The New York Times

April 30, 2012

Insights From the Youngest Minds

By NATALIE ANGIER

CAMBRIDGE, Mass. — Seated in a cheerfully cramped monitoring room at the Harvard University Laboratory for Developmental Studies, Elizabeth S. Spelke, a professor of psychology and a pre-eminent researcher of the basic ingredient list from which all human knowledge is constructed, looked on expectantly as her students prepared a boisterous 8-month-old girl with dark curly hair for the onerous task of watching cartoons.

The video clips featured simple Keith Haring-type characters jumping, sliding and dancing from one group to another. The researchers' objective, as with half a dozen similar projects under way in the lab, was to explore what infants understand about social groups and social expectations.

Yet even before the recording began, the 15-pound research subject made plain the scope of her social brain. She tracked conversations, stared at newcomers and burned off adult corneas with the brilliance of her smile. Dr. Spelke, who first came to prominence by delineating how infants learn about objects, numbers, the lay of the land, shook her head in self-mocking astonishment.

"Why did it take me 30 years to start studying this?" she said. "All this time I've been giving infants objects to hold, or spinning them around in a room to see how they navigate, when what they really wanted to do was engage with other people!"

Dr. Spelke, 62, is tall and slim, and parts her long hair down the middle, like a college student. She dresses casually, in a corduroy jumper or a cardigan and slacks, and when she talks, she pitches forward and plants forearms on thighs, hands clasped, seeming both deeply engaged and ready to bolt. The lab she founded with her colleague Susan Carey is strewed with toys and festooned with children's T-shirts, but the Elmo atmospherics belie both the lab's seriousness of purpose and Dr. Spelke's towering reputation among her peers in cognitive psychology.

"When people ask Liz, 'What do you do?' she tells them, 'I study babies,' " said Steven Pinker, a fellow Harvard professor and the author of "The Better Angels of Our Nature," among other books. "That's endearingly self-deprecating, but she sells herself short."

What Dr. Spelke is really doing, he said, is what Descartes, Kant and Locke tried to do. “She is trying to identify the bedrock categories of human knowledge. She is asking, ‘What is number, space, agency, and how does knowledge in each category develop from its minimal state?’ ”

Dr. Spelke studies babies not because they’re cute but because they’re root. “I’ve always been fascinated by questions about human cognition and the organization of the human mind,” she said, “and why we’re good at some tasks and bad at others.”

But the adult mind is far too complicated, Dr. Spelke said, “too stuffed full of facts” to make sense of it. In her view, the best way to determine what, if anything, humans are born knowing, is to go straight to the source, and consult the recently born.

Decoding Infants’ Gaze

Dr. Spelke is a pioneer in the use of the infant gaze as a key to the infant mind — that is, identifying the inherent expectations of babies as young as a week or two by measuring how long they stare at a scene in which those presumptions are upended or unmet. “More than any scientist I know, Liz combines theoretical acumen with experimental genius,” Dr. Carey said. Nancy Kanwisher, a neuroscientist at M.I.T., put it this way: “Liz developed the infant gaze idea into a powerful experimental paradigm that radically changed our view of infant cognition.”

Here, according to the Spelke lab, are some of the things that babies know, generally before the age of 1:

They know what an object is: a discrete physical unit in which all sides move roughly as one, and with some independence from other objects.

“If I reach for a corner of a book and grasp it, I expect the rest of the book to come with me, but not a chunk of the table,” said Phil Kellman, Dr. Spelke’s first graduate student, now at the University of California, Los Angeles.

A baby has the same expectation. If you show the baby a trick sequence in which a rod that appears to be solid moves back and forth behind another object, the baby will gape in astonishment when that object is removed and the rod turns out to be two fragments.

“The visual system comes equipped to partition a scene into functional units we need to know about for survival,” Dr. Kellman said. Wondering whether your bag of four oranges puts you over the limit for the supermarket express lane? A baby would say, “You pick up the bag, the parts hang

together, that makes it one item, so please get in line."

Babies know, too, that objects can't go through solid boundaries or occupy the same position as other objects, and that objects generally travel through space in a continuous trajectory. If you claimed to have invented a transporter device like the one in "Star Trek," a baby would scoff.

Babies are born accountants. They can estimate quantities and distinguish between more and less. Show infants arrays of, say, 4 or 12 dots and they will match each number to an accompanying sound, looking longer at the 4 dots when they hear 4 sounds than when they hear 12 sounds, even if each of the 4 sounds is played comparatively longer. Babies also can perform a kind of addition and subtraction, anticipating the relative abundance of groups of dots that are being pushed together or pulled apart, and looking longer when the wrong number of dots appears.

Babies are born Euclideans. Infants and toddlers use geometric clues to orient themselves in three-dimensional space, navigate through rooms and locate hidden treasures. Is the room square or rectangular? Did the nice cardigan lady put the Slinky in a corner whose left wall is long or short?

At the same time, the Spelke lab discovered, young children are quite bad at using landmarks or décor to find their way. Not until age 5 or 6 do they begin augmenting search strategies with cues like "She hid my toy in a corner whose left wall is red rather than white."

"That was a deep surprise to me," Dr. Spelke said. "My intuition was, a little kid would never make the mistake of ignoring information like the color of a wall." Nowadays, she continued, "I don't place much faith in my intuitions, except as a starting place for designing experiments."

These core mental modules — object representation, approximate number sense and geometric navigation — are all ancient systems shared at least in part with other animals; for example, rats also navigate through a maze by way of shape but not color. The modules amount to baby's first crib sheet to the physical world.

"The job of the baby," Dr. Spelke said, "is to learn."

Role of Language

More recently, she and her colleagues have begun identifying some of the baseline settings of infant social intelligence. Katherine D. Kinzler, now of the University of Chicago, and Kristin Shutts, now at the University of Wisconsin, have found that infants just a few weeks old show a clear liking for people who use speech patterns the babies have already been exposed to, and that includes the

regional accents, twangs, and R's or lack thereof. A baby from Boston not only gazes longer at somebody speaking English than at somebody speaking French; the baby gazes longest at a person who sounds like Click and Clack of the radio show "Car Talk."

In guiding early social leanings, accent trumps race. A white American baby would rather accept food from a black English-speaking adult than from a white Parisian, and a 5-year-old would rather befriend a child of another race who sounds like a local than one of the same race who has a foreign accent.

Other researchers in the Spelke lab are studying whether babies expect behavioral conformity among members of a group (hey, the blue character is supposed to be jumping like the rest of the blues, not sliding like the yellow characters); whether they expect other people to behave sensibly (if you're going to reach for a toy, will you please do it efficiently rather than let your hand meander all over the place?); and how babies decide whether a novel object has "agency" (is this small, fuzzy blob active or inert?).

Dr. Spelke is also seeking to understand how the core domains of the human mind interact to yield our uniquely restless and creative intelligence — able to master calculus, probe the cosmos and play a Bach toccata as no bonobo or New Caledonian crow can. Even though "our core systems are fundamental yet limited," as she put it, "we manage to get beyond them."

Dr. Spelke has proposed that human language is the secret ingredient, the cognitive catalyst that allows our numeric, architectonic and social modules to join forces, swap ideas and take us to far horizons. "What's special about language is its productive combinatorial power," she said. "We can use it to combine anything with anything."

She points out that children start integrating what they know about the shape of the environment, their navigational sense, with what they know about its landmarks — object recognition — at just the age when they begin to master spatial language and words like "left" and "right." Yet, she acknowledges, her ideas about language as the central consolidator of human intelligence remain unproved and contentious.

Whatever their aim, the studies in her lab are difficult, each requiring scores of parentally volunteered participants. Babies don't follow instructions and often "fuss out" mid-test, taking their data points with them.

Yet Dr. Spelke herself never fusses out or turns rote. She prowls the lab from a knee-high perspective, fretting the details of an experiment like Steve Jobs worrying over iPhone pixel

density. “Is this car seat angled a little too far back?” she asked her students, poking the little velveteen chair every which way. “I’m concerned that a baby will have to strain too much to see the screen and decide it’s not worth the trouble.”

Should a student or colleague disagree with her, Dr. Spelke skips the defensive bristling, perhaps in part because she is serenely self-confident about her intellectual powers. “It was all easy for me,” she said of her early school years. “I don’t think I had to work hard until I got to college, or even graduate school.”

So, Radcliffe Phi Beta Kappa, ho hum. “My mother is absolutely brilliant, not just in science, but in everything,” said her daughter, Bridget, a medical student. “There’s a joke in my family that my mother and brother are the geniuses, and Dad and I are the grunts.” (“I hate this joke,” Dr. Spelke commented by e-mail, “and utterly reject this distinction!”)

Above all, Dr. Spelke relishes a good debate. “She welcomes people disagreeing with her,” said her husband, Elliott M. Blass, an emeritus professor of psychology at the University of Massachusetts. “She says it’s not about being right, it’s about getting it right.”

When Lawrence H. Summers, then president of Harvard, notoriously suggested in 2005 that the shortage of women in the physical sciences might be partly due to possible innate shortcomings in math, Dr. Spelke zestily entered the fray. She combed through results from her lab and elsewhere on basic number skills, seeking evidence of early differences between girls and boys. She found none.

“My position is that the null hypothesis is correct,” she said. “There is no cognitive difference and nothing to say about it.”

Dr. Spelke laid out her case in an acclaimed debate with her old friend Dr. Pinker, who defended the Summers camp.

“I have enormous respect for Steve, and I think he’s great,” Dr. Spelke said. “But when he argues that it makes sense that so many women are going into biology and medicine because those are the ‘helping’ professions, well, I remember when being a doctor was considered far too full of blood and gore for women and their uncontrollable emotions to handle.”

Raising Her Babies

For her part, Dr. Spelke has passionately combined science and motherhood. Her mother studied

piano at Juilliard but gave it up when Elizabeth was born. “I felt terribly guilty about that,” Dr. Spelke said. “I never wanted my children to go through the same thing.”

When her children were young, Dr. Spelke often took them to the lab or held meetings at home. The whole family traveled together — France, Spain, Sweden, Egypt, Turkey — never reserving lodgings but finding accommodations as they could. (The best, Dr. Blass said, was a casbah in the Moroccan desert.)

Scaling the academic ranks, Dr. Spelke still found time to supplement her children’s public school education with a home-schooled version of the rigorous French curriculum. She baked their birthday cakes from scratch, staged elaborate treasure hunts and spent many days each year creating their Halloween costumes: Bridget as a cave girl or her favorite ballet bird; her younger brother, Joey, as a drawbridge.

“Growing up in my house was a constant adventure,” Bridget said. “As a new mother myself,” she added, “I don’t know how my mom did it.”

Is Dr. Spelke the master of every domain? It’s enough to make the average mother fuss out.

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From: The New York Times. Insights From the Youngest Minds. Tags: Communication. Developmental Psychology. The New York Times: CAMBRIDGE, Mass.Â The researchersâ€™ objective, as with half a dozen similar projects under way in the lab, was to explore what infants understand about social groups and social expectations. Yet even before the recording began, the 15-pound research subject made plain the scope of her social brain. She tracked conversations, stared at newcomers and burned off adult corneas with the brilliance of her smile. Read the whole story: The New York Times. News > Insights From the Youngest Minds. Published May 1, 2012. Leave a Comment Cancel reply. We want to understand how children get so much better at certain cognitive abilities like reading, writing, and problem solving as they get older. To better understand this, we followed hundreds of children across a period of years, to see how abilities like problem solving and vocabulary changed over time.Â Ivan is a Ph.D. student at the MRC Cognition and Brain Sciences Unit at the University of Cambridge. His research attempts to understand how the brain and behavior interact with each other during childhood and adolescence to produce intelligence. He hopes to apply insights from his research to help guide education policy, especially for disadvantaged youth struggling to learn in school. Delia Fuhrmann. Delia Fuhrmann. NGYM (Next Gen Young Minds) supporting the young and...Â See more of Next Gen Young Minds - Pavi Govinna on Facebook. Log In. or. Create New Account. See more of Next Gen Young Minds - Pavi Govinna on Facebook. Log In. Forgotten account?Â Many of the insights from the Duke University study on happiness remind us to stay optimistic, connected and forward looking. https://bit.ly/2qV6XKo. Sketchnote by @tnvora. Next Gen Young Minds - Pavi Govinna. 12 December 2019 at 12:56 Â·. Be mindful to observe your thoughts, understand itâ€™s presence, donâ€™t let them determine your existence. Next Gen Young Minds - Pavi Govinna. 10 December 2019 at 14:27 Â·. Next Gen Young Minds - Pavi Govinna.