thus exhibit an innate reliance on geometric cues.

In a 2007 experiment, fish reared in a circular tank were placed in a rectangular tank to see if they would know where to find food when it was hidden in the diagonally opposite corners. They did -- which was presented as evidence of an innate ability to use geometry -- but the UI team pointed out that each fish had eight to 12 days of experience in the rectangular tank prior to the experiment and could have learned the

behavior then.

"Researchers sometimes claim we're hard-wired for things, but when you peel through the layers of the experiments, the details matter and suddenly the evidence doesn't seem so compelling," Spencer said. "The problem is that it's much more complicated to explain why the evidence is on shaky ground, and often the one-liner wins out over the 10-minute explanation."

The challenge young children face when they encounter a new word has also been used to bolster nativist claims. When children are told a new word and shown a visual scene that contains unfamiliar objects, there are an infinite number of possible meanings for the word. But children are very good at figuring out which object in the scene the new word refers to. Given this amazing ability, researchers have suggested that kids have an innate ability to consider only some of the possible meanings of the word.

But in 2007, researchers at Indiana University placed cameras on children's foreheads to examine, from the child's perspective, how they found the correct referent for the word. They learned that a child's view of the nearby world -- which is limited by her small size and short arms -- is much more focused than originally thought. With few possibilities in sight, it's easy to figure out which object matches up with a novel word.

"When people say there's an innate constraint, they're making suppositions about what came before the behavior in question," Spencer said. "Instead of acknowledging that at 12 months a lot of development has already happened and we don't exactly know what came before this particular behavior, researchers take the easy way out and conclude that there must be inborn constraints. That's the predicament scientists have gotten themselves into."

UI psychologist Larissa Samuelson, a co-author of the paper, points to the "shape bias" as evidence that word learning is a cascading developmental process -- not an ability that's there from the beginning. Babies and toddlers learn to recognize solid objects with standard shapes -- things like ball, car, or book -- and those easy-to-distinguish objects typically become their first words.

"Language is so complex that people can't imagine how kids could do it so well without it somehow being innate," Samuelson said. "But if we steer clear of the nature-nurture debate and consider it from a developmental systems perspective, we can see how pieces of knowledge -- which may not even seem related to language -- build over time. It gets us closer to understanding the full complexity of language learning."

The UI authors realize their paper is raising eyebrows -- it has spurred several responses from other researchers that will be published in the same issue of the journal. And they understand that getting scientific peers to buy into their ideas will be a challenge -- after all, the debate dates back to Aristotle and Plato, and many scientists are passionately rooted on one side or the other.

"This is one attempt at getting the ideas out there and starting a dialog, continuing to educate the public and the scientific community, especially the younger generation of researchers," Blumberg said. "We know we don't have a sound bite that's as clean and simple and sexy as saying 'it's genetic.' But we're working on it."

More information: "Short Arms and Talking Eggs: Why We Should No Longer Abide the Nativist-Empiricist Debate," *Child Development Perspectives*

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