

# Kids, Start Your Engines

When it comes to those wonderful milestones of physical development, from rolling over to taking the first steps, 'normal' is a relative term. Children, remember, are individuals. **By Joan Raymond**

**F**RANCESCA FABE WANTS TO MAKE SURE SHE REALLY NAILS the flower-girl strut. Legs alternating perfectly, arms held delicately in front of her petite frame, Francesca, 2, is moving to an inner rhythm as she glides down the sidewalk of her suburban Cleveland home. "This is how you do it," she boasts, tossing imaginary blooms to her mother, Donna, her father, Guy, and her younger brother, Pete. Although Francesca lacks the smooth moves of a catwalk diva, she is nonetheless a picture of grace and toddler determination. Just last year, though, Donna was burning up the phone lines to Francesca's pediatrician, asking why her 13-month-old daughter wasn't walking. "I drove the doctor crazy,"

says Donna with a rueful smile. "But I just wanted to make sure everything was OK." It was. Francesca walked at 14 months, well within the average range. In the past year she has progressed to running, jumping, climbing, kicking and marching backward. "Francesca probably just wanted to get the walking thing right the first time," says Donna. Pete, on the other hand, is walking at 12 months and has a damn-the-torpedoes approach to locomotion as he tries to elude Mom's clutches. "Pete," says Donna, "just kind of went for it."

Anxious parents of the world: take a timeout. When it comes to physical growth and development and those wonderful photo-op milestones, like sitting up or crawling, "normal" is a relative term. When next-door Johnny begins walking at 11 months but your own little Mary is still content with crawling at 15 months, a by-the-growth-chart parent can't help but wonder, "*What's wrong with my kid?*" An explosion of research into the workings of the brain shows the answer may be ... nothing. The development of the brain pathways that fire up nerve endings and muscle groups to per-

of the parents of young children say they consulted books on parenting or the early childhood years before their firstborn arrived

## SITTING UP

**She now looks out at the world from a wider perspective**

form specific tasks occurs at a pace as individual as a fingerprint. Although parents should be concerned if their child doesn't develop good head and neck control by 2 to 3 months, or if a baby's movements remain poor, with muscles stiff and rigid or floppy and uncontrolled, fretting over a week-long "delay" in when a child sits up is a waste of psychic energy.

A baby passes her first amazing milestone before the typical mother has even wiped off the sweat of labor. Full-term newborns, scientists established in 1996, recognize and prefer their mother's face to all others. (In the ingenious experiment, the scientists had babies suck a special pacifier that controlled a video screen. Depending on how the infant sucked, fast or slow, the image of Mom or another woman appeared; babies sucked so they'd see Mom.)

From here on out, though, when a child reaches developmental milestones is only partly determined by biology; these events are also environmentally "sculpted," says neurodevelopmental pediatrician Dr. Alec Hoon of Baltimore's Kennedy Krieger Institute. Each time a child acquires new motor skills, such as lifting her head, she receives new environmental stimuli, like a view of the world from a new perspective. These new stimuli, even something as simple as a game of peekaboo, cement tentative brain circuits, which in turn prod and enable a child to take on more complex tasks. As these neuromotor connections mature, so does a child's sense of self. And in the seeming blink of an eye, the dependency of infancy gives way to the effervescent autonomy of toddlerhood. "Childhood," Hoon quotes his favorite bumper sticker, "is a journey, not a race."

It is one that children start at birth, when they have virtually no motor control and only rudimentary reflexes. Physical milestones move from head to toe: brain regions that control the head and neck develop before those that direct the arms and legs. In six months a baby will progress from raising her head and chest when lying on her stomach, to sitting up as she develops better balance and her back and neck



muscles strengthen. Rolling over takes major cortical power involving three brain structures: the motor cortex, which initiates movement; the basal ganglia, which both inhibits movement and stores "programs" for habitual movements, and the cerebellum, which excites motor nerves. Even the seemingly simple act of reaching for a cookie involves cementing connections between brain areas that register hunger, sight, smell and motivation with regions that control movement.

skill development warrants intervention. An infant who continually stands before mastering sitting could have muscle spasticity, indicative of numerous problems.

But underlying pathology or illness is the exception, not the rule. Some motor-skill delays may be easily explained by, for instance, the fact that "children need the opportunity to do things on their own," says Johnson. When one set of parents brought their son in because he wasn't rolling over, Johnson asked if they ever put the child on the floor. The answer was

### 0-3 MONTHS

## trusting

Babies begin to make simple associations: if he cries he gets picked up. Reflexive movements are **slowly replaced** with purposeful, voluntary ones.

### 4-7 MONTHS

## moving

A baby rolls over, learns to sit without support and turns toward sounds. Most will **reach out** to grasp objects and may transfer them from one hand to the other.

## STEP BY LITTLE STEP

The nervous system develops from the head down, but gross motor skills can appear early, late or even out of sequence.

no. The child was always being held. Within a few days of being placed on the floor so he could see the world from a different perspective, he rolled over, and went on to develop just fine. "We all want to be good parents and do for our kids," says Johnson. "A child needs to do for himself."

As common as developmental "delays" are a kind of developmental hiccup, in which children briefly lose a newly acquired skill. As a baby masters a new trick, finds kinesiologist Daniela Corbetta of Purdue University, the brain reorganizes itself. The result is a "temporary developmental step backward," she says. For instance, babies develop handedness—a preference for reaching or grasping with right rather than left, or vice versa—before they become proficient walkers. But walking requires such massive postural reorganization, balance and, initially, intense concentration that the brain apparently remaps itself to accomplish the task. One result is that many novice walkers regress to using both hands for reaching and holding, but return to using a preferred hand as they gain skill and confidence in their ambulations. Says Corbetta, "It's a big job for the brain to organize a set of muscles that it has never dealt with before."

Even though the brain acts as mission control for movement, the development of motor control is not preordained. "For the longest time development was looked at as a process that happens just because the brain is getting bigger and better," says psychologist Esther



Thelen of Indiana University. "Now we're saying what makes the brain change so dramatically [during these years] is the baby's own problem-solving skills. The brain is as educated from the outside in as it is from the inside out." Environmental feedback, in other words, is as crucial as innate biology in guiding a child toward developmental milestones. That's because about half of the trillions of connections between neurons, called synapses, in a baby's brain will be pruned—eliminated—by adulthood. The survivors will be

was them. Their younger counterparts pointed only to the mirror image, displaying no recognition of self. The development of a child's sense that he is distinct from those around him and from the rest of the world goes hand in hand with his unfolding physical prowess. "Kids will stand up, and they will fall down," says psychologist Alicia Lieberman, author of "The Emotional Life of the Toddler." "Help your child explore the world confidently." Just do it at your children's own pace. And in their own time.

#### PRESCHOOL YEARS

The dependency of infancy gives way to growing autonomy

those that have been activated most often, and thus almost hard-wired by experience. One especially powerful synaptic glue is the feedback, in the form of emotional satisfaction and praise, that a child receives from successfully crawling across a room to retrieve an errant ball. The feedback serves to strengthen the web of brain synapses that encodes the "crawl" program.

Perhaps the most powerful reinforcement a child can get is the feeling that he is an independent little being. By about 4 months, babies smile at their reflections but give no hint that they recognize themselves. Only around 18 months do toddlers exhibit a sense of self. In a now classic study, scientists dabbed lipstick on a child's nose. The 18-month-olds touched the smudge on their own faces when looking in the mirror; they understood that the reflection

#### 7-12 MONTHS

### crawling

The baby may show interest in other kids, though fear strangers, and start to **creep or crawl**. He will likely perfect crawling and standing before trying to walk.

#### 12-18 MONTHS

### walking

A baby will likely walk without support, **becoming stronger** and more coordinated. Most babies develop a preference for one hand over another.

#### 19-23 MONTHS

### running

Babies start running and climbing, even **kicking a ball**, without tripping. They often use hands to drink from cups and crayons to draw crude circles.

#### 2-3 YEARS

### exploring

Toddlers love to test their growing abilities by galloping, tumbling and hopping on one foot. They may **dance to music**, open jars and turn toy nuts and bolts.