

The power of touch: The sense reminds us of our countless connections to the world, and our own humanity

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Of all the heartrending phrases that came to define the deprivations of the COVID-19 pandemic, one stands out as particularly poignant: "skin hunger"—our visceral need for skin-to-skin contact.

Touch has the power to express or trigger countless feelings, from love, desire and comfort to menace, aversion or fear, often conveying the nuances of what our words cannot adequately voice. Perhaps then it is not surprising that touch is also the sense that philosophers and artists through the ages have embraced to define what it means to be human.

Aristotle believed that the sense of touch is what separates animals from plants, and its complexity in humans is what distinguishes us from other creatures. He posited that humans, lacking the tough hides, shells or hooves that protect other animals, often must rely on touch to keep us from harm: A scalding drop signals that the water is too hot; a sharp edge warns us to move away from a dangerous object.

During the Renaissance, Michelangelo's depiction of the creation of Adam on the ceiling of the Sistine Chapel shows God reaching out to touch Adam's outstretched finger, the contact signifying the origin of humanity itself.

One of our oldest and most ubiquitous social customs, shaking hands dates back to the fifth century BCE. What began as a way to signal that neither person was carrying a weapon was widely adopted as a symbol of peace and friendship and an expression of trust and good intention. It has long been echoed in expressions such as "staying in touch" and "losing touch."

But in recent years, as we move into a progressively digital world where life is increasingly mediated through a screen rather than experienced directly, the hitherto primacy of touch faces challenges from [artificial intelligence](#) and haptic technologies, begging the question: Are we in

danger of losing a significant part of what makes us human?

Childhood comfort

There are some reasons to be optimistic. Skin-to-[skin contact](#) between infants and their parents is now widely recognized by pediatricians as vitally important in terms of bonding and development, although it's still a relatively new concept for some European and North American cultures. Even after the age-old custom of dispatching babies to a wet nurse had largely died out in the West by the early 20th century, the prevailing attitude, that touching and holding children, especially boys, would render them "soft" and spoiled, persisted, says Darby Saxbe, professor of psychology and director of the Center for the Changing Family at USC Dornsife.

In fact, it wasn't until the middle of the 20th century that animal experiments demonstrated that infant care entailed more than simply feeding a child to keep it alive. In the studies, baby monkeys were given a choice between two maternal simulations, both made of wire. One simulation dispensed milk. The other didn't, but was covered with soft cloth. The baby monkeys preferred the soft figure, even though it provided no food. This study and others, which showed how children who have a lack of physical contact with caregivers have more difficulty regulating emotions as adults, caused psychologists to shift course and stress the importance of touch and comfort in child development.

"The intentional approach of not being emotionally available to kids tends to backfire and create children and adults who are often more emotionally needy," Saxbe says. "There is a world of research that has really confirmed that young children need a lot of closeness and comfort in the early years of life."

The cuddle system

But while recognition of the importance of touch in emotional development has led to pediatricians and psychologists promoting touch for young children and families, research shows that physical closeness is declining among adults.

Loneliness has become a newsworthy topic in recent years, with some experts classifying the trend as a health epidemic. According to former U.S. Surgeon General Vivek Murthy, "Loneliness and weak social connections are associated with a reduction in lifespan similar to that caused by smoking 15 cigarettes a day."

But most people who discuss solutions to the issue of loneliness focus on medication and talk therapy and tend to ignore how physical proximity and touch—or the absence of it—affect mood, says alumna Sushma Subramanian. In her book, "How to Feel: The Science and Meaning of Touch" (Columbia University Press, 2021), Subramanian, who graduated in 2015 with degrees in [political science](#) from USC Dornsife and print journalism from the USC Annenberg School for Communication and Journalism, discusses several facets of the sense of touch, including how increased isolation has affected [young people](#) both romantically and socially.

Subramanian believes the increases in loneliness have been fueled by the general isolation of our modern world: Living alone has become more common; friends gather less frequently, both due to the pandemic and the prevalence of the internet; and touch occurs mostly between romantic partners. Add to this the fact that an increasing awareness of personal boundaries has resulted in a decrease in casual or friendly touching, especially for men, and you have a difficult situation, she says.

"The truth is we've created very limiting conditions for a lot of people to

receive touch," Subramanian says.

"Men can basically not touch unless they're in a romantic relationship or playing sports. It's more acceptable for women to touch each other, so maybe they're missing it less. But there are many limits on who gets to touch and when, depending on identity and class."

Returning to an age when people were expected to put up with unwanted touching is obviously not the answer, Subramanian says, but she notes that people have found some ways to increase physical contact in a positive way. She believes that one such response is the popularity of activities such as yoga, which encourage a positive awareness of and relationship with one's body. A number of groups have popped up online for people interested in gathering for platonic hugging and touching, and it is possible the future might see a rise in "professional cuddlers" who can provide nonsexual comfort or contact.

"Professional cuddling has been very valuable for a lot of people," Subramanian says. "Some told me that by developing that practice of touch through a professional cuddler, they felt more confident going out in their lives and having romantic relationships and interactions."

Blocking the pain

But touch does not simply exist in the emotional sphere; it is essentially a physical function. And one of its responses—pain—is at once essential for protection in some circumstances (for example, a signal to move one's hand away from a hot stovetop) and detrimental to a person's functioning in others. Understanding how and why we feel pain is an area of expertise for USC Dornsife's David McKemy, professor of biological sciences, whose research explores how temperature regulation is linked to pain responses.

Previous research using capsaicin—found in chili peppers—has examined the function of a bodily protein that senses heat. McKemy's research instead uses menthol—found in mint—to study how the body responds to cold. He is particularly interested in how a menthol receptor, which is a cold-sensing protein, functions in individuals with chronic pain conditions, such as migraines.

"A number of genome studies have looked for genes that might be associated with migraines, and one particular menthol-sensitive protein that enables us to detect cold temperatures keeps popping up in every single one of these studies," he says. "People who have a specific mutation in this gene are more likely to have migraines and are more sensitive to cold because they make more of this protein. Another mutation in which individuals make less of this cold-sensing protein means those people aren't as likely to have migraines and can't sense cold as well."

In addition to migraines, McKemy is interested in how chronic pain develops. For example, women undergoing treatment for breast cancer often report feeling pain when they come into contact with something cool, a side effect of the toxicity of chemotherapy. When there is damage or injury to part of the nervous system, McKemy has found that a small protein is released that interacts with the menthol receptor to increase its sensitivity to cold, causing pain. Blocking the function of this protein can specifically prevent this type of pain that occurs after injury, he notes.

"We're focusing on understanding how these particular proteins might play a role in migraines and the chronic cold pain that people get in different conditions," McKemy says. In the future, the research may help prevent or better treat these types of cold-related pain.

A new sensation

While McKemy's research seeks to identify the intricacies of sensation, USC Dornsife's Andrew Hires is working on the topic from another angle: how to restore the ability to feel and touch in individuals who have lost it. Hires, assistant professor of biological sciences, is working with mouse models to identify how the brain senses the location of objects and how this translates into sensations of touch.

"I'm looking at how forces of touch are represented by patterns of electrical activity within the cortex of the brain," Hires says. "There's some integration that takes place, where the motion of the touch sensor, like fingers on a surface, has to be combined somehow with the signals coming from the fingers."

Hires' research looks at how mouse whiskers, which function similarly to fingers in humans, send signals to the brain when they move across an object or bump into a surface. Looking at how the cortex of the brain processes these signals, researchers observe patterns in brain activity that correspond to different perceptions or sensations of surfaces and objects. Then, by looking only at those brain patterns, researchers can deduce the positioning of an object encountered by the mouse.

"When we look at how touch perception is represented in the brain, we find there's a lot of variation—or plasticity—in the activity patterns," Hires says. "By observing the neurons turned on at any given time and studying how they change, we hope to determine the rules that govern this reorganization and relearning of particular touch perceptions."

If we understand the neural patterns the brain makes in response to certain sensations, it may be possible to help "retrain" the [sense of touch](#). This could benefit survivors of strokes who suffer from paralysis by reprogramming the brain to receive sensations from the paralyzed body part. Understanding cortex signals could also help "connect" the brain with artificial hands or feet, helping amputees restore feeling.

"So, an amputee could be fitted with artificial fingers that can 'feel' the surfaces of things," Hires says. "This would work by stimulating particular nerve patterns within the remaining, biological arm. The brain can relearn to interpret those patterns in order to reawaken the 'sensation' of fingers in the prosthetic hand."

Once more, with feeling

Aristotle's theory that [touch](#) is what sets humans apart from animals or plants may be scientifically incorrect—he had no way of knowing that one day science would show that the genomes of chimpanzees and humans are 96% identical. However, in highlighting how essential the sense is, and how it connects to the complexity of human emotions, his theory continues to present a strong metaphysical argument for what makes us human.

"We live in bodies that are most alive when they're open and permeable to what is around us," Subramanian writes.

When the handrail wobbles, we know to exercise caution in the face of potential danger; a hug from a family member conveys love and comfort; the cool caress of a silk blouse is synonymous with luxury; plunging our fingers into damp earth to plant a seed makes us feel in tune with nature.

"Touch is a constant affirmation that we exist as selves, separate from our surroundings but connected to them," Subramanian writes in the conclusion of her book.

And perhaps that is the aim of every human being—to live a life full with feeling.

Provided by University of Southern California

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