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Scientists once believed that the development of handedness in children was determined by the genes of their parents.

Then Dr. George Michel came on the scene.

Michel's work as one of the foremost developmental psychobiologists in the nation proves just how simplistic that genetic theory is.

In studies spanning more than three decades, the head of the psychology department at UNCG has tracked the development of handedness in infants, from their position in the uterus to grasping at 18 months old, and the role experience plays in determining whether they will grow up to be left- or right-handed adults.

Why, you might ask?

"I hope to learn how babies are educating themselves in something even as simple as how they use their hands," says Michel, noting that about 90 percent of humans are right-handed, including himself.

"I've always been fascinated by how things develop. When I say *how*, I mean the relationship between the experiences that an individual has and how that individual's brain works with that experience. For babies, it's sort of a window into the way they think about things."

Of particular interest to Michel is how individual differences (what makes us each unique) emerge during early development.

Getting a better grasp on handedness



Currently he's overseeing a five-year study of handedness in 250 babies ages 5 months to 15 months old. The work is funded by a National Science Foundation (NSF) grant totaling nearly \$1 million.

The children come to UNCG's Infant Development Center once a month to, quite literally, play. While sitting on their mothers' laps (the moms are told not to help or guide their children), two video cameras capture what happens when various toys are placed within their grasp. The cameras record reaching, contact, acquisition and manipulation of each toy.

"Some children can come in at 5 months old and do everything. They pick up, they play very well," says Iryna Babik, a student in UNCG's developmental psychology PhD program. "Other kids can do nothing — they are very passive. You can predict their development from that."

Michel, who received his doctoral training in developmental psychobiology and cognitive psychology at Rutgers University, believes such research could have profound implications on how we educate children, although that belief can be difficult to defend.

"It's not important research in the usual way in which most people understand important research, that it will solve a problem that we are currently facing," he explains.

Julia Gladstone, a 13-month-old study participant, reaches for a toy positioned just out of her grasp. During the 45-minute session in the Infant Development Center, Julia reaches, stacks, chews and plays with a variety of toys as they are presented one by one. Each toy offers a new way to measure her preference for handedness.



Michel, who in 2001 was appointed editor-in-chief of the journal *Developmental Psychobiology*, specializes in “basic research” and is quick to defend it. Although there may be no immediate or obvious problem that the knowledge gained from basic research will help solve, it provides the very foundation for all kinds of solutions to societal problems.

Case in point: cancer.

“Cancer is the uncontrolled growth and division of cells in the body. If we don’t know what makes cells grow and divide, then just attacking that growth in the way we have done it — to radiate the individual, for example — we think that cures cancer,” he says. “It doesn’t.”

Such treatments simply stop division of all cells, Michel explains, not just cancerous cells. “As we have come to learn more about what makes cells grow and divide, we are able to target the cancer cells. And yet people wouldn’t have thought just studying how cells grow and divide would be immediately applicable to that issue.”

Knowing how babies develop their hand skills may not immediately apply to a particular problem, Michel notes. But it may one day help scientists deal with problems of individual differences in the way in which babies develop mental and intellectual skills — the foundations they use to perform well in school.

“Again, we don’t see the immediate relationship between using your hands and reading, writing and doing math, but that relationship is there — just as knowing how cells grow and divide is related to cancer,” Michel says.

The NSF study on handedness is a labor of love, so to speak — time-intensive and difficult. Much psychological research involves simple tests that can be completed on a computer with adult participants. That’s not the case with Michel’s study.

“This particular project is going to take five years to collect the data, and then we have to analyze it,” he says. “Then we’ll come back and look at those individuals when they are much older, so it’s more data to collect. That would be the first study of its kind that has ever done that.”

Julie Campbell, a research coordinator in the lab who earned a master’s degree in experimental psychology at Western Illinois University, came to UNCG to study under Michel, knowing his excellent reputation in the field. Her prior work focused on studies involving rats and mice.

“I thought I might like to try something a little bit different, expand into developmental research, and who better to do that with than Dr. Michel?” she says. “When I read about the study he was doing, I thought, ‘This is a really good way to do this research.’”

Working with babies, however, presents definite challenges. Campbell has been sneezed on, smacked with toys and overcome by the occasional stinky diaper.

“A couple of us that do the research have children of our own, so it doesn’t bother us,” Campbell, the mother of a 3-year-old daughter, says with a laugh. “But it’s funny sometimes. Those things definitely happen. We often joke about having to buy helmets for the toy room, because older kids sometimes throw the toys around. That usually means they are having a good time.”

But the work also is more rewarding, she says. “Because when you come into the lab, rats don’t say, ‘Hey, how are you doing today?’ The moms are very enthusiastic.”

Campbell is working on the NSF study while taking graduate level courses in developmental psychology. She feels she’s

already learned a lot from Michel, whom she describes as a careful researcher and encouraging mentor.

“He’s been studying development for years and years. The amount of knowledge he has to offer students is really immense,” she says. “Even just in conversations in the lab, you can learn a lot from him. And you are not even in class.”

Michel’s colleagues concur. Dr. David Lewkowicz, a professor of psychology at Florida Atlantic University and longtime friend, describes Michel as an extraordinarily bright leader with a stellar reputation in the field.

For starters, Michel co-authored a textbook with Celia Moore in 1995 — colleagues describe it as “the Bible of developmental psychobiology” — still used in classrooms across the country today.

“There is just nothing like it out there,” says Lewkowicz, the current president of the International Society on Infant Studies. “It’s an amazingly scholarly compendium of all of the work done within the framework of developmental psychobiology.”

But Michel’s contributions go far beyond any textbook. His research on the development of handedness advanced understanding of the phenomenon once linked almost exclusively to genetics.

“What George did was he showed that actual experience contributes to its development,” Lewkowicz explains, noting that Michel’s early research shows the position of a baby’s head *in utero* influences which hand that baby will later use to reach for objects.

“He showed a direct link between an earlier experience and later outcome, later use of hand. That was really an important advance,” Lewkowicz says. “It opened up the possibility that there are all of these experiential factors that contribute to development.”

Dr. Robert Lickliter, a professor of psychology and director of graduate studies at Florida International University, has worked with Michel in the International Society for Developmental Psychobiology.

“The public views handedness as something that is generally determined by your parents. We now know that that is a very simplistic, wrongheaded way of looking at development,” Lickliter says.

Ultimately, Michel hopes his research will help us better appreciate how individually different we are and how to build on those differences.

“If we lived in a society more interested in education, we’d be building on those individual skills,” he says. “We tend to think of other societies as being more regimented, such as Japan. But they are much more interested in taking the strengths of an individual child and using that to compensate for their weaknesses. In the United States, we take individual differences as limitations, rather than challenges on which to build better educational programs.”

1. During the session, cameras film each interaction. Later, others will review the film and painstakingly record what occurred with each of the toys.
2. Julie Campbell, research coordinator in the lab, starts each session by checking the child’s motor development by picking up the child to see if they curl up their legs or hold them straight. Older children, such as Julia, tend to leave them straight.
3. With these blocks, Campbell watches how Julia takes them apart and puts them back together again.
4. Julia considers the suspended ring before trying to grasp it.

