

Formerly Blind Children Shed Light on a Centuries-Old Puzzle

by [Greg Miller](#) on 10 April 2011, 2:51

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Now you see it. Experiments with previously blind children (*inset*) provide new insight into a centuries-old problem.

Credit: Pawan Sinha

In 1688, an Irish polymath named William Molyneux wrote the English philosopher John Locke a letter in which he posed a vexing question: Could a blind person, upon suddenly gaining the ability to see, recognize an object by sight that he'd previously known by feel? The answer has potentially important implications for philosophers and neuroscientists alike. Now, researchers working with a medical charity that provides surgery to restore vision in blind children say they've found the answer to [Molyneux's question](#). It's "no" but with a twist.

Molyneux posed his question in the midst of a philosophical debate about how we comprehend the world around us. An affirmative answer to the question would support the argument that we possess innate (and presumably God-given) concepts that are independent of the senses—for example, that we possess a concept of a sphere, regardless of whether we have only seen one, only felt one, or both. A negative answer to Molyneux's question would support the alternative argument that any concept of a sphere or other object must be tied to sensory experience. In that view, a blind person would have only a tactile concept of a sphere that would be of no use in recognizing the shape by sight.

For modern neuroscientists, Molyneux's question raises issues about how the brain integrates information from the different senses, says Richard Held, a professor emeritus of brain and cognitive sciences at the Massachusetts Institute of Technology (MIT) in Cambridge. In search of the elusive answer, Held teamed up with MIT colleague Pawan Sinha, who founded an organization in 2003 to help blind children in India. Called [Project Prakash](#), after the Sanskrit word for "light," the group collaborates with Indian surgeons who operate to restore sight in children who've been blind from cataracts or other curable causes.

Held, Sinha, and colleagues recruited five children, ages 8 to 17, from Project Prakash to tackle Molyneux's question. The researchers built 20 pairs of simple shapes from toy blocks and tested the children within 48 hours of the surgery to restore their sight. The children had not encountered these unusual shapes before. In one experiment, the researchers gave the children a shape to feel (without looking), then asked them to feel two more shapes and indicate which was the same as the first one they'd felt. All five children chose the right shape more than 90% of the time. In a second experiment, the children could look but not touch. Again they nailed it. But on the third and most crucial experiment, their performance plummeted. After feeling a shape, the children did only slightly better than chance at identifying it by sight alone, the team [reports online today](#) in *Nature Neuroscience*.

That result suggests a negative answer to Molyneux's question. Because many children travel long distances for the operations, most go home with their families before the researchers can do follow-up experiments, Sinha says. However, when the researchers retested two of the boys with a new set of shapes a few days later, their accuracy on the touch-to-vision experiment jumped to above 80%. That suggests a more nuanced answer of "initially no but subsequently yes," Sinha says.

"It's a great story," says Alvaro Pascual-Leone, a neurologist and neuroscientist at Harvard Medical School in Boston. The change in the children's ability to integrate touch and vision happens too fast to be explained by major rewiring in the brain, Pascual-Leone says. Even though they grew up recognizing objects by touch, they needed only a little bit of visual experience to learn to translate between the two senses. "They're not starting from zero," he says.

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