



NEUROSCIENCE

CAN YOU SUPER- CHARGE YOUR BABY?

Hundreds of toys promise to help babies read, learn, do math and walk earlier than expected—many without scientific backing

By Erik Vance

WHEN SETH POLLAK'S SON

WAS A YEAR OLD, HE AND HIS WIFE, Jenny Saffran, took a trip to the Babies “R” Us store near their home in Madison, Wis. They wanted to buy a teething ring—nothing special, just a frozen band to numb the baby’s gums. Passing through the bears and bicycles, they found the correct display. They pulled a pricey package off the shelf, which read, “Promotes oral motor and language development.”

The couple had never heard of oral motor development, but it sounded important. Typical parents—worried about their child falling behind—might have bought the product without thinking. But Pollak and Saffran are not typical parents. “My wife is one of the world’s leading experts in language development, and we are both Ph.D.s in developmental psychology,” Pollak explains. “We are looking at this, and we’re like, ‘What the hell? How in the world does chewing on a cold thing promote language?’”

There is little evidence to say it does. And the claim is just one example of the disconnect between the research and marketing of child development.

Every parent wants his or her baby to have an early jump on life. Shouldn’t toys be part of that? If your baby plays with the right gizmos during the right developmental window, the sales pitch goes, she or he could become smarter, more coordinated and more successful than other babies.

But the very idea that the purpose of a toy is to give your baby an edge “fundamentally misunderstands what’s happening in development,” says Alison Gopnik, a columnist and leading child psychologist at the University of California, Berkeley. Even if experts could devise such products, “we would have defeated the whole point of childhood,” which, she asserts, is for the child to build himself or herself.

Whether it is a black-and-white mobile that supposedly catches a baby’s eye or a caterpillar that teaches your toddler to code, American toys that promote child development are rampant. But do they work? According to Gopnik and many developmental psychologists, there is a gaping hole between products and research. Too often toys come with claims based on either questionable science or none at all.

Yet the North American educational toy market is estimated at more than \$4 billion in 2018 and is grow-

ing rapidly, according to research firm Technavio. Experts say that is because of a deep insecurity in American parents. Has their daughter breast-fed too long? Not long enough? Is their son in the right preschool? If babies are not crawling, walking, talking, reading and even doing math early, then they are doing it late.

“Kids are surrounded by a panicked, kind of fearful culture. ‘Oh, my God, you’re falling behind,’” says Barbara Sarnecka, a cognitive scientist at the University of California, Irvine, who studies language and math acquisition.

Although scientists are fervently trying to understand how the human brain develops and how to help babies and toddlers who are truly developmentally or socially lagging, many toy makers seem to suggest you can supercharge the average kid. Are there any findings that might support these claims?

EARLIER IS NOT BETTER

MARKETING TO PARENTS’ anxieties begins the moment sperm meets egg. Expectant mothers must carefully manage nutrition, vitamins and stress for fear that any mistakes might have lasting effects on their children. Of course, your fetus needs the proper music.

That’s right: the fast track to a prized life starts with music in the womb. There are a number of products that come with speakers that attach to a woman’s belly to play music. One gadget, Babypod, goes a step further: it is a bulb-shaped silicone speaker that is inserted inside the woman’s vagina. The product site says, “Our initial hypothesis suggests that music creates a response which manifests as vocalisation movements, as it activates the brain circuits that stimulate language and communication. In other words, learning begins in utero.”

It is true that babies learn while in the womb and that music is enriching to young children. But there

IN BRIEF

So-called educational toys make myriad claims about helping babies read, learn, do math and walk early, but little science backs them up.

Even if babies do make early advances, research fails to show that a jump leads to any long-term advantages.

Fast-paced video and TV imagery can hamper a baby’s ability to understand the pace of the world, leading to attentional problems.

The greatest benefit from play comes from interacting with another human being—so parents should be present and not stress out.

is no evidence that music enriches a fetus. The creators of Babypod published a paper in the British Medical Ultrasound Society’s journal *Ultrasound* showing that fetuses reacted more strongly to their product than to external speakers, but it does not conclude that the reactions were positive or that this strategy translated into smarter children.

“I know of nothing out there that says that this stimulation does anything for your baby,” says Kathy Hirsh-Pasek, a developmental psychologist at Temple University and president of the International Congress of Infant Studies. Babypod did not respond to numerous requests for comment.

Hirsh-Pasek specializes in language acquisition in babies, which is a huge research area and a rich target for claims. She says she displays her least favorite toys marketed to anxious parents on a wall in her office.

Speaking is perhaps a baby’s most important milestone and is tied to later cognition and working memory. Studies show that babies and young children have certain age windows during which these abilities blossom. Some evidence suggests that how quickly babies learn new words predicts later proclivity; loquacious children tend to be loquacious in later childhood, too.

But is earlier always better? Scientists have tried to tie early speaking to intelligence for decades. A 1982 study based in Ohio found early talkers often had higher IQs later in life. Interestingly, however, the effect disappeared when researchers controlled for cognitive problems and socioeconomic status. This insight, Hirsh-Pasek says, is the crux. Speaking early or late does not determine success; zip code does. Poverty, food instability and violence create stress, and stress delays speech and leads to academic disparity down the line. In many stressful homes, infants simply are not spoken to enough and thus suffer from a language gap that turns into a pervasive performance gap. Yet many toy makers turn this situation into an unfounded assumption: because lack of speech creates a deficit, extra speech will pay dividends.

Sarnecka says that is “just a fantasy—a fantasy that’s profitable.” Mental stimulation for young children is like vitamins—enough is important, but more is not better. Yet thousands of apps for young children are available. And the average 18-month-old has at least seven DVDs.

“You think you’ve seen the worst, you know, and then something else hits the market,” Hirsh-Pasek says. “One of my all-time favorites, of course, is Your Baby Can Read. To which I answer, ‘No, she cannot.’”

Your Baby Can Read was a series of flash cards, videos and books that purported to teach children from three months to five years to read. The product was created by a researcher named Robert Titzer, who claimed to have taught his two daughters to read when they were babies. Conventional studies indicate babies simply cannot understand the written word. Yet the company selling the product offered impres-

sive-sounding, though unpublished, studies and charts, alongside glowing testimonials, including one about a preschooler reading Harry Potter books.

Hirsh-Pasek was not the only one who noticed the aggressive advertising. The Federal Trade Commission, which polices claims, opened two cases involving Titzer, charging that companies he worked with were engaged in deceptive practices.

FTC lawyers reached out to Susan Neuman of New York University to learn more. Neuman is an expert in language acquisition. She had run a randomized controlled study comparing 61 babies who were exposed to a reading program against 56 who were not and published the results in the *Journal of Educational Psychology*. Based on 14 measures, such as speech processing, word learning, letter recognition and reading with meaning, she found no difference between the two groups. Well, almost none. Although the children using the program did not advance beyond the others, their parents were convinced they had.

Titzer, for his part, told me he was never involved in marketing decisions and would never have suggested toddlers can read Harry Potter books. But he defends his product and says Neuman did not use it correctly and asked inappropriate questions to test the babies’ learning.

In the end, Titzer and the companies settled with the FTC in 2014 for \$800,000. The FTC also promised much larger fines, should he make similar claims again. He now runs Infant Learning Company, which sells a set of DVDs, printed cards and books called Your Baby Can Learn! The company also sells a kit called Your Child Can Read!; one display line on the packaging says, “A Science Based Approach to Learning.”

As for the marketing, Titzer says it has changed: “We have babies *looking* at books. Everyone recommends that babies look at books, so I don’t see anything wrong with babies looking at books.”

Dozens of studies indicate that many video learning programs fail to show reliable results. Titzer insists that his products are measurably superior and notes that he is working on a publication that vindicates them. According to FTC lawyer Annette Soberats, who spoke with a colleague who was involved in the Your Baby Can Read case, her agency considers the matter closed.

FLASH CARDS + VIDEOS = MATH SKILLS

OF COURSE, toys do not exist in a vacuum. There is some pressure from consumers to make sure toys are educational, especially for the very young, says Clement Chau, an expert in child development and a director for toy company LeapFrog Enterprises. “I think there is a tendency to say, ‘I want my kid to go to Harvard, so I’m going to buy them a toy from LeapFrog, and they will go to Harvard eventually,’” he says. That viewpoint is unrealistic, but toys can be an integrated part of learning, Chau adds.

In the end, it is not clear that parents can super-



Erik Vance is a science writer and relatively new father. His first book, *Suggestible You* (National Geographic, 2016), is about how belief affects the brain.

charge their baby to boost his or her long-term abilities. At least, that is what David Barner says. And he should know; he tried like crazy to supercharge his daughter.

Barner is an expert in the development of math education for children. He knows math learning is important for cognition and life skills. So he wanted his two-year-old daughter to be a math whiz. He was never great at math himself—both he and his wife preferred reading—but he saw its value. So for months he spent time each day quizzing his child using products that utilize flash cards, videos, games and comic books to teach math to toddlers and preschoolers.

In the end, although he delighted in watching a young mind absorb math in real time, that is pretty much all he got, while his daughter developed a distaste for math. Her true passion and skill? Reading, of course.

Speaking with his professional hat on, Barner thinks parents have less impact on their kids than “things like who your friends are, what school you go to, whether you have access to good resources.” Many analyses, such as an ongoing University of Minnesota study with separated twins, also show that personality and proclivities are surprisingly heritable.

Barner’s work has revealed that many kids between three and five who can count and even seem to do simple addition do not actually comprehend the principles of numbers but use memorized tricks to get the right answers. Although U.S. toddlers are intensely trained to count, they are quickly passed in math skills by children in Asia.

GOING FOR GOLD

NOT ALL PARENTS want their little darling to win a Fields Medal for mathematics. Some prefer Olympic gold. For that result, they look to motor learning.

“If my baby walked at 10 months instead of 13 months, are they on a fast track to travel-team soccer?” asks Karen Adolph, a child psychologist at New York University. “Does speeding up motor skills have long-term effects?”

Compared with language or math skills, the motor-learning field is small, and many basic questions are still wide open. But a few insights seem clear. The first is, shockingly, that you can supercharge your baby’s ability to sit, crawl and even walk. In 1935 developmental psychologist Myrtle McGraw famously trained one baby to swim, climb and roller skate while his twin brother sat in a crib. But as soon as McGraw allowed the other brother to play, he quickly caught up. “Practicing motor skills accelerates motor skills in the short term,” Adolph says. But there is “no evidence that it does anything for the long term.”

If you want to raise the next Usain Bolt or Nolan Ryan, early walking or throwing probably will not matter. Such skills may, however, offer some cognitive advantages; kids who can sit up can reach for

things sooner, and those who walk can explore their world earlier.

Adolph says there is another key difference between movement and cognition: the parents she meets in the laboratory are far less worked up about motor learning in their babies, which corresponds to the toy market as well. No one is selling Your Baby Can Backflip. Some products, such as little pushcarts and walkers, promise to help babies learn to walk, but the marketing statements about that seem muted and secondary to just having fun. If you give a baby a rattle, she or he will learn to shake it. Is that the first step to becoming the drummer in a Rush revival band? No.

Adolph points to running cultures such as the Tarahumara people of Mexico; they begin running at a young age, but they do not walk or crawl especially early. She is now working in Tajikistan, where babies are bound for most of the day. The practice delays when they first walk, but her early evidence shows no differences compared with how Western babies walk by preschool age.

LEARN GRAVITY FIRST

SCIENCE-BASED INVESTIGATIONS indicate that parents cannot supercharge their babies. But that does not mean science has not generated advice for what babies should play with.

Play is incredibly important for developing minds. Just as food nourishes the body, play promotes language, cognition, spatial reasoning and other talents in ways scientists are still trying to understand. And like food, sometimes the simplest options can be among the best.

For instance, blocks and Legos pop up often in the scientific literature. Kids who build stuff have better spatial reasoning and, in one controversial study, better math skills. According to experts, there is nothing magical about building; children simply benefit from toys such as balls, dump trucks and ramps that teach them about the physics of gravity, shape and movement. Watching a baby careen toward the floor or into a closed door is terrifying, but these are just their physics experiments to understand how gravity operates and whether two objects can occupy the same space.

Perhaps the most crucial experiments deal with the most enigmatic of phenomena: time. It turns out that babies do not understand time any better than they do gravity or inertia. And some experts worry that if this learning is disrupted, a skewed view can have long-lasting effects.

Dimitri Christakis is a child psychologist at the University of Washington, who directs a children’s center at Seattle Children’s Hospital. He studies the effect of video screen time on children, which is crucial as children increasingly use tablets, phones and laptops. He has found that it is not the screen that causes problems but the pace of the programming on



\$4 BILLION
North American educational toy market

\$2.8 BILLION
Global education apps market for ages 0–4

7+
DVDs owned by the average 18-month-old

MATHIAS DARMELL/Getty Images; SOURCES: GLOBAL EDUCATIONAL TOYS MARKET 2017-2021; TECHNAVIO, JULY 2017 (markets); “SCREEN MEDIA AND LANGUAGE DEVELOPMENT IN INFANTS AND TODDLERS: AN ECOLOGICAL PERSPECTIVE,” BY DEBORAH L. LINEBARGER AND SARAH E. WAALA IN DEVELOPMENTAL REVIEW, VOL. 30, NO. 2, JUNE 2010 (DVIDs)

it. Games and cartoons that speed up the action or quickly switch scenes may affect a child’s “internal metronome,” a mechanism that Christakis believes develops in the first three years to help individuals understand the pace of the world. If that pace is set too fast, it can lead to attentional problems—a theory backed by studies in which he has induced deficits in cognition and attention in mice.

Christakis compares older shows such as *Mister Rogers’ Neighborhood* with modern, frenetic cartoons or video products for infants such as those put out in the past by Baby Einstein. He is concerned that not only are TV and video games faster today but their consumers are younger. Hirsh-Pasek agrees. Her lab has also shown that no matter how interactive a game or show seems to be, it is not as beneficial as a live human being—either in person or via a video phone call. The key for nutritious play is another

human who interacts at a normal pace.

Chau, the LeapFrog director, agrees that videos should not replace human interaction but says they can be a part of a child’s development. Rather than playing with a real wedge or lever, a baby might do it on a screen while she is not interacting with real people.

But Christakis worries screens could have lasting detrimental effects. By looking at how parts of the brain used glutamate, a basic neurotransmitter involved in learning and memory, he has found connections to cocaine addiction in his attention-challenged mice. Overstimulation led to more enjoyment of cocaine, less sensitization to it and ever more hyperactivity. This is not to say that the same is true in humans or that overstimulated kids will turn to drugs, but addictions rely on reward networks in the brain and habit formation. To better understand these ideas, Christakis is now studying screen addiction in children as young as two years old. That would have been unheard of a decade ago, and he says he has found it in almost 10 percent of his subjects.

“My fear is that we are going to see that go up and that we’ll see it start at a younger and younger age as more and more infants and toddlers spend time” on screens, Christakis says. “These devices have a lot of addictive features.”

Hidden danger can lurk behind certain products, it seems. But even if educational products aimed at babies may do no harm, there is a dearth of evidence that they convey benefits in the long term. If you simply must buy some cool toy, perhaps find one that *you* want to play with. Because experts agree the time a baby spends with you—hearing you talk and watching you interact with the world—is the best education she can get.

Which brings us back to Pollak and Saffran. Standing in front of the teething ring display, they had to decide whether to try to increase their son’s oral motor development. They burst out laughing and put the ring back.

“We went to the grocery store, and we bought him a package of frozen bagels for 99 cents,” Pollak says. “I took one out of the freezer and let him chomp on that. It numbed his gums a little bit, and he stopped crying.” ■

MORE TO EXPLORE

Becoming Brilliant: What Science Tells Us about Raising Successful Children. Roberta Michnick Golinkoff and Kathy Hirsh-Pasek. American Psychological Association, 2016.
The Gardener and the Carpenter: What the New Science of Child Development Tells Us about the Relationship between Parents and Children. Alison Gopnik, Farrar, Straus and Giroux, 2016.
Gwen Dewar’s blog Parenting for the Science-Minded: www.parentingscience.com

FROM OUR ARCHIVES

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