

Sunday Review | OPINION

# What Babies Know About Physics and Foreign Languages

By ALISON GOPNIK JULY 30, 2016

Parents and policy makers have become obsessed with getting young children to learn more, faster. But the picture of early learning that drives them is exactly the opposite of the one that emerges from developmental science.

In the last 30 years, the United States has completed its transformation to an information economy. Knowledge is as important in the 21st century as capital was in the 19th, or land in the 18th. In the same 30 years, scientists have discovered that even very young children learn more than we once thought possible. Put those together and our preoccupation with making children learn is no surprise.

The trouble is that most people think learning is the sort of thing we do in school, and that parents should act like teachers — they should direct special lessons at children to produce particular kinds of knowledge or skill, with the help of how-to books and “parenting” apps. Studies prove that high-quality preschool helps children thrive. But policy makers and educators are still under pressure to justify their investments in early childhood education. They’ve reacted by replacing pretend corners and playground time with “school readiness” tests.

But in fact, schools are a very recent invention. Young children were learning thousands of years before we had ever even thought of schools. Children in

foraging cultures learned by watching what the people around them did every day, and by playing with the tools they used. New studies show that even the youngest children's brains are designed to learn from this simple observation and play in a remarkably sensitive way.

Young children today continue to learn best by watching the everyday things that grown-ups do, from cleaning the house to fixing a car. My grandson Augie, like most 4-year-olds, loves to watch me cook, and tries manfully to copy what I do. But how does he decide whether to just push the egg whites around the bowl, or to try to reproduce exactly the peculiar wristy beating action I learned from my own mother? How does he know that he should transfer the egg yolks to the flour bowl without accidentally dropping them in the whites, as Grandmom often does? How did he decide that green peas would be a good addition to a strawberry soufflé? (He was right, by the way.)

Experimental studies show that even the youngest children are naturally driven to imitate. Back in 1988, Andrew Meltzoff of the University of Washington did a study in which 14-month-olds saw an experimenter do something weird — she tapped her forehead on top of a box to make it light up. A week later, the babies came back to the lab and saw the box. Most of them immediately tried to tap their own foreheads on the box to make the light go on.

In 2002 Gyorgy Gergely, Harold Bekkering and Ildiko Kiraly did a different version of this study. Sometimes the experimenters' arms were wrapped in a blanket when she tapped her forehead on the box. The babies seemed to figure out that when the experimenter's arms were wrapped up, she couldn't use her hands, and that must have been why she had used her head instead. So when it was the babies' turn they took the easy route and tapped the box with their hands.

In 2013 David Buttelmann and his colleagues did yet another version. First, the babies heard the experimenter speak the same language they did or a different one. Then the experimenter tapped her head on the box. When she had spoken the same language, the babies were more likely to tap the box with their foreheads; when she spoke a different language they were more likely to use their hands.

In other words, babies don't copy mindlessly — they take note of who you are and why you act.

Children will also use what they see to figure out intelligent new actions, like putting peas in a soufflé. For example, in our lab, Daphna Buchsbaum, some colleagues and I showed 4-year-olds a toy with lots of different handles and tabs. A grown-up said, “Hmm I wonder how this toy works” and performed nine complicated series of actions, like pulling one of the handles, shaking a tab and turning the toy over. Sometimes the toy played music and sometimes it didn’t.

The actions followed a pattern: Some of them were necessary to make the machine go and some were superfluous. For example, the children might see that the toy lit up only when the experimenter shook the tab and turned over the toy, no matter what else she did.

Then she asked the child to make the music play. The children analyzed the pattern of events, figured out which actions actually made the toy go, and immediately produced just those actions. They would just pull the tab and turn over the toy. They used their observations to create an intelligent new solution to the problem.

We take it for granted that young children “get into everything.” But new studies of “active learning” show that when children play with toys they are acting a lot like scientists doing experiments. Preschoolers prefer to play with the toys that will teach them the most, and they play with those toys in just the way that will give them the most information about how the world works.

In one recent experiment, for example, Aimee E. Stahl and Lisa Feigenson of Johns Hopkins showed 11-month-old babies a sort of magic trick. Either a ball appeared to pass through a solid wall, or a toy car appeared to roll off the end of a shelf and remain suspended in thin air. The babies apparently knew enough about everyday physics to be surprised by these strange events and paid a lot of attention to them.

Then the researchers gave the babies toys to play with. The babies who had seen the ball vanish through the wall banged it; those who’d seen the car hovering in thin air kept dropping it. It was as if they were testing to see if the ball really was solid, or if the toy car really did defy gravity.

It’s not just that young children don’t need to be taught in order to learn. In

fact, studies show that explicit instruction, the sort of teaching that goes with school and “parenting,” can be limiting. When children think they are being taught, they are much more likely to simply reproduce what the adult does, instead of creating something new.

My lab tried a different version of the experiment with the complicated toy. This time, though, the experimenter acted like a teacher. She said, “I’m going to show you how my toy works,” instead of “I wonder how this toy works.” The children imitated exactly what she did, and didn’t come up with their own solutions.

The children seem to work out, quite rationally, that if a teacher shows them one particular way to do something, that must be the right technique, and there’s no point in trying something new. But as a result, the kind of teaching that comes with schools and “parenting” pushes children toward imitation and away from innovation.

There is a deep irony here. Parents and policy makers care about teaching because they recognize that learning is increasingly important in an information age. But the new information economy, as opposed to the older industrial one, demands more innovation and less imitation, more creativity and less conformity.

In fact, children’s naturally evolved learning techniques are better suited to that sort of challenge than the teaching methods of the past two centuries.

New research tells us scientifically what most preschool teachers have always known intuitively. If we want to encourage learning, innovation and creativity we should love our young children, take care of them, talk to them, let them play and let them watch what we do as we go about our everyday lives.

We don’t have to make children learn, we just have to let them learn.

Alison Gopnik is a professor of psychology at the University of California, Berkeley, and the author of the forthcoming “The Gardener and the Carpenter: What the New Science of Child Development Tells Us About the Relationship Between Parents and Children,” from which this essay was adapted.

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