Making Sense

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“What is it like to be a bat?” asked philosopher Thomas Nagel in his influential 1974 essay.

“I assume we all believe that bats have experience,” he continued, but can we ever understand what it is like to fly, navigate by sonar, or spend our days snoozing upside down in an attic? Even if we understand how a bat (or for that matter, another person) behaves, Nagel argued, we can’t presume to know what one experiences.

Nagel’s metaphor resonated even outside of his field, perhaps because people find it hard to talk about subjective experience without resorting to platitudes: We describe the human mind as “awesome,” “mysterious,” and “beyond comprehension.” Yet 41 years after the publication of Nagel’s essay, psychological scientists and their counterparts in physiology, philosophy, anthropology, and physics continue the hard work of studying conscious experience.

Four researchers gathered at the inaugural International Convention of Psychological Science in Amsterdam, the Netherlands, for a symposium on “Making Sense: Society, Culture, and Meaning Systems.” Their challenge was to speak about how humans understand the world around them.

Different Strokes for Different Folks

Cultural neuroscientist Shihui Han of Peking University, China, an APS Fellow, commenced the program by reminding the audience that the human experience isn’t the same for everyone. Sensory experiences, social context, and genetic makeup are three factors that uniquely shape how each of us understands the world.

“It’s common knowledge that the occipital lobe is involved in visual processing, but whether or not it is true for everyone depends on our sensory experiences. For example … blind people … use the occipital lobe to do auditory processing rather than doing visual processing,” Han explained.

Han also has identified cultural differences in the way individuals think of the self. In one experiment,

Han and his colleagues asked 13 Chinese college students and 13 college students of English, American, Australian, or Canadian origin to sit in an fMRI scanner while they were shown adjectives such as "selfish" and "brave." Participants were asked whether the traits were true of themselves, their mothers, or a public figure (Bill Clinton for the Western students and former Chinese Premier Zhu Rongji for the Chinese students).

When asked to judge their own traits, both Chinese and Western subjects showed activation of the medial prefrontal cortex, an unsurprising finding given that neuroscientists recognize the medial prefrontal cortex as a brain region associated with thoughts about the self. Yet when Chinese students were asked to judge the characteristics of their mothers, those subjects' prefrontal cortexes tended to activate in exactly the same way as they had when the subjects thought about themselves. Western study participants did not use the prefrontal cortex when thinking about their mothers (Zhu, Zhang, Fan, & Han, 2007).

This difference, Han says, reflects the values that permeate each culture. Whereas the European conception of self emphasizes independence, autonomy, and the unique feelings and motives of each individual, Chinese people tend to think of themselves in terms of their relationships with others.

Genetic traits also influence the way each person thinks, Han said. He has studied individuals who carry different versions of a serotonin transporter polymorphism, 5-HTTLPR, and found that those who carry the short allele of this gene are more sensitive to their environments and more prone to depression than those who carry the long allele of the gene. Han and his colleagues conducted a study of 90 individuals who carried the short version of 5-HTTLPR and 90 individuals who carried the long version of 5-HTTLPR. While in an fMRI scanner, participants saw positive (e.g., "smart") and negative (e.g., "greedy") adjectives. They were asked to judge the extent to which each adjective described themselves.

After the task, the participants rated the level of distress they experienced when thinking about their own negative traits. Participants with the short version of the 5-HTTLPR gene — the one that increases environmental sensitivity and risk of depression — reported feeling more distress about their negative characteristics than did participants with the long version of the 5-HTTLPR gene. The short-allele carriers also showed greater activation of brain regions associated with physical pain, such as the dorsal anterior cingulate/dorsal medial prefrontal cortex and the right anterior insula (Ma et al., 2014).

"Our brains are strongly shaped by the sensory experiences and our cultural background and our genetic makeup," Han concluded. "These things together determine … how the brain makes sense of the self [and] how the person makes meaning for the self."

Talking With the Body

 Language also shapes the way we think about the world, noted cognitive scientist Benjamin K. Bergen of the University of California, San Diego. Bergen spoke about evidence in favor of the “embodied simulation hypothesis,” also known as “embodied cognition.”

According to this hypothesis, people process language by constructing quick, “internal representations of what the things being described might be like to be experienced,” Bergen said. So if someone tells a story about being at a party and seeing the host’s cat scratch a friend, you might imagine what it would feel like to be the scratched friend, the mortified host, or even the offending (and presumably frightened) cat.

“These processes are described as ‘embodied’ in that they engage or are believed to engage … systems primarily evolved for and developmentally used for perception, action, and affect,” Bergen explained.

Both behavioral and brain imaging provide evidence in favor of embodied simulation. For example, when scientists ask people to enter an fMRI scanner and “passively listen to sentences involving the hand, foot, or mouth,” Bergen said, they observe that listeners recruit the same parts of the brain activated when they actually use the hand, foot, or mouth, respectively.

Bergen doesn’t believe that embodied simulation results from “reflective, automatic, dumb” processes. Rather, people’s very understanding of language comes from combining knowledge about “the words that appear, the context they appear in, the grammar that structures them, [and people’s] world knowledge,” he said. The process of understanding language — of combining all that knowledge — requires us to think about what it’s like to do and perceive the things being explained to us, he added.

Several studies, Bergen said, support the view that embodied simulation is part of — not simply an effect of — language processing. In one study, Tad Brunyé of Tufts University asked people to read active-voice sentences in either the first or third person. At the same time, they were shown a picture that either “matched” or did not match the subject of the sentence. For instance, a participant who had read the sentence “I slice a tomato” may have been shown a matching photo — hands cutting a tomato from something close to her own perspective, such as the arms coming from the bottom of the photo — or a mismatching photo — hands cutting a tomato from a perspective that didn’t match her own, such as the arms coming from the side or top of the photo.

Brunyé asked participants to press a button indicating whether the image they were looking at showed the same activity (e.g., slicing tomatoes) that had been described in the sentence. He measured how long it took participants to respond and found that people answered more quickly when the perspective of the

image they were shown matched the subject of the sentence, a pattern that Bergen has replicated in his own work (Brunyé, Ditman, Mahoney, Augustyn, & Taylor, 2009).

“This seems to suggest,” Bergen said, “that you are not merely activating tomato and slicing and perceptual motor association of those. Rather, at least for a visual representation, what you represent internally seemed to be modulated by grammar.”

Bergen hopes that research on embodied simulation and language has much more to teach us about how people think. For example, Bergen asked, how do people understand linguistic concepts that they can’t comprehend through embodied associations? “What else is going on inside people’s heads in order to understand the meaning of sentences?”

Making Meaning Together

One of the things going on in people’s heads when they process language is the need to communicate with others. Psychological scientists call the study of how people think about other people “social cognition.” But Hanne De Jaegher, a philosopher of mind and cognitive science from the University of the Basque Country in Spain, believes her colleagues in psychology would benefit from learning about how other fields talk about interpersonal interaction.

“We are used to looking at an individual processing something in front of them,” De Jaegher told the audience. “But if we start looking at the interaction process as such and how it works, then you get a different view.”

De Jaegher uses a theory called “participatory sense-making” to understand interpersonal interaction. The theory has two “pillars”: (1) the interaction process between subjects and (2) the subjects involved in the interaction. She believes that participatory sense-making is a particularly good framework for understanding what happens when people unexpectedly coordinate their thought and behavior — for example, when loved ones sync heartbeats during emotionally tense situations or when people preparing to lift a heavy object as a part of a team perceive that object to be lighter than people preparing to lift the same object alone perceive it to be.

Participatory sense-making, De Jaegher said, takes place between “sense-makers” or “cognitive agents” (e.g., people). Each agent is an autonomous, self-organizing being that needs to maintain a certain balance with its environment in order to survive. The precariousness of our lives — our dependence on basic physical and emotional needs that we must actively work to obtain — is what motivates us to create meaning, De Jaegher argued.

A Family Affair

 Whereas De Jaegher examines the finer points of interpersonal interaction, anthropologist Elinor Ochs of the University of California, Los Angeles, takes a high-level approach to the study of communication. The work Ochs presented centered on the unique meaning systems and patterns of family behavior that have arisen in postindustrial middle-class families.

For 9 years, Ochs directed the Center on Everyday Lives of Families, where she led a multidisciplinary study that documented the everyday lives of middle-class families in Los Angeles. Through this work, she noticed that many modern families place a tremendous emphasis on raising children with the entrepreneurial, problem-solving, and academic skills that will allow them to compete in a knowledge-based economy.

Ochs thinks that the recent attention to the vocabularies of young children in the United States, Europe, Japan, and China is an example of a uniquely postindustrial social phenomenon.

“A vocabulary-rich input, combined with directing toddlers to label objects, is a feature of middle-class caregiving but has been less frequently observed in lower income households,” Ochs said.

Developmental psychologists and educators tend to see this pattern as a cause for alarm, arguing that “a culture of poverty is perpetuated in low-income families because children are not exposed to a high number of vocabulary items.” In the United States, interventions with low-income families have encouraged poor parents to close the “vocabulary gap” between their own children and middle-class children in order to ensure that youngsters from poor families are equipped to academically compete with their middle-class counterparts.

People from knowledge-based economies may consider the value of a large vocabulary self-evident, but Ochs pointed out that this way of thinking is by no means universal across time or culture. In many indigenous societies in the Americas and Oceania, for example, adults believe that the best way for children to learn is through immersion in everyday work and community engagement. Such immersive learning has the benefits of fostering a sense of belonging, motivating children to learn collaboratively, and freeing up adult time for work on activities other than child-rearing. It also may encourage children to take on work in the home. In contrast, Ochs said, postindustrial middle-class parents, particularly mothers, often struggle to keep up with household chores without help from their children, who spend much of their energy on academic work and other structured activities.

What It’s Like to Be a Human

 Ochs's work reminded the audience that familiar values are not universal values. This theme was repeated throughout the symposium by all four speakers: Culture, genetics, sensory experience, language, and interaction with the people around us inform the meaning that each individual makes for herself.

APS Secretary Gün R. Semin (ISPA – Instituto Universitário, Portugal, and Utrecht University, the Netherlands), who served as chair and discussant for the program, asked, "Can the four perspectives [presented by the speakers] lead to an integrative and informed view of meaning?" Unfortunately, he concluded, to answer that question was "too tall an order" for a 2-hour symposium. He did hope, however, that the insights shared by the four speakers would inspire researchers who study meaning to look outside their own disciplinary and geographic circles for inspiration. œ

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