MedicalXpress

Young children rely on one sense or another, not a combination, studies find

May 1 2008

Unlike adults, children younger than eight can't integrate different forms of sensory input to improve the accuracy with which they perceive the world around them, according to a pair of studies reported online in *Current Biology* on May 1st.

The findings suggest that the perceptual systems of developing children might require constant recalibration—through the use of one sense to fine-tune another and vice versa, according to the researchers. They might also reflect inherent limitations of the still-developing brain.

"Kids have to stay calibrated while they are growing all the time—their eyes get farther apart and their limbs longer," said David Burr of Università Degli Studi di Firenze, who led one of the studies. Under these conditions, "they may use one sense to calibrate the other."

"It could be adaptive for humans not to integrate sensory information while they are still developing," agreed Marko Nardini of the Centre for Brain and Cognitive Development at Birkbeck College, University of London. "But there might also be constraints on what children can do. It's possible that brain development needs to take place to make integration possible." Nardini led the other of the two studies with colleagues at Oxford University's Visual Development Unit.

The studies followed earlier findings that showed that adults can integrate information obtained visually with that obtained through the sense of touch, optimally weighting each sense according to its reliability

in a given situation.

In the new study, Burr's team first had children complete a task in which they were asked to judge which of two blocks was taller on the basis of touch or visual information or some combination of the two. In another set of experiments, the children were asked to judge which of two bars was oriented more counterclockwise.

Their studies revealed that the ability to combine sensory information doesn't develop in children until about the age of eight. Prior to that, integration of visual and touch-derived spatial information (also known as haptic information) is far from optimal, they reported, with either vision or touch dominating totally even in conditions where the dominant sense is far less precise than the other. However, they found no evidence that either vision or touch acts as a "gold standard," always dominating the other.

In the task involving size discrimination, their results fit with the old notion that 'touch educates vision," Burr noted. "At first it looked like that was what was happening," he said, "but in the case of orientation tasks, the opposite occurred. It's doesn't just go in one direction."

At eight to ten years of age, children's integrating skills become optimal, as in adults, they showed.

Nardini's group made a similar discovery while studying the navigating skills of children versus adults. Navigation depends both on attending to visual landmarks and on keeping track of one's own movement (self-motion), they explained.

In their study, children and adults attempted to return an object to its original place in an arena, using visual landmarks only, non-visual self-motion information only, or both.

Adults—but not four- to five-year-olds or seven- to eight-year-olds—got better at the task when both information sources were available, they found.

Further observations supported the notion that adult behavior was best explained by sensory integration, while children's behavior suggested they were alternating between using the two types of information. The findings led them to conclude that people can integrate spatial cues nearly optimally to navigate, but that this ability depends on an extended developmental process.
" We already know that kids are more liable to get lost and disoriented," Nardini said, "but this study suggests that a specific reason for that is poor ability to integrate different kinds of spatial information."

It might also explain how adults manage to improve on all sorts of tasks over time, he added. "It demonstrates how adults build on their perceptual abilities not just by improving individual senses, but also by getting better at integration."

Source: Cell Press

Citation: Young children rely on one sense or another, not a combination, studies find (2008, May 1) retrieved 5 May 2024 from
https://medicalxpress.com/news/2008-05-young-children-combination.html