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Testimony Presented to the
Allegheny County Department of Public Welfare
Proposed Early Intervention Regulations

REVIEW COMMISSION
October 13, 2000
11:00 AM

Thank you for providing another open comments period. While I think five minutes isn't enough time to address all my concerns with your proposed changes, I will do the best I can. The research I have found which proves that the first years of a child's life are the most critical for learning and interventions is all attached.

Many families schedule important doctor or therapist appointments, surgeries, evaluations or testing during the summer. We went to Maryland three times to get our daughter fitted with a new prosthetic eye because without it, her head would become misshapen. So it was important to do this procedure over the summer. As a responsible parent I do what is needed to support my family. We have had to make many decisions about our daughter's care and we always take into consideration research and expertise. I ask that you all will do what is necessary to continue supporting families appropriately according to best practices, research, and common sense.

Comprehensive Child Find System

My daughter, Martha entered kindergarten six weeks ago ready to learn. She attends a local Catholic school where the teacher expects a lot of students. Being ready to learn took a couple of years, many highly educated teachers and support staff such as the Service Coordinators at the Alliance for Infants and Toddlers teachers at the Early Learning Institute. Being ready to learn at age of beginners is key and expected by school districts.

When Martha was six months old I knew something was wrong with her vision and that this was affecting her development. I went to her doctor and asked where I could take my child who was not meeting her developmental milestones, but he didn't know. For four months I called public agencies asking this same question. I even called DPW asking what, where or how I could get help for my child, but they didn't know. I talked to someone who was at a parent meeting describing how to access Medical Assistance for children with disabilities and she didn't know either. It was another parent in this meeting who heard me asking my question. This parent gave me the number of St. Peters. I finally ended up at the Alliance for Infants. I performed child find on behalf of my child.

The Child Find process used today finds the children who need early intervention services. There is a whole group of children in pre-school now who got the critical services they needed to so they are ready to learn when they enter school. You ask a doctor now "Where do I take my child who is delayed?" and you are referred to the Alliance for Infants and Toddlers. Even specialists such as eye doctors are referring children. It's especially effective using television as a way to reach families who often sit home with their child watching television.

Child Find is right where it should be today. I know lots of children in elementary, middle, and high schools who struggle and many fail. These parents have said to me, "Oh you are so lucky that you got your child got into early intervention.

If you don't inform the public about the early intervention programs, you will have infants and toddlers who are not ready to learn. Please change the proposed regulations so they state that the legal entity will perform these functions, "with the assistance of the State."

Time Lines

Time lines are very important. In my daughter's case, we searched for help for four months. During that four months my daughter continued to fall behind. As science is now telling us, some of the most important preparation we can give our children takes place during the earliest years of life. The first three years are crucial. If DPW decides to impose inappropriate regulations on the children of Allegheny County do you want these children, whom you are trying to short change, to be the ones who decide our care and future when we are retired and experiencing disabilities? Perhaps by not using best practices in decisions you make for young children now, later these same young children (when they are grown to be adults) will decide to make arbitrary decisions about us when we are most vulnerable. I am asking you to give infants and toddlers and their families the tools they need to succeed.

Through highly trained and experienced teachers and therapists my daughter was near age-appropriate levels by age 2 ½. Please make clearer the 45 days of referral rule in your proposed regulations. Why not just make it clearer so there is no question that 45 days of referral means 45 days from referral.

Requirements and Qualifications of Service Coordinators And Case Load Maximums

Perhaps the most devastating proposed change is the level of expertise that a service coordinator must have to do their job competently. While our Service Coordinator was as responsive as she could be based on her knowledge of what was available to our family, I believe that had she far fewer families to coordinate services for she would have had time to keep up to date on community and state based services. For example, our service coordinator didn't tell us about Medical Assistance. For almost two years we supported Martha's medical needs which, were intensive. She was in the hospital 23 times in another city because there wasn't the level of expertise (medically) to support her complex needs locally. We were in debt, which my service coordinator was aware of. If our Service Coordinator (who was a big help in so many other ways) had the training and time to research services she was trying to coordinate, our family would not have suffered that burden of debt. We would have had Medical Assistance which would have helped with medical and travel expenses. Our Service Coordinator at the time was really just a Caseworker because her caseload was just that: a load. I felt it and so did other families in the county. In fact it was felt so much that the title of Caseworker was changed to Service Coordinator. Families did not want to be considered cases.

Our Service Coordinator was wonderful and I am glad she was there for us as much as she could be. Please keep the current level of expertise required for Service Coordinators and provide an appropriate caseload or change the title from Service Coordinator to Case Manager. Service Coordinator would be deceiving to a new family coming into Early Intervention. One would expect comprehensive service coordination. One would get only Case Management, which are two entirely different things. I want to thank The Alliance for Infants and Toddlers for the wonderful job they do coordinating services for families. I encourage you to keep service coordination at the levels that reflect the competencies required. In order to accomplish the service coordination appropriately there should also be a caseload maximum. This is only a suggestion but you could see what other counties have as a caseload maximum.

Outcomes-Based Research

Recently the National Academy of Sciences issued an important report that recommends a re-examination of national policy and practice related to young children. Given the explosion in scientific knowledge about development from birth to age five, coupled with dramatic social and economic changes in recent decades, the report recommends that the nation should thoroughly re-examine policies that affect young children and bolster its investments in their well-being.

The book From Neurons to Neighborhoods: The Science of Early Childhood Development concludes that two profound changes over the past several decades have coincided to produce a dramatically altered landscape for early childhood policy, services, and childrearing in the United States. First, an explosion of research in the neurobiological, behavioral, and social sciences has led to major advances in understanding the conditions that influence whether children get off to a promising or worrisome start in life. These scientific gains have generated a much deeper appreciation of: (1) the importance of early life experiences, as well as the inseparable and highly interactive influences of genetics and environment on the development of the brain and the unfolding of human behavior; (2) the central roles of early relationships as source of either support and adaptation or risk and dysfunction; (3) the powerful capabilities, complex emotions, and essential social skills that develop during the earliest months and years of life; and (4) the capacity to increase the odds of favorable developmental outcomes through planned interventions.

"As a nation, we're simply not taking advantage of how much we have learned about early development over the past 40 years," said Jack P. Shonkoff, chair of the committee that wrote the report and dean of the Florence Heller Graduate School, Brandeis University, Waltham, MA. "Work and family life are changing dramatically yet children's needs are not being addressed. This is not about blaming parents, the workplace, communities, or government. This is about sharing responsibility, separating fact from fiction, and using scientific knowledge to promote the well-being of babies and young children." In the spirit that this book projects, I am giving you my copy of this book.

The author makes four major recommendations that could benefit policy decision-makers in considering current practice and defining future and more appropriate directions. I urge DPW to use best practices and research as you move through this process.

End of Testimony
Documents supporting my positions are attached

Infant and Toddler's Research Opportunities

The National Academies has a book on-line or it can be purchased which would help you understand that care and protection are shared responsibilities. It is called From Neurons to Neighborhoods: The Science of Early Childhood Development and is published by the National Research Council. At a family's most intimate level, they require the investment and attention of a limited number of adults. In the book's final analysis, healthy child development is dependent on a combination of individual responsibility, informal social supports, and formalized structures that evolve within a society.

(<http://www.nap.edu/books/0309069882/html>)

Dr. Shonkoff will be one of the keynote speakers at OSEP's national Part c and 619 meeting in February. You may want to review the recommendations in light of your proposed changes. You can order the book at: <http://books.nap.edu/catalog/9824.html>. To listen to the press conference: <http://video.nationalacademies.org/ramgen/news/100300.rm>

Attachments:

1. The Day-care Dilemma: Time magazine a Special Report, February 3, 1997.
2. Fertile Minds: Time magazine a Special Report, February 3, 1997.
3. Where You Can Turn: Newsweek magazine a Special Issue, Spring/Summer 1997.
4. Raising a Moral Child: Newsweek magazine a Special Issue, Spring/Summer 1997.
5. Helping Families Help Themselves: Newsweek magazine a Special Issue, Spring/Summer 1997.
6. Won't You Be My Buddy? Newsweek magazine a Special Issue, Spring/Summer 1997.
7. Good Kid, Bad Kid: Newsweek magazine a Special Issue, Spring/Summer 1997.
8. Building A Better self-image: Newsweek magazine a Special Issue, Spring/Summer 1997.
9. Nature or Nurture: Newsweek magazine a Special Issue, Spring/Summer 1997.

10. Building Healthy Habits: Newsweek magazine a Special Issue, Spring/Summer 1997.
11. Your Baby Has A Problem: Newsweek magazine a Special Issue, Spring/Summer 1997.
12. Giving Infants a Helping Hand: Newsweek magazine a Special Issue, Spring/Summer 1997.
13. Cultivating the Mind: Newsweek magazine a Special Issue, Spring/Summer 1997.
14. The New Preschool: Newsweek magazine a Special Issue, Spring/Summer 1997.
15. Fragile: Handle With Care: Newsweek magazine a Special Issue, Spring/Summer 1997.
16. How to Build a Baby's Brain: Newsweek magazine a Special Issue, Spring/Summer 1997.
17. When a Child's Silence Isn't Golden: Newsweek magazine a Special Issue, Spring/Summer 1997.
18. Turning On the Motor: Newsweek magazine a Special Issue, Spring/Summer 1997.
19. The Language Explosion: Newsweek magazine a Special Issue, Spring/Summer 1997.
20. 20 links to Infant and Toddler Web Sites:
<http://www.washington.edu/isei/links.html>
21. Off to a Good Start, Why the first years are so crucial to a child's development. Newsweek magazine a Special Issue, Spring/Summer 1997. Hey-Look Out World, Here I Come: Newsweek magazine a Special Issue, Spring/Summer 1997. Infants & Young Children: An Interdisciplinary Journal of Special Care Practices by James A. Blackman.
22. Frank Porter Graham Child Development Center, The University of North Carolina at Chapel Hill. <http://www.nap.edu/>
23. Infants and Young Children an Editorial Statement.
<http://www.depts.washington.edu/isei/journal.htm>
24. Monographs of the International Society on Early Intervention and Editorial Statement.
25. Effective Practices for Preparing Young Children with Disabilities for School. Source: ERIC Clearinghouse on Disabilities and Gifted Education Reston VA.
26. Early Childhood Program Research and Evaluation. ERIC Clearinghouse on Assessment and Evaluation, Washington DC.
27. Core Concepts in Child Development: The National Academies.
28. A Bundle of Emotions: Newsweek magazine a Special Issue, Spring/Summer 1997.

THE DAY-CARE I

By JAMES COLLINS

ENVIRONMENT MATTERS. FOR ANYONE wondering how the latest brain research applies to the care of infants and toddlers, that is the crucial finding. Yes, proper brain development is a matter of genetics and nutrition and whether a mother-to-be drinks or smokes, but it also depends on the stimuli, as the scientists call them, that a baby receives. It depends on what the baby sees, hears and touches

and on the emotions he or she repeatedly experiences. But if environment matters, we are faced with a question: At a time when children suffer from perhaps the gravest social problems of any group in the U.S., how do we ensure that they grow up in the best environment possible?

In many ways, children are better off today than they were in previous decades. They are healthier, their families have a higher income, the level of their mother's education (the most important determinant of a child's intelligence) has risen. But 1 out of every 10 children three years old and younger lives in "extreme poverty"—at or below 50% of the federal poverty level. And the well-being of many others is threatened by such social changes as the rise of single-parent households, the uneven quality of day care, the decline of communities and, some would argue, the push to reform the welfare system.

Social policy cannot ameliorate all these conditions. A change in attitude toward parenting and marriage would do children far more good than any government program. Over the past few years, however, there has been a movement in Washington and the state cap-

itals to address the problems of children, from newborn to the age of three. Now neuroscientists, by confirming much of what social scientists had already surmised about early development, are giving that movement added momentum.

The recent concern about infants and toddlers has been inspired in part by *Starting Points*, a landmark report published by the Carnegie Corporation in 1994, which identified a "quiet crisis" in the lives of the youngest children. Hillary Clinton has begun to speak out on the importance of a child's earliest years, and several Governors have forcefully taken up the issue. The size of the programs in place is quite modest. But to their advocates they hold out promise not only



DILEMMA

Too many children today live in conditions that threaten their brain development. What can we do?

of helping children fulfill their potential but also of saving society the costs incurred when intellectually and socially impaired children grow up to be intellectually and socially impaired adults.

Government policy in any number of areas—health care, taxes, the economy, crime—touches children. But the initiative that will have the most particular and powerful effect on them is welfare reform. If, as some predict, the incomes of poor mothers are drastically reduced as a result of the new system, children will be harmed.

But let's assume that the reforms work as intended and mothers get jobs that pay them more than paupers' wages. What effect may the changes

have on childhood development?

There is some evidence that children benefit if their mothers stay home with them until they are one year old, and the welfare law allows states to exempt new mothers from work requirements for a year. But so far, states do not seem to be taking advantage of the provision. For example, in Wisconsin, which is a leader in welfare reform, mothers must start looking for work when their baby is 12 weeks old. Those who favor these reforms say a mother who has a job will be a prouder and more responsible parent, and some studies suggest that children do benefit if their mother receives earned income rather than a government check for the same amount.

If mothers are out working, however, the quality of child care provided by others will largely determine how well the children fare under the states' new plans. To care for their children, many mothers will rely on relatives and friends, some of whom will be loving and attentive and some of whom will not. Also, the strain on the day-care system is a matter of

grave concern to child-development and child-care experts. A recent study found that 40% of day-care centers for infants and toddlers gave less than the minimal standard of care. Problems ranged from safety hazards to unresponsive caregivers to a lack of toys. If a caregiver spoons food from one bowl into the mouths of half a dozen toddlers lined up in high chairs, as has been known to happen, not only is the health of the children at risk but they are surely not receiving the kind of attention that promotes healthy brain development.

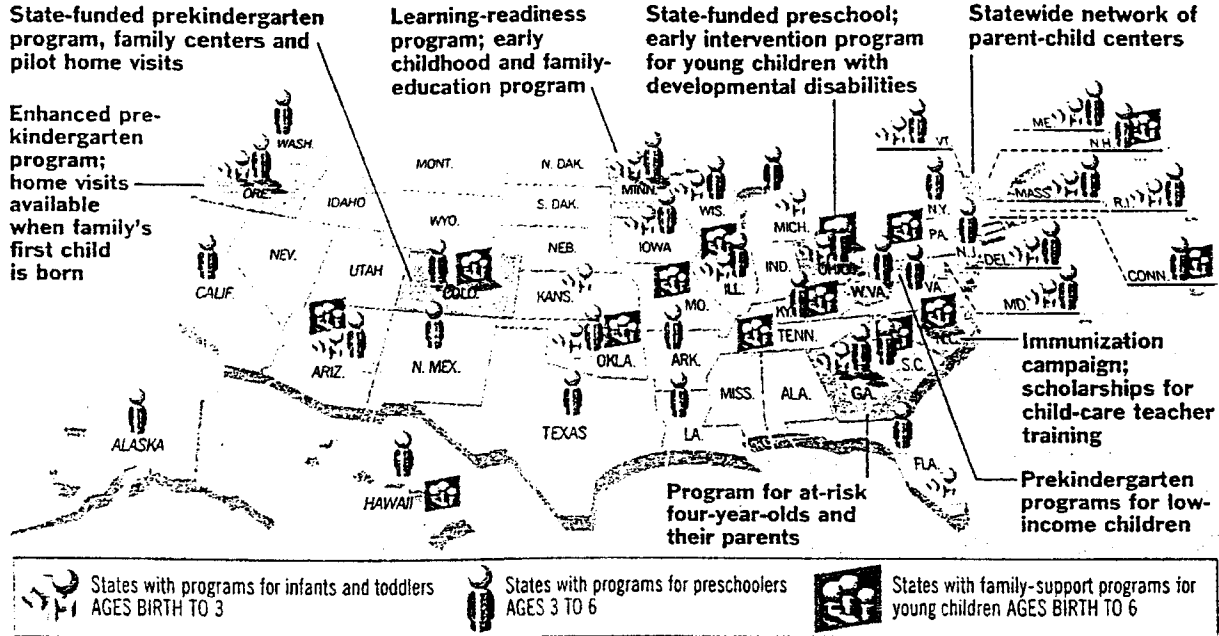
"If you push more children into this system through welfare reform," says Ellen Galinsky, co-president of the Families and Work Institute, "and you are saying to these families, 'Just get any child care you can find and can pay for,' there's a real danger."

The challenge for the states is to regulate and subsidize child care in such a way



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What States Are Doing



Source: National Center for Children in Poverty. TIME Graphics by Steve Hart

as to increase the likelihood of good outcomes for children. This is true regardless of welfare reform, of course. Bad day-care can harm the development of any child. Research has shown that children benefit when caregivers are trained and the ratio of staff to children is high. Several states license centers accordingly, requiring a minimum amount of training and setting ratios for different age groups. Welfare mothers themselves are not necessarily the best caregivers, and it is possible that in some instances welfare reform will actually improve the care of children. But high-quality care is expensive, and states do not have adequate budgets to subsidize it.

The Federal Government and the states do have programs specifically aimed at helping the development of infants and toddlers, although as social policy they are nowhere near as sweeping as an overhaul of welfare. The most notable federal initiative is Early Head Start, which was created in 1994 when Congress reauthorized funding for Head Start, the 32-year-old program that brings three-, four- and five- year-olds into classroom settings in part to prepare them for school. Mary Jo Bane was working at the time at the Department of Health and Human Services (she quit over welfare reform), and she led a task force charged with finding ways to improve Head Start. Child-development experts, she says, "pointed the group

toward the importance of interventions earlier than age four."

In 1996, the budget for Early Head Start was \$146 million, and HHS awarded grants to 143 sites. The money is used to provide a variety of services to poor families with children under the age of four and to poor pregnant women. How the funds are spent is determined to some extent by the communities that receive them. Some communities are experimenting with family interventions that include grandparents; others are trying to address the special health needs of newborns or to provide extra help to teen parents with a history of drug abuse.

SMART START, HEALTHY START

NORTH CAROLINA HAS INSTITUTED A FLEXIBLE program called Smart Start. Under it, parents, teachers, doctors and nurses, child-care providers, ministers and businesspeople form partnerships at the county level that set goals for the education and health care of children under six. These partnerships then administer private and public funds as they see fit. In one county, for example, administrators chose to give subsidies to new parents so that mothers could stay home from work during a baby's first year. More than half of North Carolina's 100 counties are participating in the program, at a cost to the state of \$68 million.

Governor James Hunt hopes that by adding hard science to his arguments, he will strengthen his position when battling for increases in Smart Start funding. "This is revolutionary information," he says of studies demonstrating the sensitivity of babies' brains in the first years of life. "Now that we can measure it and prove it, and if it can be made known widely so people understand this, then they'll understand why their schools aren't going to work for them, their technical training isn't going to work, other things we do later on aren't going to work fully unless we do this part right and do this at the appropriate time."

Some states have found that a very simple but powerful way to help parents is simply to coordinate the various services that they already offer. In West Virginia, for example, single sites that provide more than a dozen services have been established in seven communities. "Parents typically get a runaround and may only get a long list of phone numbers," says Kimberly Veraas, chairwoman of the state's Early Childhood Implementation Commission. "If they're really motivated, they can get information. But now we're rolling out the red carpet to parents. They only have to tell their story once."

As developmental experts often point out, child rearing is not an innate skill, and several states are trying to help educate parents about parenting. Home visits by

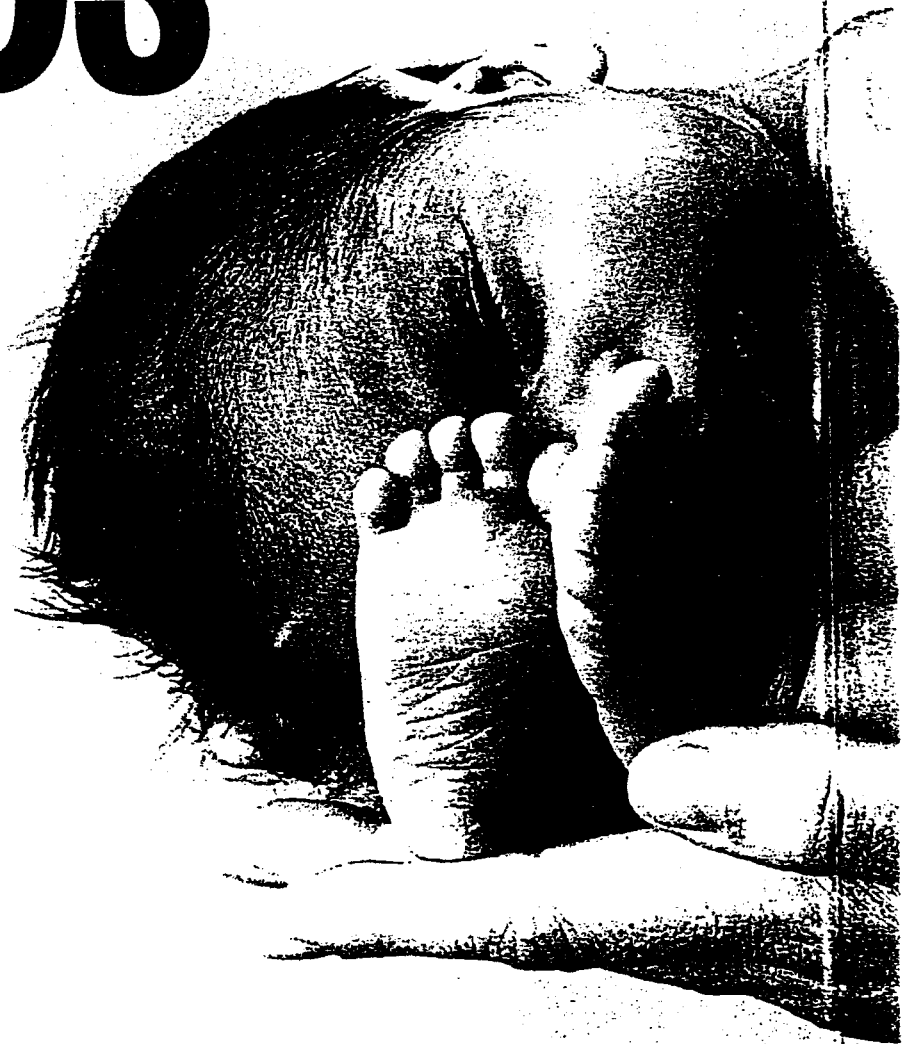
FERTILE MINDS

From birth, a baby's brain cells proliferate wildly, making connections that may shape a lifetime of experience. The first three years are critical

By J. MADELEINE NASH

RAT-A-TAT-TAT. RAT-A-TAT-TAT. RAT-A-TAT-tat. If scientists could eavesdrop on the brain of a human embryo 10, maybe 12 weeks after conception, they would hear an astonishing racket. Inside the womb, long before light first strikes the retina of the eye or the earliest dreamy images flicker through the cortex, nerve cells in the developing brain crackle with purposeful activity. Like teenagers with telephones, cells in one neighborhood of the brain are calling friends in another, and these cells are calling their friends, and they keep calling one another over and over again, "almost," says neurobiologist Carla Shatz of the University of California, Berkeley, "as if they were autodialing."

But these neurons—as the long, wiry cells that carry electrical messages through the nervous system and the brain are called—are not transmitting signals in scattershot fashion. That would produce a featureless static, the sort of noise picked up by a radio tuned between stations. On the contrary, evidence is growing that the staccato bursts of electricity that form those distinctive rat-a-tat-tats arise from coordinated waves of neural activity, and that those pulsing waves, like currents shifting sand on the ocean



Photograph by Anne Geddes



LENNART NILSSON—DONNICH ALIDA AD

At six weeks, the growing brain of an embryo, richly irrigated by blood vessels, is almost as big as its body

floor, actually change the shape of the brain, carving mental circuits into patterns that over time will enable the newborn infant to perceive a father's voice, a mother's touch, a shiny mobile twirling over the crib.

Of all the discoveries that have poured out of neuroscience labs in recent years, the finding that the electrical activity of brain cells changes the physical structure of the brain is perhaps the most breathtaking. For the rhythmic firing of neurons is no longer assumed to be a by-product of building the brain but essential to the process, and it begins, scientists have established, well before birth. A brain is not a computer. Nature does not cobble it together, then turn it on. No, the brain begins working long before it is finished. And the same processes that wire the

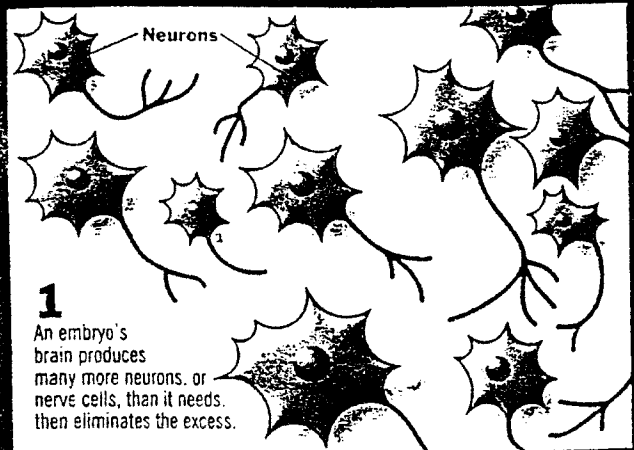
brain before birth, neuroscientists are finding, also drive the explosion of learning that occurs immediately afterward.

At birth a baby's brain contains 100 billion neurons, roughly as many nerve cells as there are stars in the Milky Way. Also in place are a trillion glial cells, named after the Greek word for glue, which form a kind of honeycomb that protects and nourishes the neurons. But while the brain contains virtually all the nerve cells it will ever have, the pattern of wiring between them has yet to stabilize. Up to this point, says Shatz, "what the brain has done is lay out circuits that are its best guess about what's required for vision, for language, for whatever." And now it is up to neural activity—no longer spontaneous, but dri-

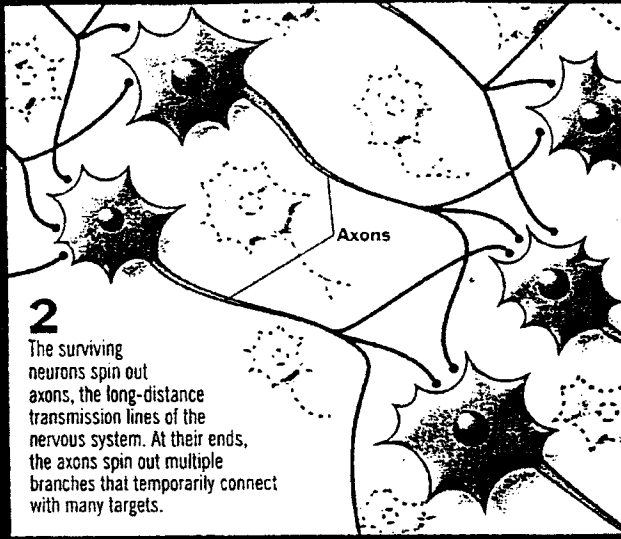
ven, by a flood of sensory experiences—to take this rough blueprint and progressively refine it.

During the first years of life, the brain undergoes a series of extraordinary changes. Starting shortly after birth, a baby's brain, in a display of biological exuberance, produces trillions more connections between neurons than it can possibly use. Then, through a process that resembles Darwinian competition, the brain eliminates connections, or synapses, that are seldom or never used. The excess synapses in a child's brain undergo a draconian pruning, starting around the age of 10 or earlier, leaving behind a mind whose patterns of emotion and thought are, for better or worse, unique.

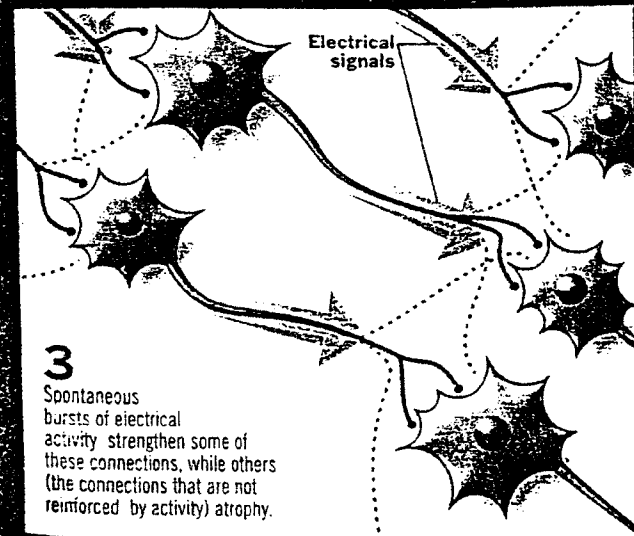
Wiring the Brain



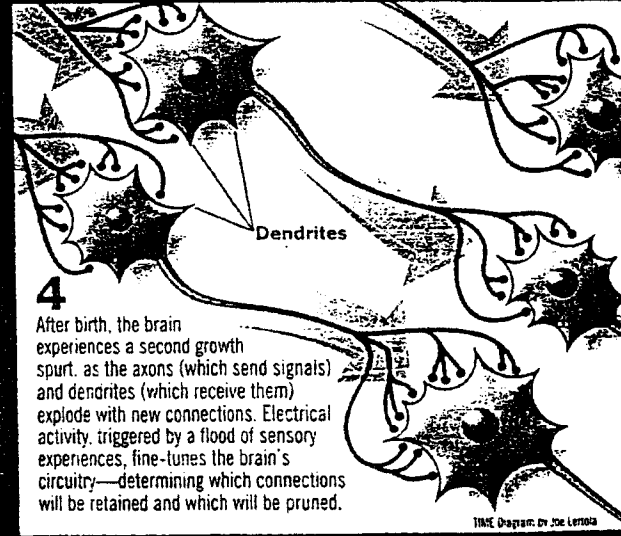
1
An embryo's brain produces many more neurons, or nerve cells, than it needs, then eliminates the excess.



2
The surviving neurons spin out axons, the long-distance transmission lines of the nervous system. At their ends, the axons spin out multiple branches that temporarily connect with many targets.



3
Spontaneous bursts of electrical activity strengthen some of these connections, while others (the connections that are not reinforced by activity) atrophy.



4
After birth, the brain experiences a second growth spurt, as the axons (which send signals) and dendrites (which receive them) explode with new connections. Electrical activity, triggered by a flood of sensory experiences, fine-tunes the brain's circuitry—determining which connections will be retained and which will be pruned.

TIME Diagram by Joe Lertola

Deprived of a stimulating environment, a child's brain suffers. Researchers at Baylor College of Medicine, for example, have found that children who don't play much, or are rarely touched develop brains 20% to 30% smaller than normal for their age. Laboratory animals provide another provocative parallel. Not only do young rats reared in toy-strewn cages exhibit more complex behavior than rats confined to sterile, uninteresting boxes, researchers at the University of Illinois at Urbana-Champaign have found, but the brains of these rats contain as many as 25% more synapses per neuron. Rich experiences, in other words, really do produce rich brains. The new insights into brain development are more than just interesting sci-

ence. They have profound implications for parents and policymakers. In an age when mothers and fathers are increasingly pressed for time—and may already be feeling guilty about how many hours they spend away from their children—the results coming out of the labs are likely to increase concerns about leaving very young children in the care of others. For the data underscore the importance of hands-on parenting, of finding the time to cuddle a baby, talk with a toddler and provide infants with stimulating experiences. The new insights have begun to infuse new passion into the political debate over early education and day care. There is an urgent need, say child-development experts, for preschool programs designed to

boost the brain power of youngsters born into impoverished rural and inner-city households. Without such programs, they warn, the current drive to curtail welfare costs by pushing mothers with infants and toddlers into the work force may well backfire. "There is a time scale to brain development, and the most important year is the first," notes Frank Newman, president of the Education Commission of the States. By the age of three, a child who is neglected or abused bears marks that, if not indelible, are exceedingly difficult to erase. But the new research offers hope as well. Scientists have found that the brain during the first years of life is so malleable that very young children who suffer strokes or injuries that wipe out an entire hemi-

sphere can still mature into highly functional adults. Moreover, it is becoming increasingly clear that well-designed preschool programs can help many children overcome glaring deficits in their home environment. With appropriate therapy, say researchers, even serious disorders like dyslexia may be treatable. While inherited problems may place certain children at greater risk than others, says Dr. Harry Chugani, a pediatric neurologist at Wayne State University in Detroit, that is no excuse for ignoring the environment's power to remodel the brain. "We may not do much to change what happens before birth, but we can change what happens after a baby is born," he observes.

Strong evidence that activity changes the brain began accumulating in the 1970s. But only recently have researchers had tools powerful enough to reveal the precise mechanisms by which those changes are brought about. Neural activity triggers a biochemical cascade that reaches all the way to the nucleus of cells and the coils of DNA that encode specific genes. In fact, two of the genes affected by neural activity in embryonic fruit flies, neurobiologist Corey Goodman and his colleagues at Berkeley reported late last year, are identical to those that other studies have linked to learning and memory. How thrilling, exclaims Goodman, how intellectually satisfying that the snippets of DNA that embryos use to build their brains are the very same ones that will later allow adult organisms to process and store new information.

As researchers explore the once hidden links between brain activity and brain structure, they are beginning to construct a sturdy bridge over the chasm that previously separated genes from the environment. Experts now agree that a baby does not come into the world as a genetically preprogrammed automaton or a blank slate at the mercy of the environment, but arrives as something much more interesting. For this reason the debate that engaged countless generations of philosophers—whether nature or nurture calls the shots—no longer interests most scientists. They are much too busy chronicling the myriad ways in which genes and the environment interact. "It's

not a competition," says Dr. Stanley Greenspan, a psychiatrist at George Washington University. "It's a dance."

THE IMPORTANCE OF GENES

THAT DANCE BEGINS AT AROUND THE THIRD week of gestation, when a thin layer of cells

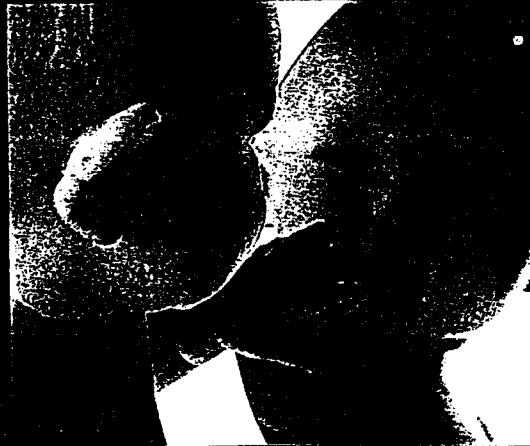
dominant partner during this phase of development, but nurture plays a vital supportive role. Changes in the environment of the womb—whether caused by maternal malnutrition, drug abuse or a viral infection—can wreck the clockwork precision of the neural assembly line. Some forms of epilepsy, mental retardation, autism and schizophrenia appear to be the results of developmental processes gone awry.

But what awes scientists who study the brain, what still stuns them, is not that things occasionally go wrong in the developing brain but that so much of the time they go right. This is all the more remarkable, says Berkeley's Shatz, as the central nervous system of an embryo is not a miniature of the adult system but more like a tadpole that gives rise to a frog. Among other things, the cells produced in the neural tube must migrate to distant locations and accurately lay down the connections that link one part of the brain to another. In addition, the embryonic brain must construct a variety of temporary structures, including the neural tube, that will, like a tadpole's tail, eventually disappear.

What biochemical magic underlies this incredible metamorphosis? The instructions programmed into the genes, of course. Scientists have recently discovered, for instance, that a gene nicknamed "sonic hedgehog" (after the popular video game *Sonic the Hedgehog*) determines the fate of neurons in the spinal cord and the brain. Like a strong scent carried by the wind, the protein encoded by the hedgehog gene (so called because in its absence, fruit-fly embryos sprout a coat of prickles) diffuses outward from the cells that produce it, becoming fainter and fainter. Columbia University neurobiologist Thomas Jessell has found that it takes middling concentrations of this potent morphing factor to produce a motor neuron and lower concentrations to make an interneuron (a cell that relays signals to other neurons, instead of to muscle fibers, as motor neurons do).

Scientists are also beginning to identify some of the genes that guide neurons in their long migrations. Consider the problem faced by neurons destined to become part of the cerebral cortex. Because they

Wiring Vision



WHAT'S GOING ON Babies can see at birth, but not in fine-grained detail. They have not yet acquired the knack of focusing both eyes on a single object or developed more sophisticated visual skills like depth perception. They also lack hand-eye coordination.

WHAT PARENTS CAN DO There is no need to buy high-contrast black-and-white toys to stimulate vision. But regular eye exams, starting as early as two weeks of age, can detect problems that, if left uncorrected, can cause a weak or unused eye to lose its functional connections to the brain.

WINDOW OF LEARNING Unless it is exercised early on, the visual system will not develop.

AGE (in years) Birth 1 2 3 4 5 6 7 8 9 10

Visual acuity

Binocular vision

in the developing embryo performs an origami-like trick, folding inward to give rise to a fluid-filled cylinder known as the neural tube. As cells in the neural tube proliferate at the astonishing rate of 250,000 a minute, the brain and spinal cord assemble themselves in a series of tightly choreographed steps. Nature is the

foreign language. Moreover, Fernald says, Parentese appears to hasten the process of connecting words to the objects they denote. Twelve-month-olds, directed to "look at the ball" in Parentese, direct their eyes to the correct picture more frequently than when the instruction is delivered in normal English.

In some ways the exaggerated, vowel-rich sounds of Parentese appear to resemble the choice morsels fed to hatchlings by adult birds. The University of Washington's Patricia Kuhl and her colleagues have conditioned dozens of newborns to turn their heads when they detect the *ee* sound emitted by American parents, vs. the *eu* favored by doting Swedes. Very young babies, says Kuhl, invariably perceive slight variations in pronunciation as totally different sounds. But by the age of six months, American babies no longer react when they hear variants of *ee*, and Swedish babies have become impervious to differences in *eu*. "It's as though their brains have formed little magnets," says Kuhl, "and all the sounds in the vicinity are swept in."

TUNED TO DANGER

EVEN MORE FUNDAMENTAL, SAYS Dr. Bruce Perry of Baylor College of Medicine in Houston, is the role parents play in setting up the neural circuitry that helps children regulate their responses to stress. Children who are physically abused early in life, he observes, develop brains that are exquisitely tuned to danger. At the slightest threat, their hearts race, their stress hormones surge and their brains anxiously track the nonverbal cues that might signal the next attack. Because the brain develops in sequence, with more primitive structures stabilizing their connections first, early abuse is particularly damaging. Says Perry: "Experience is the chief architect of the brain." And because these early experiences of stress form a kind of template around which later brain development is organized, the changes they create are all the more pervasive.

Emotional deprivation early in life has a similar effect. For six years University of Washington psychologist Geraldine Dawson, and her colleagues have monitored the brain-wave patterns of children born to

mothers who were diagnosed as suffering from depression. As infants, these children showed markedly reduced activity in the left frontal lobe, an area of the brain that serves as a center for joy and other light-hearted emotions. Even more telling, the patterns of brain activity displayed by these

brain-wave patterns. Dawson has found. What accounts for the difference appears to be the emotional tone of the exchanges between mother and child. By scrutinizing hours of videotape that show depressed mothers interacting with their babies, Dawson has attempted to identify the links

between maternal behavior and children's brains. She found that mothers who were disengaged, irritable or impatient had babies with sad brains. But depressed mothers who managed to rise above their melancholy, lavishing their babies with attention and indulging in playful games, had children with brain activity of a considerably more cheerful cast.

When is it too late to repair the damage wrought by physical and emotional abuse or neglect? For a time, at least, a child's brain is extremely forgiving. If a mother snaps out of her depression before her child is a year old, Dawson has found, brain activity in the left frontal lobe quickly picks up. However, the ability to rebound declines markedly as a child grows older. Many scientists believe that in the first few years of childhood there are a number of critical or sensitive periods, or "windows," when the brain demands certain types of input in order to create or stabilize certain long-lasting structures.

For example, children who are born with a cataract will become permanently blind in that eye if the clouded lens is not promptly removed. Why? The brain's visual centers require sensory stimulus—in this case the stimulus provided by light hitting the retina of the eye—to maintain their still tentative connections. More controversially, many linguists believe that language skills unfold according to a strict, biologically defined timetable. Children, in their view, resemble certain species of birds that cannot master their song unless they hear it sung at an early age. In zebra finches the window for acquiring the appropriate song opens 25 to 30 days after hatching and shuts some 50 days later.

WINDOWS OF OPPORTUNITY

WITH A FEW EXCEPTIONS, THE WINDOWS OF opportunity in the human brain do not close quite so abruptly. There appears to be a series of windows for developing lan-

Wiring Movement



HENRY D. HENRI

WHAT'S GOING ON At birth babies can move their limbs, but in a jerky, uncontrolled fashion. Over the next four years, the brain progressively refines the circuits for reaching, grabbing, sitting, crawling, walking and running.

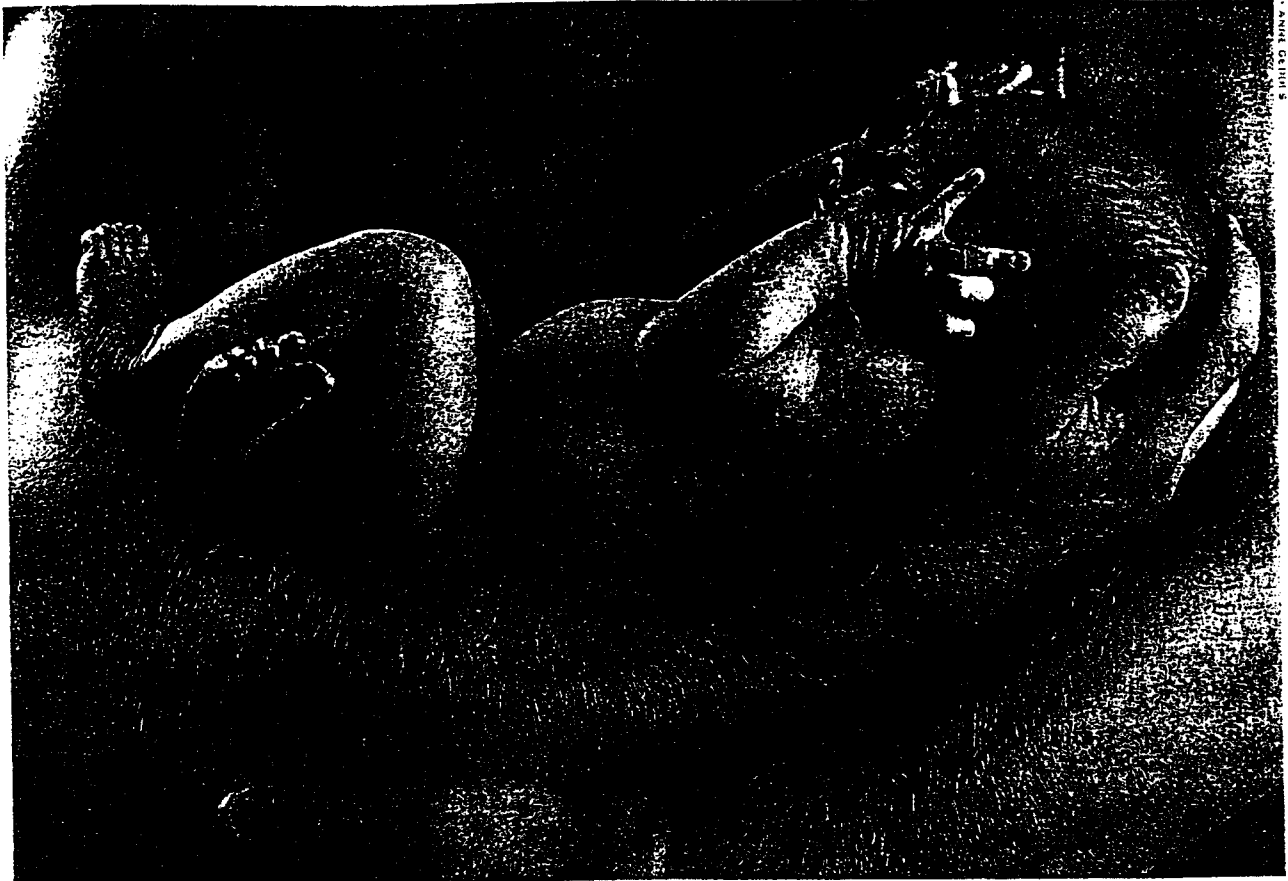
WHAT PARENTS CAN DO Give babies as much freedom to explore as safety permits. Just reaching for an object helps the brain develop hand-eye coordination. As soon as children are ready for them, activities like drawing and playing a violin or piano encourage the development of fine motor skills.

WINDOW OF LEARNING Motor-skill development moves from gross to increasingly fine.

AGE (in years)	Birth	1	2	3	4	5	6	7	8	9	10
Basic motor skills											
Fine motor ability											
Musical fingering											

children closely tracked the ups and downs of their mother's depression. At the age of three, children whose mothers were more severely depressed or whose depression lasted longer continued to show abnormally low readings.

Strikingly, not all the children born to depressed mothers develop these aberrant



guage. The window for acquiring syntax may close as early as five or six years of age, while the window for adding new words may never close. (The ability to learn a second language is highest between birth and the age of six, then undergoes a steady and inexorable decline.) Many adults still manage to learn new languages, but usually only after great struggle.

The brain's greatest growth spurt, neuroscientists have now confirmed, draws to a close around the age of 10, when the balance between synapse creation and atrophy abruptly shifts. Over the next several years, the brain will ruthlessly destroy its weakest synapses, preserving only those that have been magically transformed by experience. This magic, once again, seems to be encoded in the genes. The ephemeral bursts of electricity that travel through the brain, creating everything from visual images and pleasurable sensations to dark dreams and wild thoughts, ensure the survival of synapses by stimulating genes that promote the release of powerful growth factors and suppressing genes that encode for synapse-destroying enzymes.

By the end of adolescence, around the age of 18, the brain has declined in plasticity

but increased in power. Talents and latent tendencies that have been nurtured are ready to blossom. The experiences that drive neural activity, says Yale's Rakic, are like a sculptor's chisel or a dressmaker's shears, conjuring up form from a lump of stone or a length of cloth. The presence of extra material expands the range of possibilities, but cutting away the extraneous is what makes art. "It is the overproduction of synaptic connections followed by their loss that leads to patterns in the brain," says neuroscientist William Greenough of the University of Illinois at Urbana-Champaign. Potential for greatness may be encoded in the genes, but whether that potential is realized as a gift for mathematics, say, or a brilliant criminal mind depends on patterns etched by experience in those critical early years.

Psychiatrists and educators have long recognized the value of early experience. But their observations have until now been largely anecdotal. What's so exciting, says Matthew Melmed, executive director of Zero to Three, a nonprofit organization devoted to highlighting the importance of the first three years of life, is that modern neuroscience is providing the hard, quantifi-

able evidence that was missing earlier. "Because you can see the results under a microscope or in a PET scan," he observes, "it's become that much more convincing."

What lessons can be drawn from the new findings? Among other things, it is clear that foreign languages should be taught in elementary school, if not before. That remedial education may be more effective at the age of three or four than at nine or 10. That good, affordable day care is not a luxury or a fringe benefit for welfare mothers and working parents but essential brain food for the next generation. For while new synapses continue to form throughout life, and even adults continually refurbish their minds through reading and learning, never again will the brain be able to master new skills so readily or rebound from setbacks so easily.

Rat-a-tat-tat. Rat-a-tat-tat. Rat-a-tat-tat. Just last week, in the U.S. alone, some 77,000 newborns began the miraculous process of wiring their brains for a lifetime of learning. If parents and policymakers don't pay attention to the conditions under which this delicate process takes place, we will all suffer the consequences—starting around the year 2010. ■

Where You Can Turn

BY CARLA KOEHL

AVID "TELE-PARENTS" WILL TELL YOU THAT THERE'S nothing like a phone jack and 16 megabytes of RAM for navigating the mysteries, hurdles and hassles of life with an infant or toddler. If only you had Net-scape and a 28.8 modem—or at least speed-dial—they'll say, you'd be surfing and dialing your way to parental bliss with all the child-rearing info that's available by PC and phone. Are they batty? No. Just a little excited.

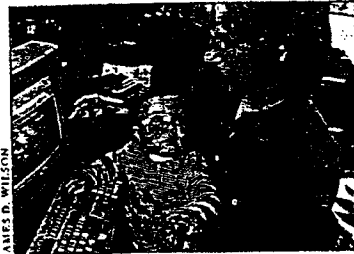
There are now more places than ever to phone for help when mothers and fathers feel parentally challenged. And the explosion of parenting Web sites and newsgroups that's taken place on the Internet over the last five years is connecting families from household to household the way the telephone did for the first time in 1876. Only this time the advance in communications isn't just overcoming distance and isolation. It's conquering stigmas.

Kate Ripley was nursing her newborn in her cabin half an hour outside Fairbanks,

Alaska, when she found an online breast-feeding newsgroup. "I was really lonely," she says. "It was a huge relief." Now that Rory's 9 months, the baby books are hinting that he's eating too often. Ripley's group (misc.kids.breastfeeding) says otherwise. "You don't just want to have someone validate everything you think," she says. "But it's such a variety of voices, you can cull." Even in Los Angeles, where there's no such thing as a remote location, actor Brian Markinson logs on whenever he and his wife are stumped about their 9-month-old. "It's another resource," he says,

"rather than call a doctor and feel like you're being a pain."

Technological alarmists, of course, take delight in warning that millions of modem-happy moms and dads will do nothing but produce millions of antisocial, monitor-gazing kids. A reliance on dial-tone parenting, they insist, keeps families, friends and neighbors from trading advice the old-fashioned way: in person. But a glance at all the live, wired interaction out there suggests that, so far, the alarmists are wrong.



Online support: Rory and Kate

On the Net

Usenet

alt.parenting and misc.kids
Great places to start on the Usenet—the Internet's collection of newsgroups—for discussions on hundreds of topics from teething and breast-feeding to pets and snoring.

Also, rec.arts.books.children is a 24-hour-a-day book group on children's literature.

Childbirth.Org

<http://www.childbirth.org>
Top discussion forums here, and a home page that gets right to the point on tough issues, including "Pregnancy & HIV," "Having Your First Baby Over 35" and "Complications."

Family.com

<http://www.family.com>
Disney's new site has been criticized for being more upscale than helpful. But their bulletin boards and chat rooms are filled with the voices of intelligent, caring parents. They must be doing something right.

ParentTalk Newsletter

<http://www.tnpc.com/parenttalk/index.html>
Clearly written articles by physicians and psychologists. What this site lacks in graphic creativity, it makes up for in sheer mass of information.

ParenthoodWeb

<http://parenthoodweb.com>
Pediatricians and psychiatrists respond (in due time) to your e-mail. Meanwhile, they've posted their stock answers to anything-but-stock questions, including "Did we make a mistake by having a child?"

Parenting Q&A

<http://www.parenting-qa.com/>
This site calls itself the only one on the Web "solely devoted to providing parents with answers to their most pressing questions." It does answer questions faster than most other sites we tried. But it also offers essays on touchy subjects like spirituality, and suggests reading lists for kids, games for rainy days.

ParentSoup

<http://www.parentsoup.com>
Excellent discussion forums address everything from step-parenting and disciplining closely spaced siblings to premature babies and children with attention deficit disorder.

Zero to Three

<http://www.zerotothree.org>
The Washington, D.C.-based child-advocacy group has just launched its Web site. On it: a wealth of research and information on physical, cognitive and social development of infants and toddlers.

On the Phone

Child Care Aware

800-424-2246

Operators refer parents anywhere in the country to licensed and accredited child-care centers in their area.

They'll also send, at no charge, an information packet on how to choose quality child care. Coordinated by the National Association of Child Care Resource and Referral Agencies. Weekdays, 9 a.m.-5 p.m. CST.

ChildHelp National Hotline

800-4-A-CHILD

Twenty-four-hour advice and referrals for children and adults with questions or in crisis. Staffers with graduate degrees in counseling field calls on issues ranging from child-abuse prevention to whether it's normal for a 3-year-old girl to try urinating while standing up. (Yes, says a hotline counselor, it is.)

Gerber Information Line

800-443-7237

Tipper Gore's recorded welcome message jolts you from thoughts of strained peas on this 24-hour consumer-info line (she reminds callers that doctors recommend having babies sleep on their backs). Moms, dads, grandparents—not nurses—work the phones, advising

callers on nonmedical essentials like diapering, sleeping and "lots and lots of questions about food," says one operator.

National Parent Information Network

800-533-4135

NPIN boasts the largest parenting database in the country. Researchers hunt down referrals, abstracts and answers—and send them free of charge—to hundreds of callers every month.

Trouble with toilet training, the merits of co-op playgroups vs. private preschools, baby bowel movements: absolutely nothing is out of bounds here. Weekdays, 8 a.m.-5 p.m. CST.

Parents Anonymous

909-621-6184 (not toll-free)

The national office in Claremont, Calif., refers parents to 45 state and regional affiliates, which offer support groups, counseling, referrals. Weekdays, 8 a.m.-4:30 p.m. PST.

Single Parents Association

800-704-2102

This line, which has just gone national, helps parents find support groups and resources in their communities, fields questions on parenting skills and reminds single parents that they're not alone. Weekdays, 9 a.m.-6 p.m. CST.

With T. TRENT GEGAN

Raising a Mom

A child's first few years of life are the key to whether you wind up with a darling or a delinquent. What may ultimately become empathy, generosity or charity stems initially from a child's selfish preoccupations.

BY DEBRA ROSENBERG

FIRST COMES HEALTH. "Doctor," every parent asks, "is my baby OK?" Then comes the harder part: "Will my child turn out to be good?" A child's first few years of life are the key to whether you wind up with a darling or a delinquent. What may ultimately become empathy, generosity or charity stems initially from a child's selfish preoccupations. Infants are unable to distinguish themselves from the rest of the world. That may be why newborns cry at the sound of other babies crying—they're not sure who's really hurting. This "reflexive crying" means that babies have the capacity to respond to others' distress—a primitive form of empathy. It also suggests that some morals are hard-wired from birth.

Scientists have long noted that empathetic parents tend to have empathetic children. One recent experiment on toddlers found that identical twins were more likely than fraternal twins to show similar inclinations to help people. Because identical twins share more genes, this is proof that nature, not just nurture, is at work, says Carolyn Zahn-Waxler, a psychologist at the National Institute of Mental Health (NIMH) and one of those who conducted the study. Researchers don't think there are "good" genes and "bad" genes. But they suspect that genes influence patterns of brain chemistry, which in turn govern some behaviors.

Still, genes are only part of the picture. It's up to parents to show their kids the ethical ropes. While newborns aren't likely to absorb long lectures, they can grasp many rules before they—or their parents—even realize it. Dr. Robert Coles, a Harvard

child psychiatrist and author of "The Moral Intelligence of Children," maintains that there are moral implications to nearly every decision a parent makes. "It's those everyday, minute-by-minute cues that the little ones pick up on," says Coles.

Rushing to the crib every time a child cries may train her to expect instant gratification. It doesn't do the harried parents any favors, either. Not only will they lose control of their lives while the child is an infant, but "it may be difficult for them to say no down the line," says Coles. Children who don't learn the meaning of the word "no" will be at the mercy of impulses and desires they don't know how to control. The result? Spoiled and demanding little tyrants. This isn't just a matter of discipline. "The child has to learn that there is a higher authority that you just don't question," Coles says.

Parents may be unintentionally sending signals from the start, or deliberately shaping the most crucial messages. In his book, Coles relates the story of Maisie, a woman whose 6-month-old son, Don, seemed to relish the act of tossing his empty bottle onto the kitchen floor. At first Maisie figured Don didn't know any better. But she quickly began to suspect he was enjoying the commotion. Maisie then waited by her son's highchair and, while distracting him with chatter, gently eased away the empty bottle. The boy soon lost interest in throwing it. What may seem like a clever mother's trick was actually an early lesson in morals. "That's a kind of moral awareness; it's learning the meaning of constraint," says Coles.

Most moral training doesn't have to be so calculated. Pat-a-cake and peekaboo look like innocent play, but the parent is in fact communicating complex sets of rules about

82% of all mothers and 74% of all fathers say they plan to send their child to Sunday school or some other kind of religious training

turn-taking and expectations. Learning to alternate coos or synchronize gazes with a parent prepares the baby for more intricate relationships later in life. "This is social reciprocity," says Dr. Robert Emde, a psychiatrist at the University of Colorado Health Sciences Center. This kind of give-and-take is at the heart of all moral systems. Put simply, it's the golden rule: do unto others as



you would have them do unto you. Babies who are cuddled and cared for—who aren't spoiled but have their emotional needs met—are more likely to demonstrate caring behavior later.

Children who go emotionally hungry in infancy may simply not have the biological wherewithal to be compassionate. Dr. Bruce Perry, a psychiatrist at Baylor Col-

lege of Medicine, studied brain scans of children who had been severely neglected. He discovered that the brain region responsible for emotional attachments never developed properly. According to Perry, babies who don't get their quota of TLC early in life may lack the proper wiring to form close relationships. Other research supports the theory. Bonnie Klimes-

Dougan, a psychologist at the NIMH, found that toddlers who'd been abused were themselves more likely to hit or insult a crying peer.

As infants learn to crawl and then to walk, the budding explorers grow familiar with how things look and where they belong. By the age of 2, kids have become sticklers for consistency and can't tolerate it when their own "rules" are violated. A toddler might become outraged, for example, if his mashed potatoes touch his peas. At the same time, children are constantly testing the boundaries of their new world. But they don't go it alone. By 18 months, kids will turn to Mom or Dad for guidance in unfamiliar situations. Experts call this "social referencing." In one study, Emde watched as toddlers glanced at their mothers' expressions, seeking tacit permission, before approaching a strange robot.

Social referencing helps children acquire the moral emotions of pride and shame. Pride is the celebration kids feel as a reward for "getting it right," says Emde. A big smile and a "puffed up" posture are telltale symptoms. Shame, on the other hand, occurs when kids form mental images of a disapproving parent. Ashamed children avert their eyes and try to shrink out of sight. That may not be all bad. "Shame is a part of growing up and developing a conscience," says Coles. It reinforces the notion that certain behavior—say, torturing the family pet—just isn't acceptable. Warns Coles: "If a child doesn't learn to be ashamed of that behavior, we're in real trouble by the age of 2 or 3."

As children learn to talk, parents can tutor them in positive behaviors, such as altruism and manners. By saying "Let's both of us say 'thank you,'" a parent sets a good example and includes the child in the behavior. Such joint efforts are more effective than direct commands. They also help instill a sense of belonging to a team, what Emde calls "an executive sense of we." By the time they are 2, even when they are alone, kids retain a sense of a parent guiding them. In one experiment, Emde tempted children to play with toys forbidden to them by their mothers. Remarkably, the toddlers resisted—even though their mothers were out of the room. "Didn't you hear my mommy? I better not play with those toys," one toddler said.

Just as children learn to imitate language and gestures, they also mimic the moral practices they see. Good role models help. Consider the effect on a toddler who hears his father say "Tell him I'm not here" when the boss calls at home. Showering a spouse with a chorus of "pleases" and "thank yous," on the other hand, will likely lead to a thoughtful tot. "Every day is a school day when it comes to moral development," says Coles. By doing their homework, parents can help their kids graduate with honors. ■

'Your Baby Has a Problem'

Three out of 100 newborns suffer birth defects. But more and more of them can now hope to lead normal lives.

By ROBINA RICCIHELLO
AND JERRY ADLER

THERE IS A PROBLEM," THE doctors say. But even before the words are out you've seen it in their eyes, sensed it in the way they peered at the baby as it struggled into life, bearing the mark of a moment when, in the twining dance of chromosomes that we call conception, something microscopic stuck or came undone. A problem. Two soft folds of tissue, groping toward one another in the darkness of the womb, failed to meet, somewhere in the three-dimensional complexities of the embryonic heart. Or the skein of nerves, spreading intricately from the bulb of the brain, left an unaccountable gap where no sensations flow, no muscles feel the impulse to move. And of all the things you might have wished for your child—wisdom or beauty or simple happiness—you are left forever after with one simple desire, a word that now embodies all your hope and longing: normal.

But these problems are a part of the human condition, exactly as prevalent now as they were when the United States began keeping detailed statistics in the 1960s, or for that matter in studies that go back to the 1890s: out of 100 babies, on average three are born with anomalies that will seriously affect their health. In one sense, this should be reassuring for expectant mothers who get nervous driving under electrical-power lines: while there is no doubt that drugs, ra-



Benjamin Ford Kriska (above and right), a Down syndrome child, attends preschool with normal kids

diation or industrial chemicals are capable of causing birth defects, these events are so rare as to be statistically negligible. (To the degree that birth defects are caused by environmental toxins, says Dr. Godfrey Oakley, head of the division of birth defects and developmental disabilities at the federal Centers for Disease Control, danger is more likely to be found in molds, vegetables or something else that has been with humanity for much longer than Alar or saccharin.) On the other hand, the great advances of the last 25 years in genetic science and embryology haven't done much to



bring the rate of birth defects down, either. Surprisingly little research has been done on birth defects specifically, as distinct from human genetics: it was just last year that the CDC committed a modest \$3 million to set up five centers to study the estimated 75 percent of birth defects whose causes remain a mystery.

Some problems are very well understood and can be prevented, although the prevention in some cases takes the form of an abortion. Abolishing fetal alco-

hol syndrome, which afflicts one baby in 1,000 with developmental problems, is as easy, and as difficult, as getting pregnant women to control their drinking. Four hundred micrograms daily of folic acid, taken before and during pregnancy, cuts by two thirds the risk of having a baby with neural-tube defects such as spina bifida, a crippling failure of the spinal cord to close. Yet "the best evidence we have is that only one out of four women is actually following that advice," Oakley says. One problem: the vitamin must be taken in the very first weeks after conception: starting only after a preg-



PHOTO BY AP/WIDEWORLD

in 20 years, to approximately two in 1,000 births. This is because doctors are now keeping alive many more very premature and low-weight babies, who are prone to brain damage from lack of oxygen at birth. Yet a recent study showed a virtual elimination of cerebral palsy in at-risk babies whose mothers received the drug magnesium sulfate, which appears to protect the brain against the toxic effects of oxygen deprivation. Thus the partial conquest of this crippling condition may yet be at hand, allowing for the fact that it can also be caused by lead poisoning, head injuries, encephalitis and probably several other things that we don't even know about yet.

But cerebral palsy is far from the worst problem a baby can be born with. The very worst things that can go wrong with an embryo are never encountered, because they are lethal long before birth, in some cases before the woman even knows she has conceived. By definition, a fetus born alive is a survivor, although sometimes the parents have no choice but to start mourning there and then. Babies born without brains (anencephaly) or with extra copies of chromosomes (trisomy) rarely live for more than a few days or weeks, except in some special cases, of which the best known is Down syndrome.

These conditions are rare, however. The most common lethal defects, although still accounting for only a fraction of 1 percent of all births, are malformations of the heart. Fortunately, these are problems that surgeons have learned to treat (chart). Few conditions are more devastating than hypoplastic left-heart syndrome, in which the main pumping chamber fails to develop, and as recently as 15 years ago it was invariably fatal. But a three-stage operation developed by Dr. William I. Norwood, in which the right ventricle is made to do the job of its undeveloped partner, now keeps some of these children alive, at least until they can receive a transplant. Transposition of the aorta and pulmonary artery, which results in the heart's recirculating unoxygenated blood out to the body, used to be fatal about 90 percent of the time, but now has a 90 percent survival rate after surgery. Advances such as these, plus better neonatal intensive care generally, have contributed to what Dr. Richard B. Johnston, medical

⊕ When Things Go Wrong: Birth Defects

Birth defects can arise from inherited genetic abnormalities as is the case with sickle cell anemia, from viruses such as those responsible for rubella, from poor prenatal care—or from reasons so mysterious they can only be labeled fate:

Most common birth defects*	Occurrence	Other birth defects	Occurrence
Congenital heart defects	1/110	Spina bifida	1/2,000
Narrow stomach/intestine junction	1/250	Cystic fibrosis	1/2,000**
Congenital hip dislocation	1/400	Fragile X syndrome	1/2,000††
Sickle cell anemia	1/400†	Congenital HIV infection	1/2,400
Cerebral palsy	1/500	Missing/underdeveloped limbs	1/2,500
Cleft lip/cleft palate	1/730	Duchenne muscular dystrophy	1/3,500***
Clubfoot	1/735	Anencephaly	1/8,000†††
Down syndrome	1/900	Congenital rubella syndrome	1/100,000
Fetal alcohol syndrome	1/1,000		
Hearing impairment	1/1,000		

*LIVE BIRTHS IN THE U.S. **BLACK BABIES. ***WHITE BABIES. ††MOSTLY BOYS. †††BOYS — OCCURS IN 12,000 TOTAL PREGNANCIES, BUT MANY ARE OFTEN STILLBORN OR ABORTED. SOURCE: THE MARCH OF DIMES, CENTERS FOR DISEASE CONTROL

nancy is confirmed may be too late. In the last four years, Oakley adds, there were more preventable birth defects resulting from folic-acid deficiency in the United States than in the infamous epidemic of thalidomide poisoning in Europe 40 years ago, when a drug prescribed to ease morning sickness turned out to cause babies to be born with flippers for arms and legs.

A more complicated case is that of cerebral palsy, a nerve disorder that can affect voluntary movements including walking, writing and speech. Many cases result from maternal infections during pregnancy, and when doctors began controlling these a generation ago they expected cerebral palsy to eventually disappear. Instead, the rate has increased by 20 percent

director of the March of Dimes, says is a 50 percent drop in deaths from birth defects since the 1960s.

Down syndrome in theory is completely preventable, in the sense that there is a reliable test for the extra chromosome known to be its cause, after which the pregnancy can be terminated. Of course, that's not a solution to everyone's taste, and around 10 percent of women who know their babies will be born with Down syndrome go on to have them anyway, says Dr. Barbara K. Burton, director of the genetics center at Columbia Michael Reese Hospital in Chicago. But even though the other 90 percent do have abortions, the number of Down syndrome babies born each year is not declining, because more women are becoming pregnant later in life, when the chance of having a Down syndrome child rises dramatically. Burton estimates that only 6 to 8 percent of pregnant mothers get the tests—

amniocentesis or chorionic villus sampling—that can detect the extra chromosome. Some of them may be put off by the slight risk of miscarriage, but a new test that may be available as early as next year promises to end that danger, according to Dr. Allen Horwitz of the University of Illinois College of Medicine. The procedure involves locating the infinitesimal quantity of fetal cells that cross the placenta into the mother's bloodstream, so only a sample of her blood would be required. "It's a way of finding samples of genes or chromosomes of the fetus without invading the uterus," says Horwitz.

And what of the mothers who have their babies anyway? A generation ago they would have been told that their child might never learn to speak, was certainly ineducable and probably should be sent to an institution—where, says David Patterson, president of the Eleanor Roosevelt

Institute (which promotes genetic research), life expectancy was around 9 years. Unnumbered thousands of children perished in neglect that way, before an astounding paradigm shift that began in the 1970s, with parents who insisted on taking their Down syndrome babies home with them. With adequate care, it turned out, Down syndrome children didn't have to die before the age of 10; life expectancy now is 58 and rising, according to Patterson. With someone willing to teach them, most could learn to read, and some, says Lori Atkins of the National Down Syndrome Society, even have driver's licenses. It is possible, in short, for a Down syndrome child to hold a job and live at least a version of the sort of life that every parent dreams of from the moment he or she hears the fateful news that a child has "a problem."

A normal life.

Finding a Web of Support

Online sites offer information and a sense of community

BY CARLA KOEHL

PARK BENCHES will always be great places to pick up parenting tips. So will back fences, doctors' offices and boardrooms. But for families of children with disabilities, all the chats in the world can't begin to provide the depth of information—and, often, the level of understanding and sympathy—that's available online. Which is why, for every major disorder and disease, it seems there's a Web site or online support group. It's also why some of the best Internet resources are created and maintained by the very parents who need them most.

Case in point: Portia Iversen. When her son, Dov, was diagnosed with autism at 21 months, Iversen feverishly hunted for information about the disease. "I would just spend all night going

on different neuroscience Web sites," she says. A relief? Sort of. Like so many mothers before her, she found it wasn't enough, especially for narrowing down the best research studies and finding the most plugged-in parents. So in November 1995, when Dov was 3½, the Los Angeles sitcom writer put her career on

hold to cofound **Cure Autism Now** with her husband, movie producer Jonathan Shestack. From CAN's Web site (<http://www.canfoundation.org/>), users can now get updates on research studies and grant proposals, and hyperlink to autism newsgroups.

Dozens of other top parent-created sites on everything from **Down syndrome** (<http://www.epix.net/~mccross/down-syn.html>), **Sturge-Weber syndrome** (<http://www.centex.net/~huntjul/index.html>) and **infantile Refsum's disease** (<http://www.pacifier.com/~mstephe/>) are connecting families to one another, going far beyond the fare offered in health sections of online services or even online parenting magazines. Along with **Parents Helping Parents** (<http://www.php.com/>) and the Usenet's hundreds of special-interest bulletin boards, they're creating a sense of community among families who—either because they live in remote areas or because they're coping with such rare diseases—would otherwise feel nothing but isolated.

Also keep in mind: some of the best sites are those whose sole purpose is to link users to as many different childhood-disability and disease pages as possible. **Internet Resources for Special Children** (<http://www.irsc.org/>) was created by Julio G. Ciamarra, whose son was born with cerebral palsy, epilepsy and moderate retardation. **Rare Genetic Diseases in Children** (<http://mcrcr4.med.nyu.edu/~murphp01/homenew/htm>) is maintained by staffers at the New York University Medical Center. **WellnessWeb** (<http://wellweb.com/index.htm>) pays such close attention to issues like treatment options, drug dosages and physician selection that it won a 1996 Best Site of the Year award from Net Magazine. Its **sickle cell anemia link** (<http://wellweb.com/index/qsickle.htm>) goes a lot further than other sickle cell sites to focus on the disease in African-American children. Another excellent site is the **National Institutes of Health** home page (<http://www.nih.gov>), where just typing "childhood" into the search engine field pulls up dozens of links to highly specialized research studies, including papers on acute lymphocytic leukemia. Try finding those on a park bench.

With JEANNE GORDON in Los Angeles



— An Internet Resource Gateway —
Double strand of hope: 'A Child's DNA Helix' marks a home page

Giving Infants a Helping Hand

Of course kids need hugs. But physical contact may also help preemies gain weight faster and healthy babies digest food better.

BY SARAH VAN BOVEN

IN BETWEEN CRUSADES AND IDEOLOGICAL battles with the pope, the Holy Roman Emperor Frederick II had time to conduct a little 13th-century-style child-development research. He removed a group of babies from their families and handed them over to nurses who attended only to their most basic needs—feeding but not holding them, bathing but not hugging them. Frederick wanted to learn what language the infants would speak if they never heard adults talk or sing a lullaby. He learned something else instead: the children all died. As one 13th-century historian explained, Frederick “laboured in vain ... For they could not live without the petting.”

Fortunately, scientists now do more compassionate research. But their work with fragile neonates and classrooms full of romping preschoolers points toward much the same conclusion: touch is vitally important to the development of healthy, happy children. Whether bolstering the immune system or simply increasing communication between parents and children, an extra dose of cuddling and massage appears to have many positive effects.

At the University of Miami's Touch Research Institute, director Tiffany Field can rattle off study after study on the effects of touch. Premature babies given daily massage gain 47 percent more weight and are discharged from hospitals six days earlier—at a savings of \$10,000 each in medical costs. Cocaine-addicted and HIV-infected newborns show lower levels of stress as well as better weight gain and motor skills with touch therapy. From colic to sleep disorders to hyperactivity, therapeutic touch seems beneficial. Says Field, “Most of us think touch only has psychological benefits, but it's actually an important stimulus to the central nervous system.”

This stimulus works in

91% of all parents say that they hug and cuddle their young child every day; **88%** say that they play with their child every day



Feel the power: In case parents need another excuse to cuddle a baby, science shows it's therapeutic, too

several ways. Biological psychologist Saul Schanberg of Duke University found that newborn rat pups failed to grow when taken away from their mothers. Without regular maternal licking, pups showed decreased levels of important growth hormones. But when a lab assistant imitated the tongue strokes with a wet paintbrush, hormone levels rose and the pups resumed growing. Similarly, studies have shown that touch therapy can also lead to weight gain in human babies. “The pressure stimulates a branch of a cranial nerve called the vegetative vagus,” says Field. “It activates the gastrointestinal tract, releasing hormones like insulin.” The higher insulin levels make food absorption more efficient—and babies can grow faster. According to Field, touch also decreases stress. Infants who receive massage show lower levels of the stress hormone cortisol in their urine—a hormone that

kills important immune cells at high levels.

Little 3-month-old Alexandra Reynolds doesn't know anything about cortisol levels. She just knows that she likes the strokes her mother. Tracy Reynolds, is practicing on her chubby arms and torso during an infant-massage class at New York City's 92nd Street Y. “At home I massage her after her bath, or when she's a little crabby, and she calms right down,” says Reynolds as Alexandra coos and waves her fists, never taking her eyes off her mother. An estimated 10,000 parents learned baby massage last year, says Mindy Zlotnick of the International Association of Infant Massage. The association considers massage a way for parents to get to know their babies' nonverbal cues, and for both to relax together. “I'm glad brain research is documenting the power of touch,” says Zlotnick. “But for parents who take my classes, the baby's reaction is all the proof they need.”

While Alexandra and her mother easily grasp the power of touch, the medical establishment isn't always quite as enthusiastic. Many doctors who heartily endorse the idea of extra hugs and back rubs stop short of prescribing regular massage for the purpose of helping babies to grow or re-

ducing their stress. After all, touch research is still a relatively new field. Cautions Dr. Neena Modi, a pediatrician at London's Hammersmith Hospital. “It is very correct for the medical establishment to be skeptical. We're only at the beginning stage of addressing basic research questions.” Still, more and more neonatal ICUs like those at Presbyterian Hospital in Dallas and the University of New Mexico Hospital in Albuquerque are beginning to utilize touch therapy, and the popularity of parental infant massage continues to grow. And if it doesn't accomplish anything else, touch research certainly gives parents a good justification for extra hugs and kisses.

Schanberg still laughs when he recalls his elderly grandmother's reaction to his discovery of a link between touch and growth. “She said, ‘You went to Yale to get a Ph.D. and to get an M.D., and that's what you've learned? To touch a baby is good?’ I told her, ‘Grandma, sometimes science is slow.’” But after seven centuries, at least science is catching up with Frederick II. ■

Cultivating the Mind

Children come preprogrammed to learn. How can parents help? Be patient, keep talking and soon you will hear those magic words: Dada, can I borrow the car?

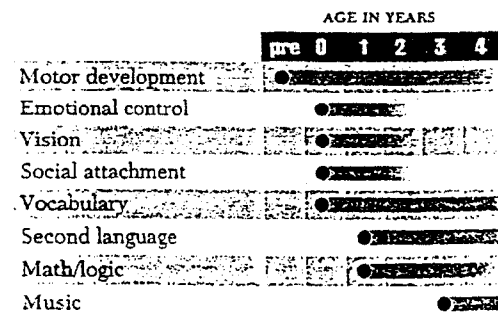
The Baby's Brain ...

When a baby is born, primitive structures in the brain—those controlling respiration, reflexes and heartbeat—are already wired. But in higher regions of the cortex, neural circuits are rudimentary at best: the vast majority of the 1,000 trillion connections (synapses) that the newborn's billions of neurons will eventually make are therefore determined by early experience.

Connections that are reinforced by a baby's exposure to language, images, sounds, facial expressions and even lessons in cause and effect (Baby smiles. Mommy smiles back) become permanent. Tentative connections that are not reinforced by early experience are eliminated. To maintain such a large number of connections requires so much metabolic energy that a child's brain consumes twice the energy of an adult's. And because no two babies have the same experiences, no two brains are wired the same.

The Windows of Opportunity

Circuits in different regions of the brain mature at different times. As a result, different circuits are most sensitive to life's experiences at different ages. What a child is best able to learn when:



0-2 months old

1 month old

Language Small throaty sounds may turn into cooing by end of first month. Responds to voices.
Memory Some babies may start to expect feedings at regular intervals.
Fun Use simple, lively phrases and address baby by name.

2 months old

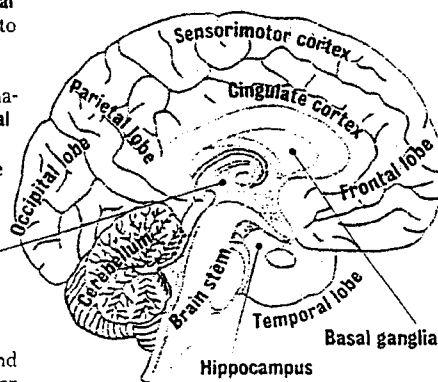
Awareness Begins to make simple associations—if he cries, he gets picked up. Awareness of outside stimuli increases.
Language Communicates mainly by crying. Grunting noises sound more vowel-like, such as "ooh-ooh" and "ahh-ahh."

... is Greater Than the Sum of Its Parts

Active from the second or third month, the **parietal lobe** allows child to recognize objects and have better eye-hand coordination. The **temporal lobe** assists with hearing, language and smell.

The **cerebellum** controls a newborn's balance and muscle tone. Later this large region of the brain coordinates motor, sensory and other functions.

Divided into four lobes, the **cerebrum** represents 70 percent of the central nervous system. A person's ability to remember, feel and think depends on this region.



The **brain stem** controls the necessary functions of the body, such as breathing, circulation, heartbeat and reflexes. It is one of four regions of the brain already completely wired at birth.

Along with the **sensorimotor cortex**, the **thalamus** regulates a newborn's basic movement and is already wired at birth. The **cingulate cortex**, **hippocampus** and **basal ganglia** are also just about fully formed and control basic functions.

The **frontal lobe** develops gradually at the end of the first year. It coincides with the arrival of higher cognitive abilities such as reasoning and speech.

3-8 months old

3 months old

Awareness May respond to mirror image by smiling. Stops sucking to listen to parent's voice.
Language Whimpers, squeals, chuckles, gurgles at back of throat. Stimulated to make sounds by hearing others talk.

4 months old

Awareness May sense strange places or people.
Language May babble routinely to himself or to others. May raise voice as if asking a question.
Memory Distinguishes who's who in his life. May recognize mother in a group of people.
Fun Engage child in face-to-face talk. Mimic his sounds to show interest.

5 months old

Awareness May drop object just to watch parent pick it up. Looks at where object falls from and where it lands on the floor.
Language Watches mouths intently and tries to imitate inflections. May start to utter consonant sounds like "m" and "b."
Memory May anticipate a whole object after seeing only part of it.

6 months old

Awareness May perceive cause and effect; wave the rattle and it makes a noise.
Language Learns to make new sounds by changing shape of mouth.
Fun Try to phase out baby talk and use more adult language around child.

7 months old

Awareness May sort toys like blocks by size.
Language May make several sounds in one breath. Recognizes different tones and inflections.
Memory Improves memory by playing hiding games and by observing the comings and goings of others. Remembers that a jack-in-the-box pops up at the end of a song.

8 months old

Awareness Starts to imitate a broader range of sounds. Responds to familiar noises by turning head and torso.
Memory Remembers how to respond to specific phrases: raises his arms when he hears "so big."

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Babies understand more than they can say at first, so don't be discouraged if your child's first words take time. Speak to your child constantly. During the second year, a toddler discovers that everything has a name, and vocabulary explodes:

Age	Average number of words
12 months	3
18 months	22
2 years	272
3 years	696

Age	Sounds mastered
4-7 months	First language-like sounds: "eee-eee," "ooo-ooo"
7-9 months	First well-formed syllables: "ma-ma," "da-da"
9-12 months	Melodic babbling
Around 12 months	First words
15-20 months	First word combinations
Around 2 years	First sentences

9-16 months old

9 months old

Awareness May respond to his name and other words, like "no." Listens intently to conversations. May say "ma-ma" and "da-da." Likes to imitate coughs. **Memory** Notices when someone leaves room and anticipates their return.

10 months old

Awareness May be able to determine heights and edges of objects. **Language** Adds gestures to words: waves when saying "bye-bye" or shakes his head while saying "no."

11 months old

Awareness Imitates word sounds as well as actions. Learns the meaning of words by hearing them used in different situations.

Memory Games like peekaboo and pat-a-cake stimulate baby's memory skills.

12 months old

Awareness May babble short sentences that only he understands. Shows more control over intonation and inflection. May say two to eight words like "bow-wow" or "hi."

13 months old

Awareness By imitating adult actions, she learns that objects have functions. Uses toy telephone like a real phone. **Language** May not say full words yet but gestures to complete idea. Says "ba" and points to ball.

14 months old

Awareness Understands that she can make things happen by her actions. **Language** Enjoys rhymes and jingles. Expresses needs mainly through gestures: brings books to parent to read.

15 months old

Language May follow simple commands like "come here." Points to familiar objects when requested. Recognizes names of major body parts. **Tips** Develop associations by giving word labels to everyday objects and activities.

16 months old

Language May say six or seven words clearly. Enjoys word games and singing songs like "Pop Goes the Weasel."

Stimulating Solutions

Holding a child's interest for more than two minutes can be a challenge, but there's no need to dash to the toy store for a cure. Some of the best learning tools are right in your house:

Socks: Teach colors by sorting socks with child. **Fabrics/materials:** Stimulate baby's touch with materials like fur, tissue, felt and sandpaper.

Old magazines: Test memory by asking baby to point out familiar objects like animals and food.

Stairs: Practice counting when climbing with child.

17-24 months old

17 months old

Language May start to use words to express needs: says "up" to be held. Enjoys pointing at pictures in books. May understand more words than can say. **Tips** Speak slowly and give child time to respond.

18 months old

Awareness May grasp the idea of "now." **Language** Vocabulary explodes. Child starts learning as many as 12 words a day. "No" is chief word. Points to own body parts or to pieces of clothing when asked. May refer to self by name. **Tips** Asking child simple questions stimulates decision-making process.

19 months old

Awareness May be aware of cause and effect but not of potential dangers. Realizes doors open and shut, but may not know to keep hands from getting caught. **Language** Focuses on words and objects that are central to her life.

20 months old

Language Near end of second year, she learns that everything has a name and constantly asks, "What's that?" May combine two words like "all gone." **Memory** May be able to recall a familiar object or person without seeing or touching it. **Tips** Do not pressure a child to speak. Acknowledge her body language but let child hear the words that complement the gesture.

21 months old

Awareness Improving memory skills may allow child to make right associations. Matches shoes with the correct family member. **Tips** Explain safety in simple terms. Feeling the heat from a stove teaches the meaning and danger of "hot" objects.

22 months old

Awareness Recognizes when a picture book is upside down. Learns to turn pages one at a time. **Language** Enjoys listening to simple stories. May take the lead in conversations and use words to express feelings or ideas.

23 months old

Language May use words to express frustration or anger. At times, still relies on facial expressions or an occasional scream to communicate feelings. **Memory** May follow simple directions, but attention span is fleeting. **Tips** Have genuine two-way conversations with child. Try not to respond with "uh-huh." A child will recognize when you are not listening.

24 months old

Language By end of second year, some children may have a vocabulary of more than 200 words. Mimics adult inflections and actions. **Memory** May grasp meaning of "soon" and "after dinner..." but has limited knowledge of days and time.

2-3 years old

25-29 months old

Awareness Starts to solve problems in his head. May understand number concepts like ordination (one dog, two dogs) and the process of classification (a cat is an animal).

Language Vocabulary grows rapidly and child starts combining nouns with verbs to form three- to four-word sentences.

Begins to use pronouns, such as "I" and "me," and other parts of speech. May begin to ask "why" questions. Pays attention to what others say, whether to him or to someone else. **Tips** To keep his attention, choose books that encourage touching and pointing to objects.

30-35 months old

Awareness Understands relationship between objects. May sort out toys by shapes and colors. By the age of 3, has very one-sided reasoning and still cannot see an issue from two angles.

Language May grasp two- or three-part command. Can follow story line and remembers many ideas presented in books. May correctly name colors. **Memory** Becomes more focused on activities like reading and drawing. May tell people his age but has no sense of the length of a year.

Tips Do not expect child to use perfect diction. If he stutters, set an example by talking calmly and correctly. Slow down speech and try not to draw attention to his difficulties. Help child use words to describe emotions.

By JENNIFER LACH

SOURCES: "THE EARLY CHILDHOOD YEARS: THE 2 TO 6 YEAR OLD," "THE SECOND TWELVE MONTHS OF LIFE" AND "THE FIRST TWELVE MONTHS OF LIFE" BY THERESA AND FRANK CAPLAN; "CARING FOR YOUR BABY AND YOUNG CHILD" BY STEVEN P. SHELTON, M.D.; "YOUR BABY & CHILD" BY PENILOPE LEACH; "THE BABY BOOK" BY WILLIAM SEARS, M.D., AND MARTHA SEARS, R.N.; PARENTS AS TEACHERS NATIONAL CENTER, INC.; HARRY T. CHUGANI, M.D., WAYNE STATE UNIVERSITY'S CHILDREN'S HOSPITAL; DORLING KINDERSLEY'S "ULTIMATE VISUAL DICTIONARY"

Teaching nursery school is not about formal lessons.
It's about listening and guiding, helping little children
to make sense of the big world they're entering.

The New Preschool

BY LYNNE HANCOCK
AND PAT WINGERT

LISTEN TO THE SNAP, crackle, pop of baby neurons. Teacher Martha Rodriguez crouches near the 2-year-old sand diggers at Manhattan's Bank Street Family Center, gently negotiating the rights to a suddenly special yellow rake. As Rodriguez bargains, the toddlers spin new connections to the brain area that controls "gimme now" impulses, connections that could very well later be used to ratchet up their SAT scores or their job-interviewing skills. Head teacher Lisa Farrell explains that the doll in Cammy's hot grip is really Caroline's from home, hence her classmate's avalanche of tears. Cammy's brain is wiring up to read other people's feelings, a skill she'll need to navigate through future relationships. A third teacher leads the diaper-dependent kids, one by one, to the changing table, exchanging coo for coo, babble for babble. Each child's neural circuits are carving highways in the brain where future vocabulary words will later travel with ease.

In the "superbaby" '80s, the preschool debate centered on how soon was too soon for children to be coached in the ABCs or one-two-threes. Now the discussion has become more about nurturing neurons, less about drilling for facts. Brain research underscores what educators have long argued: early social and emotional experiences are the seeds of human intelligence. Time spent flipping flashcards—at the age of 1 or 3—is precious time wasted. Instead, teachers need

to tune in to each child's daily experiences and needs, helping them feel safe and loved while encouraging them to explore and experiment. "Children are born hard-wired," says Sue Bredekamp of the National Association for the Education of Young Children. "Experience provides the software."

Is this nation's haphazard collection of nurseries and day-care centers—which accommodate nearly half the 15 million infants and toddlers whose parents are working—up to such a task? According to a 1995 national study conducted by the University of Colorado Economics Department, the answer is clearly no. Many programs are unlicensed. Most are staffed with untrained, poorly paid adults. Ninety-one percent don't have basic toys, books, hygiene or enough adults to respond to each child. A full 40 percent are downright hazardous, both to a child's health and safety as well as to her social and intellectual development.

33% of all parents say that they plan to start sending their child to school by the age of 3; an additional **30%** say their child will start by age 4

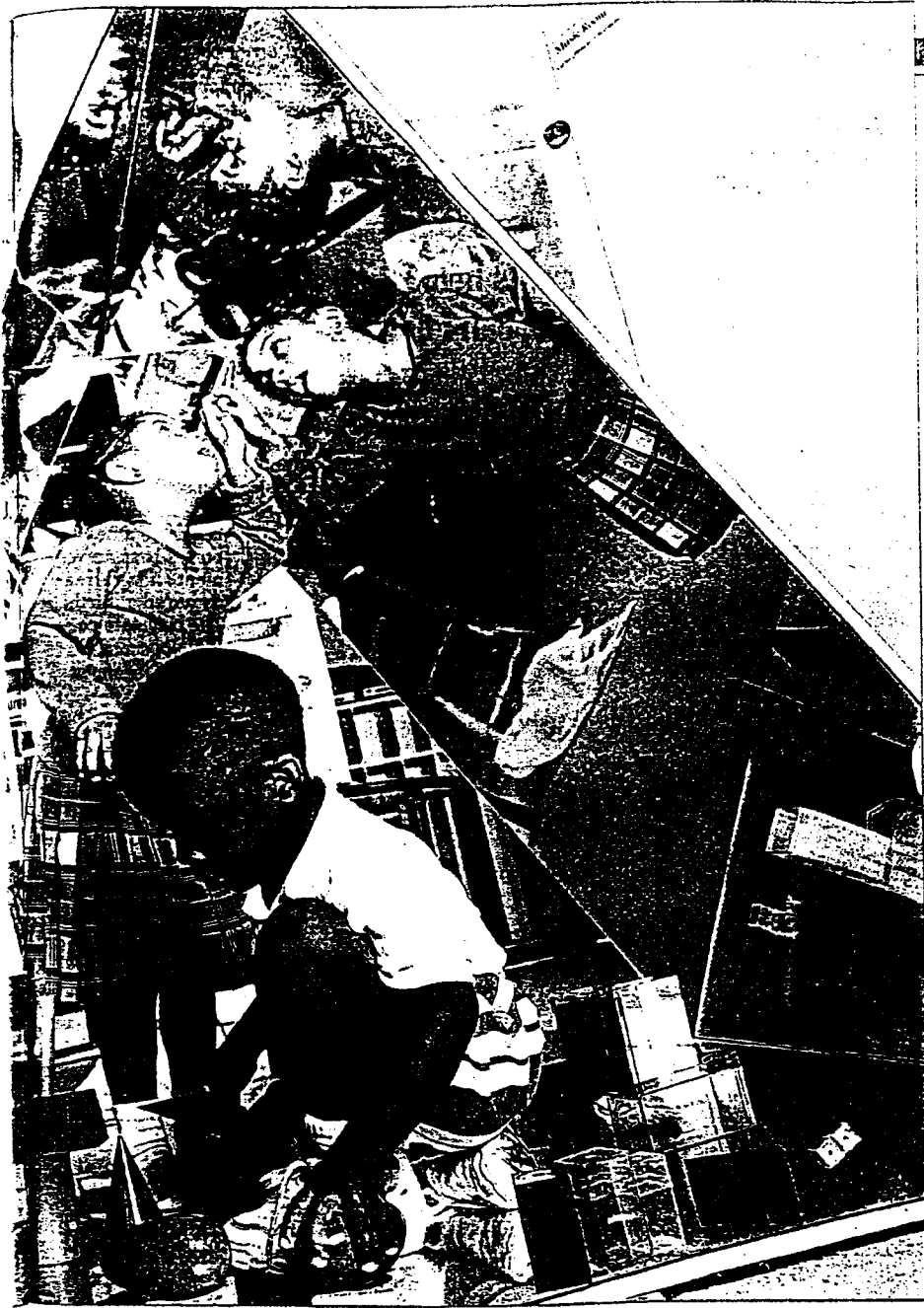
The formula for preschool success mirrors a child's upbringing in a good home. Whether in pricey private preschools or Head Start-like programs, American educators agree on the simple elements that add up to quality: one trained, well-paid teacher assigned to every three to four infants or half-dozen toddlers; safe, stimulating surroundings and strong ties between staff and families, so children know there is loving continuity in their lives. This is neuroscience, not rocket science. The well-regarded Bank Street Family Center, for children 6 months to 4 years, has been perfecting this family-friendly formula for nearly three decades. There is no Mozart



KATHLEEN FAUBERT

training, no foreign-language tapes, no work sheets to ponder. Instead, its unassuming rooms are filled with big, lumpy armchairs for reading, a kitchen for cooking, tables for drawing, blocks for building forts, stairs for building muscles. Children (about 12 per class) are free to visit other classrooms, as they would go from bedroom to den at home.

Education at this age is not about imparting facts and imposing strict schedules. It's about listening, guiding, helping individual children to make sense of the real world. The "curriculum" is learning to say goodbye to Mom, forming relationships to others, feeling competent exploring their world. With these emotional skills rein-



dren under 3 only has 22,000 slots for 2.9 million eligible children. With federal welfare reform pushing more mothers of young children into the work force, demand is expected to reach record levels. More parents will have to patch together a makeshift sitter system. "There is too much freelancing with these kids already," says Ron Lally, director of the Center for Child and Family Studies in San Francisco.

Although some child-development experts believe the best solution would be for more parents to stay home with young kids, that clearly isn't a reality for many families, especially since many women bring home half the family income. Unlike families in Germany or Sweden, American parents do not receive government subsidies to replace one parent's paycheck. Instead, we rely on the kindness of strangers. "We require licenses for beauticians and caterers," says Sharon Lynn Kagan, author of "Reinventing Early Care and Education." "It's ludicrous that we don't require licenses for child-care workers."

Licenses will not rescue Washington, D.C.'s Model Early Learning Center, home away from home to 20 children and their pudgy cat, Coco. The richly outfitted preschool, modeled after the pioneering Reggio Emilia nurseries in northern Italy, has served some of the capital's poorest children for the past four years. But last year local public funding shriveled, and the school may close in June.

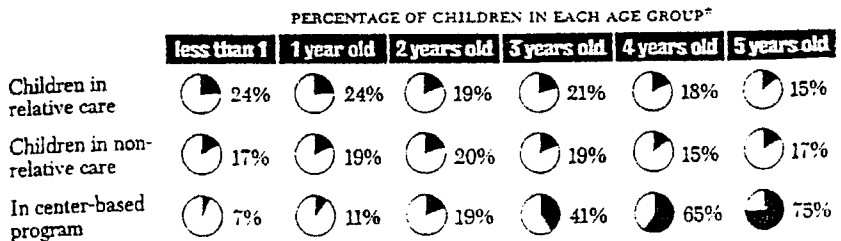
Still, the Model Center children go about their projects, oblivious to the school's fate. A small group recently hatched a plan for a "flying machine" for the peripatetic Coco. The cat's contraption would have a magic button to convert it into a submarine, and wings made of dried leaves and feathers. Whether or not this ambitious plan is ever completed, it already has produced enough brainstorming to electrify the minds of its young designers. These tots are wired for ideas, the ultimate head start. ■

forced, says director Margot Hammond, reading, writing and physics will come more easily when kids are ready. And, since children's brains are so malleable at this age, supportive care can even repair neurological damage created by depressed, distracted or abusive parents. Heavy doses of love, attention and proper signaling between caregiver and toddler forge new connections.

Parents are known to scramble for a spot on Bank Street's lengthy waiting list while their children are still in utero. They start saving then, too: tuition is \$16,000 a year for an all-day program. The vast majority of families can't afford such sticker prices. The new Early Head Start for chil-

Who's Watching the Kids?

Parents rely on relatives or paid sitters to help mind even their smallest children. With 1-year-olds, 50 percent of families use some nonparental arrangement. By the time they are 5, just 16 percent of children are watched only by their parents.



*COLUMNS DO NOT ADD UP TO 100 BECAUSE SOME CHILDREN PARTICIPATED IN MORE THAN ONE TYPE OF DAY CARE. SOURCE: U.S. DEPARTMENT OF EDUCATION, NATIONAL CENTER FOR EDUCATION STATISTICS

When a Child's Silence Isn't Golden

Some toddlers don't say a word. Should their parents simply be patient—or send them to 'speech-language' therapy?

BY CLAUDIA KALB
AND TESSA NAMUTH

MALINDA Boyd is increasingly worried about her 18-month-old son, Ryan. At 15 months, Ryan said absolutely nothing. Now he has a handful of words—"mama," "dada," "duck," "ball"—but far fewer than the norm for his age. Ryan's pediatrician has suggested that he be tested for a speech delay, but Boyd has resisted, concerned that her son will be labeled developmentally impaired simply because he's not talking as much as his playmates. "I think he'll talk when he's ready," she says. "You've got to give kids a little room to grow and be themselves."

Not long ago, giving children like Ryan a little room would have been routine. Parents of 2-year-olds who were barely saying single words, let alone simple two-word sentences, were reassured that the child would "outgrow it." Speech therapy was reserved for severely disabled children, such as those with autism or cerebral palsy. But today toddlers who have what developmental specialists call "expressive language delay" are at the center of a heated debate over whether they need speech therapy. Research has shown that early speech and language disorders can lead to later difficulties learning to read, write and spell. As a result, some pediatricians and preschools have abandoned the wait-and-see attitudes and are recommending intervention for children whose language development raises red flags (page 21). "Now if we see a child faltering at all," says Jean Mandelbaum, director of All Souls, a Manhattan nursery school, "we recommend an evaluation." But others see speech-language ther-



Speech work: Joe Riccardo, 3; New York therapist Sima Gerber

apy as unwarranted treatment for a problem that will likely clear up on its own. "It can get them talking a lot faster," says Grover Whitehurst, a specialist in language delays, "but after a couple of years you can't tell the difference between kids who had early intervention and kids who did not."

No one knows why children like Ryan (the majority of late talkers are boys) don't speak. "It's often a big mystery," says Patricia Walsh Kaye, a Manhattan speech-language pathologist. Hearing is an obvious suspect: even mild loss from ear infections can slow comprehension and thus the ability to speak. High-risk pregnancies involving

drugs or alcohol interfere with normal brain development. Environment may play a role, too: some children do not speak because nobody speaks to them.

For parents, the mystery is less what caused the problem than how to know when it's serious. There can be huge variability in speech and language development. By 18 months most children have a vocabulary of about 20 words. By 2 they're forming two-word sentences ("Mommy juice"). What if the child is nowhere close to passing these milestones? If she shows good comprehension and uses gestures to communicate, she is probably still on target for language development, lack of words notwithstanding. Talking will almost certainly come soon. Doctors' real concern centers on toddlers who do not understand simple questions or instructions.

Proponents of early intervention worry that kids who appear to be just delayed speakers may end up having more severe speech and language problems later. They're also concerned that toddlers who are frustrated at not being able to express themselves could develop behavior problems. Denying treatment, they say, is not the answer. "I'd rather err on the side of putting a kid in therapy who might outgrow it," says Pamela Rollins of the Callier Center for Communication Disorders in Dallas, Texas.

Not all would agree. It is difficult to tell, argue researchers, whether in the long run speech therapy actively helps or simply goes along for the developmental ride. One speech and language specialist, Rhea Paul at Portland State University in

Oregon, found that of children under 2 who were not talking, about two thirds showed continued delays at 3. At 4, half did. But by kindergarten 75 percent of the children had caught up with their peers, scoring within the normal range—albeit at the low end—for language expression. "They are making slow progress all along," says Paul. "It's likely they will be able to function more or less OK by the time they get to kindergarten—even without intervention."

The debate is far from over. In the meantime, Malinda Boyd is hoping Ryan will outgrow his problem—and that soon enough he'll be talking her ear off. ■

Turning On the Motor

Babies start their engines at the same time, but some may be crawling while others are tottering across the room. No matter what speed, they all cross the finish line.

➤ Growing Up, Step by Step

As any parent can attest, children grow at their own pace. Some babies walk at eight months, others start at fifteen months. Some speak at a year, others a few months later. The step-by-step graphics throughout this issue, like the one below, track an average child's development from zero to three. Please consider them a guide, not a dictum.

AGE (IN MOS.) ACHIEVED BY PERCENTAGE OF CHILDREN

	50%	75%	90%
On back: turns head freely from side to side, head centered most of the time	2	2½	3
On stomach: lifts head strongly, face straight ahead	2	2½	3½
Rolls completely over: any direction	2½	3½	4½
On stomach: raises head and chest, supporting self on forearms or arms	3	3½	4½
Sitting, supported: holds head erect and steady	3	3½	4½
Sits alone for 30 seconds or more	6	7	8
Pulls self to stand by furniture	7	9	10
Prewalking progression: creeping on hands and knees or hands and feet: sit-and-hitch	7	10	11
Gets from lying to sitting without aid	8	9½	11
Stands alone: 10 seconds or more	10½	13	14
Walks well alone	12	13½	14

0-2 months old

1 month old

Gross motor: Jerky movement smoothens as nervous system and muscle control improve. Most actions are reflexive, like sucking and bringing closed fists up to his mouth. Thrusts arms and legs. Head flops backward if unsupported.

2 months old

Fine motor: Opens and closes hands carefully. May hold object for a few moments.
Gross motor: Legs start to straighten from inward-curving newborn position. Struggles to raise head. Some reflexes fade near month's end.

4 months old

Fine motor: Reaches with arms. Clenches rattle and puts it in mouth.
Gross motor: May learn how to shift weight from side to side and flip over. Upper body and arms strengthen; child may sit up with support. Often leans for balance.

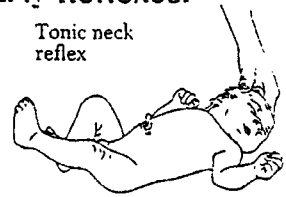
⊕ En Garde! Fencing and Other Early Reflexes.

Primitive reflexes dominate a newborn's movement. Place a nipple in his mouth and he will automatically suck. During the first year, reflexes fade and are replaced with intentional actions:

Moro reflex

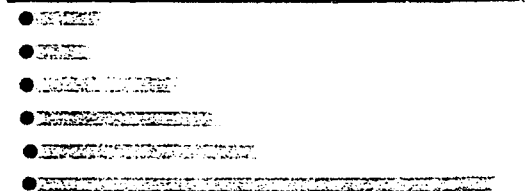


Tonic neck reflex



AGE (IN MONTHS) WHEN REFLEX DISAPPEARS

0	1	2	3	4	5	6	7	8	9	10	11	12
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Moro reflex: When startled, throws arms and legs out and extends neck.

Walking/stepping reflex: When soles touch a flat surface, places one foot in front of the other.

Rooting: When stroked on cheek, turns head toward hand in search of food.

Tonic neck reflex: When head is turned to one side, arm on same side straightens while the

Palmar grasp: When hand is stroked, immediately grabs finger.

Plantar grasp: When sole of foot is touched, foot flexes and toes curl.

Rooting: When stroked on cheek, turns head toward hand in search of food.
Tonic neck (fencing) reflex: When head is turned to one side, arm on same side straightens while the

opposite arm bends.

Palmar grasp: When hand is stroked, immediately grabs finger.

Plantar grasp: When sole of foot is touched, foot flexes and toes curl.

3-8 months old

3 months old

Fine motor: May swipe at dangling objects. Should move both arms equally well when lying on back.
Gross motor: Pushes down on legs when standing on firm surface. Learns to bounce. May raise head and chest when lying on stomach. Kicks gain force, as flexibility in hip and knee joints develop.

5 months old

Fine motor: May swap object from hand to hand. May hold bottle.
Gross motor: Developing better control of trunk, head and neck. Raises head and holds it up while lying on stomach. May also rock like an airplane. Grabs feet and brings them to mouth when resting on back.

7 months old

Fine motor: Clasps hands and enjoys banging objects together. May grab for a toy with one hand.
Gross motor: Supports entire weight on legs; likes to bounce. Sits with light support from pillows. Pivots when sitting to reach objects. May get into sitting position by pushing up on arms.

6 months old

Fine motor: Reaches out when sitting, often in a raking motion.
Gross motor: Rolls over in both directions. Maintains balance while sitting due to stronger abdominal and back muscles. May move forward on stomach, pushing with legs.

8 months old

Fine motor: Learns to open fingers at will and drop or throw objects.
Gross motor: Coordination improves, and child may start to crawl, often pushing backward at first. Some babies scoot across the room on their bottoms instead of crawling.

• In b daily and be p seen

• P bac leg we • P stor enc to l • L bla for me rea • F rrig ing

9

9

co ou pe wt wi of be tu h d

C

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C

F o a a C a c e v a



In between feeding and sleeping, babies need a daily dose of exercise to strengthen their muscles and improve coordination. Workout time should be playful and relaxed; stop immediately if baby seems distressed:

Birth-1 year

- Put baby on back, rotate legs as if he were pedaling.
- Place child on stomach to encourage him to lift his head.
- Lay baby on a blanket on the floor so he can move body and reach for toys.
- Hold baby upright, supporting his weight.

1-2 years old

- Practice kicking with balls.
- Make simple obstacle courses to improve coordination.
- Play follow the leader together.
- Help child move along monkey bars, climb up slides.
- Let child push stroller.
- Climb stairs by holding hands.

2-3 years old

- Teach child how to pedal and maneuver tricycle.
- Throw balls into large basket to improve aim.
- Practice balance by walking on tiptoe and standing on one leg.
- Play simple game of Simon says.

9-16 months old

9 months old

Fine motor Puts objects in containers then takes them out. May finger holes on a pegboard and enjoy toys with moving parts like wheels or levers.

Gross motor Near the end of the first year, baby may begin to pull up on furniture and stand. Learns how to bend knees and sit down after standing.

10 months old

Fine motor May hold crayon and try to scribble. Intrigued by tiny things.

Gross motor May walk while holding on to furniture. May let go momentarily and stand without support. Sits confidently.

11 months old

Fine motor Likes to turn pages, often not one by one. Fascinated by hinges and may swing door back and forth.

12 months old

Gross motor Children walk at about their first birthday, although some start earlier or later. First steps will be shaky; stumbles, and an occasional bump, are very likely.

15 months old

Fine motor Points with index finger. Accurately picks up small objects with thumb and index finger.

Gross motor May walk with feet wide apart, toes pointing out. Uses arms for balance when walking.

14 months old

Fine motor Holds two or three objects in one hand. Turns containers over to dump contents.

Gross motor May stoop to pick up toy and carry it across the room.

15 months old

Fine motor Builds small towers of blocks and then knocks them down.

Gross motor Climbs stairs on hands and knees; descends by crawling and sliding. Pushes or pulls a toy while walking.

16 months old

Fine motor Puts round peg into correct hole. Tries to fit things inside each other.

Gross motor May try to kick ball but steps on it instead. Walks sideways and backwards. Quickens pace when excited or being chased.

Learning Motor Lingo

Open a parenting book and you may feel you need a translator to understand what you're reading. A few key motor terms, deciphered:

Combat crawling: Uses only arms to push forward on stomach.

Creeping: Moves on stomach by pushing with feet and steering with outstretched arms.

Gruising: Walks while holding on to furniture.

Pincer grasp: Picks up objects with thumb and index finger.

Raking: Reaches out and grabs many objects.

17-24 months old

17 months old

Fine motor May roll ball to others and pick up objects in motion. Throws balls. Drinks regularly from cup.

Gross motor Has more control over stopping and turning when she walks. Likes to push carriage, rather than sit in it.

18 months old

Fine motor Sorts many shapes and drops them in matching holes. Takes toy apart and puts it back together. Unzips zippers.

Gross motor Keeps feet closer together when walking; gait becomes much smoother. May walk up stairs with parents.

19 months old

Fine motor May stack three or four blocks. Loves to inspect new objects and places. Tries to climb out of bed. May take off socks and shoes.

Gross motor Active and adventuresome throughout the day. Walks, climbs, trots and runs whenever possible.

20 months old

Fine motor Throws ball overhand instead of tossing it.

Gross motor May kick ball without falling or tripping. Likes to hang from bars by her hands. May climb onto an adult-size chair, pivot around and sit down. Running may look stiff; child may have trouble stopping and maneuvering corners while running. Tries to jump with both feet, but may not get off the ground.

21 months old

Fine motor May turn pages one at a time. Enjoys finger painting and scribbling with big crayons. Loves to inspect tiny objects, especially bugs. Shows hand preference.

Gross motor Looks down to dodge obstacles while walking. May walk up stairs, holding on to rail, both feet on one step.

22 months old

Fine motor May put on shoes but often on the wrong foot. Tries to buckle car seat belt.

Gross motor Alternates easily between walking and running, sitting and standing. Likes to be pushed on a swing and enjoys other playground activities.

23 months old

Fine motor Likes to play with clay. May draw a crude circle if shown how.

Gross motor Shows greater coordination in movement. Often runs rather than walks. Can seat self at table and climb into car seat on own. May throw ball into a basket.

24 months old

Gross motor Moves with greater efficiency by end of second year. Child is sturdier on feet and less likely to fall. Some toddlers may walk up and down stairs by themselves; others may feel more comfortable crawling on steps. May enjoy dancing to music and learns how to move according to tempo.

2-3 years old

25-26 months old

Fine motor Child learns to coordinate movements of his wrist, fingers and palm. May unscrew lids, turn knobs, unwrap paper.

Gross motor Constantly on the move. Loves to be chased. Enjoys going down slides, swinging and running around playgrounds. May pedal small tricycle. Learns to walk on tiptoe and may be able to stand on one foot. May count stairs and jump off the final step. Jumping in place still takes great effort and coordination.

30-36 months old

Fine motor Learns how to hold a pencil in writing position. Loves to draw with chalk and crayons. Imitates vertical and horizontal strokes, but may have difficulty making a cross with two lines. May use small scissors with parent supervision. Rotates jigsaw pieces and completes a simple puzzle. By the age of 3, child will have enough muscle coordination to play a simple musical instrument.

Gross motor Walking becomes more adultlike with a heel-to-toe gait. Likes to try out new types of movement like galloping and trotting. May alternate feet when going up stairs. Capable of multiple actions when moving. May throw a ball while running or eat ice cream while walking. Bends over easily without falling. Kicks ball in an intended direction. May hit a baseball if it's placed on a stand. Pedals and steers a tricycle well.

By JENNIFER LACH

SOURCES: "THE EARLY CHILDHOOD YEARS: THE 2 TO 6 YEAR OLD," "THE SECOND TWELVE MONTHS OF LIFE" AND "THE FIRST TWELVE MONTHS OF LIFE" BY THERESA AND FRANK CAPLAN; "CARING FOR YOUR BABY AND 'YOUNG CHILD'" BY STEVEN P. SHELOV, M.D.; "YOUR BABY & CHILD" BY PENELOPE LEACH; PARENTS AS TEACHERS NATIONAL CENTER, INC.; GROWING CHILD: INFANT REFLEX ILLUSTRATIONS BASED ON DRAWINGS BY WENDY WRAY

The Language

BY GEOFFREY COWLEY

BARRY IS A PIXIE-FACED 3-YEAR-OLD WHO CAN'T yet draw a circle or stack his blocks in a simple pattern. There is little chance he will ever live independently. He may never learn to tie his own shoes. Yet Barry is as chatty and engaging a person as you could ever hope to meet. He knows his preschool classmates—and their parents—by name. When he wakes his mom in the morning, he strokes her cheek and tells her how beautiful she is. Then he asks her how she slept. Barry has Williams syndrome, a rare congenital disorder caused by abnormalities on chromosome 7. Children with the condition share an array of distinctive traits, including weak hearts, elfin faces and extremely low IQs. But they're unusually sociable, and often display an extraordinary feeling for language. Ask a Williams child to name an animal, says Dr. Ursula Bellugi of the Salk Institute's Laboratory for Cognitive Neuroscience, and you may get a fanciful discourse on yaks, koalas or unicorns.

If we learned language in the same way that we learn to add, subtract or play cards, children like Barry would not get much beyond hello and good-bye. Nor, for that matter, would normal toddlers.

Whether they emerge speaking English, Spanish, Czech or Hindi, children all travel the same road as they learn to speak and understand words

As anyone who has struggled through college French can attest, picking up a new language as an adult is as simple as picking up a truck. Yet virtually every kid in the world succeeds at it—and without conscious effort. Children attach meanings to sounds long before they shed their diapers. They launch into grammatical analysis before they can tie their shoes. And by the age of 3, most produce sentences as readily as laughter or tears.

Scholars have bickered for centuries over how kids accomplish this feat, but most now agree that their brains are wired for the task. Like finches or sparrows, which learn to sing as hatchlings or not at all, we're designed to acquire certain kinds of knowledge at particular stages of development. Children surrounded by words almost always become fluent by 3, whatever their general intelligence. And people deprived of language as children rarely master it as adults, no matter how smart they are or how intensively they're trained. As MIT linguist Steven Pinker observes in his acclaimed 1994 book "The Lan-

ge Explosion

guage Instinct." "Language is not a cultural artifact that we learn the way we learn to tell time or how the federal government works. It is a distinct piece of [our] biological makeup." Whether they emerge speaking Spanish, Czech or Hindi, kids all acquire language on the same general schedule. And as a growing body of research makes clear, they all travel the same remarkable path.

Sound

THE JOURNEY TOWARD LANGUAGE STARTS NOT IN THE nursery, but in the womb, where the fetus is continually bathed in the sounds of its mother's voice. Babies just 4 days old can distinguish one language from another. French newborns suck more vigorously when they hear French spoken than when they hear Russian—and Russian babies show the opposite preference. At first, they notice only general rhythms and melodies. But newborns are also sensitive to speech sounds, and they home in quickly on the ones that matter.

Each of the world's approximately 6,000 languages uses a different assortment of phonemes, or distinctive

Kids attach meanings to sounds before they shed their diapers and analyze grammar by age 3

sounds, to build words. As adults, we have a hard time even hearing phonemes from foreign languages. The French don't notice any real difference between the *th* sounds in *thick* and *then*—and to most English speakers, the vowel in the French word *tu* (ee through rounded lips) is just another *oo*. Researchers have found that month-old infants register both of those distinctions and countless others from the world's languages. But at 6 and 10 months, they start to narrow their range. They grow oblivious to foreign phonemes while staying attuned to whatever sounds the speakers around them are using.

Acquiring a set of phonemes is a first step toward language, but just a baby step. To start decoding speech, you have to recognize words. And as anyone listening to a foreign conversation quickly discovers, people don't talk one ... word ... at ... a ... time. Real-life language—even the melodious "parentese" that parents use with infants—consists mainly of nonstop streams of sound. So how do babies suss out the boundaries? Long before they recognize words, says Peter Jusczyk, a cognitive scientist at Johns Hopkins University, they get a feel for how their language uses phonemes to launch syllables. By the time they're 7 months old, American babies are well accustomed to hearing *t* joined with *r* (as in *tram*) and *c* with *l* (as in *clam*), but they've been spared combinations like *db*, *gd*, *kt*, *ts* and *ng*, all of which oc-



cur in other languages. And once they have an ear for syllables, word boundaries become less mysterious. *Ten / groaning / deadbeats / are / cleaning / a / train on / blacktop* makes acoustic sense in English, even if you don't know the words. *Te / ngroanin / gdea / dbea / tsare / cleani / nga / traino / nbla / cktop* isn't an option.

As children start to recognize and play with syllables, they also pick up on the metrical patterns among them. French words tend to end with a stressed syllable. The majority of English words—and virtually all of the *mommy-daddy-baby-doggie* diminutives that parents heap on children—have the accented syllable up front. Until they're 6 months old, American babies are no more responsive to words like *bigger* than they are to words like *guitar*. But Jusczyk has found that 6- to 10-month-olds develop a

clear bias for words with first-syllable accents. They suck more vigorously when they hear such words, regardless of whether they're read from lists or tucked into streams of normal speech. The implication is that children less than a year old hear speech not as a blur of sound but as a series of distinct but meaningless words.

Meaning

BY THEIR FIRST BIRTHDAY, MOST KIDS start linking words to meanings. Amid their streams of sweet, melodic gibberish, they start to name things—ball, cup, bottle, doggie. And even those who don't speak for a while often gesture to show off their mastery of the nose, eyes, ears and toes. These may seem small steps; after all, most 1-year-olds are surrounded by people who insist on pointing and naming every object in sight. But as Pinker observes, making the right connections is a complicated business. How complicated? Imagine yourself surrounded by people speaking a strange language. A rabbit runs

by, and someone shouts, "Gavagai!" What does the word mean? "Rabbit" may seem the obvious inference, but it's just one of countless logical alternatives. *Gavagai* could refer to that particular creature, or it could have a range of broader meanings, from "four-legged plant eater" to "furry thing in motion." How do kids get to the right level of generalization? Why don't they spend their lives trying to figure out what words like "rabbit" mean?

Because, says Stanford psychologist Ellen Markman, they come to the game with innate mental biases. Markman has shown that instead of testing endless hypotheses about each word's meaning, kids start from three basic assumptions. First, they figure that labels refer to whole objects, not parts or qualities. Second, they expect labels to denote classes of things (cups, balls, rabbits) rather than individual items. Third, they assume that anything with a name can have only one. These assumptions don't always lead directly to the right inference ("I'm not a noying," Dennis the Menace once told Mr. Wilson, "I'm a cowboy"). But they vastly simplify word learning. In keeping with the "whole object" assumption, a child won't consider a label for "handle" until she has one for "cup." And thanks to the "one label per ob-



Using innate linguistic software, kids assume that labels refer to wholes rather than parts, and to classes (cups, balls), not individual items

ject" assumption, a child who has mastered the word *cup* never assumes that *handle* is just another way of saying the same thing. "In that situation," says Markman, "the child accepts the possibility that the new word applies to some feature of the object."

Words accrue slowly at first. But around the age of 18 months, children's abilities explode. Most start acquiring new words at the phenomenal rate of one every two hours—and for the first time, they start combining them. Children don't all reach these milestones on exactly the same schedule; their development rates can vary by a year or more, and there's no evidence that late talkers end up less fluent than early talkers. But by their second birthdays, most kids have socked away 1,000 to 2,000 words and started tossing around two-word strings such as "no nap," "all wet" or "bottle juice."

How to Talk 'Parentese' to Your Child

PEOPLE THE WORLD over alter their way of speaking when they address infants and toddlers. The effects of "parentese" (originally called "motherese") continue to be hotly debated, but "a number of [its] features are likely to facilitate language learning," says linguist Naomi Baron of The American University. Among them:

Higher **pitch** captures a child's attention. Speaking more slowly, and with careful enunciation, makes it easier for the baby to distinguish individual words; emphasizing or repeating one word ("Isn't that a *huuuuuuge* huge doggie?") also helps.

Short utterances help the child grasp grammar more readily than Faulknerian monologues. Don't abandon complex sentences entirely, though: toddlers whose parents use many dependent clauses ("because..." and "which...") learn to do so earlier than the children of parents who do not.

Repeating a child's utterances ("That's right! It's a birdie") assures her she's been understood. Recasting



Enunciate, repeat new words and don't forget your pronouns

what the child says ("Want cookie?" "Would you like a cookie?") expands her repertoire. The only aspect of parentese that may impede language development: substituting proper nouns for **pronouns** ("Does Billy want to swing?"). These are tricky to master (your "you" is my "I"), and toddlers should be exposed to them.

Red Flags

Even normal children whose ears are filled with parentese may refuse to speak. Some delays can be harmless, but those after the age of 3 may affect how well a child will read, write and even think.

■ **0-3 months** Does not turn when you speak or repeat sounds like coos.

■ **4-6 months** Does not respond to "no" or changes in tone of voice, look around for sources of sound like a doorbell, or babble in speechlike

sounds such as p, b and m.

■ **7-12 months** Does not recognize words for common items, turn when you call her name, imitate speech sounds or use sounds other than crying to get your attention.

■ **1-2 years** Cannot point to pictures in a book that you name or understand simple questions ("Where is your Teddy?").

■ **2-3 years** Can't understand differences in meaning ("up" vs. "down"), follow two requests ("please pick up the bottle and give it to me"), string together two or three words or name common objects.

■ **3-4 years** Does not answer simple "who," "what" and "where" questions. Cannot be understood by people outside the family, use four-word sentences or pronounce most phonemes correctly. If delays persist until kindergarten, most pediatricians recommend speech therapy.

reporting who did what to whom. When a chimp with a signboard signals "Me banana you banana you," chances are he wants you to give him one, but the utterance could mean almost anything. Three-year-olds don't talk that way. The reason, most linguists agree, is that natural selection has outfitted the human brain with software for grammatical analysis. As MIT linguist Noam Chomsky realized more than 30 years ago, the world's languages all build sentences from noun phrases ("The big dog") and verb phrases ("ate my homework"). And toddlers who have never heard of grammar identify them effortlessly.

To confirm that point, psycholinguists Stephen Crain and Mineharu Nakayama once invited 3-, 4- and 5-year-olds to interview a talking "Star Wars" doll (Jabba the Hutt). With a child at his side, one researcher would pull out a picture and suggest asking Jabba about it. For example: "Ask Jabba if the boy who is unhappy is watching Mickey Mouse." You can't compose the right sentence—"Is the boy who is unhappy watching Mickey Mouse?"—unless you recognize *the-boy-who-is-unhappy* as a single noun phrase. As Chomsky would have predicted, the kids got it right every time.

If children's minds were open to all the possible relationships among words, they would never get very far. No one could memorize 140 million sentences, but a kid who masters 25 common recipes for a noun phrase can produce

more than that number from scratch. Too much mental flexibility would confine children. Pinker observes: "innate constraints set them free." Not everyone is blessed with those constraints. Kids with a hereditary condition known as Specific Language Impairment, or SLI, never develop certain aspects of grammar, despite their normal IQs. But those are rare exceptions. Most kids are so primed for grammatical rules that they'll invent them if necessary.

Consider hearing adults who take up American Sign Language so they can share it with their deaf children. They tend to fracture phrases and leave verbs unconjugated. Yet their kids still become fluent,

Grammar

ONCE KIDS CAN PASTE TWO WORDS TOGETHER, it's not long before they're generating sentences. Between 24 and 30 months, "no nap" may become "I don't want nap," and "bottle juice" may blossom into "I want juice." When kids hit that stage, their repertoires start expanding exponentially. Between 30 and 36 months, most acquire rules for expressing tense (*walk versus walked*) and number (*house versus houses*), often overextending them to produce statements like "I bringed home three mouses." They also start using "function words"—the *somes*, *woulds*, *whos*, *hows* and *afters* that enable us to ask

either "Do you like milk?" or "Would you like some milk?"

More fundamentally, they discover that words can have radically different meanings depending on how they're strung together. Even before children start combining words on their own, most know the difference between "Big Bird is tickling Cookie Monster" and "Cookie Monster is tickling Big Bird." That awareness marks the zenith of language development. A chimp can learn to label things, and a high-powered computer can process more information in a minute than any person could handle in a lifetime. But neither a chimp nor a mainframe is any match for a runny-nosed 3-year-old when it comes to

grammatical signers. "Children don't need good teachers to master language," says Elissa Newport, a cognitive scientist at the University of Rochester. "They pick up whatever rules they can find, and sharpen and extend them." That, according to University of Hawaii linguist Derek Bickerton, is why the crude pidgins that crop up in mixed-language communities quickly evolve into fully grammatical creoles.

When language lacks a coherent grammar, children create one.

That's not to say language requires no nurture. Children raised in complete silence grow deaf to grammar. "Chelsea," whose correctable hearing problem went untreated until she was 31, eventually learned enough words to hold a job in a vet's office. Yet her expressive powers have never surpassed those of a chimp

with a signboard. She says things like "The woman is bus the going" or "I Wanda be drive come." Fortunately, Chelsea is a rare exception. Given even a few words to play with, most kids quickly take flight. "You don't need to have left the Stone Age," Pinker says. "You don't need to be middle class." All you need to be is young.

With DONNA FOOTE in Los Angeles

Advise and Consent

There are baby books galore. A guide to the best of the lot.



Eisenberg (left) and Murkoff tell parents 'what to expect'

BY WESTON KOVOVA

THE SHELVES OF many homes groan under the weight of parenting books.

Some are truly awful—ponderously written and clumsily organized. Others offer little more than what most parents would have figured out without much effort. But the best among them are more than mere owner's manuals. Their authors have wisdom and humor about the inner lives of children, and a near-telepathic ability to anticipate and clearly answer even the most arcane questions. Each gets

there by a slightly different way, and none covers everything. But any of the books below will unravel the mystery behind most blooming rashes, teething bouts and crying jags.



Clear-eyed

In the beginning, there was Dr. Benjamin Spock. Fifty years and five editions later, his **Baby and Child Care** (Pocket Books, \$18) is still one of the most thorough and clear-eyed of the guides. In briskly titled chunks ("Reasons for weaning from the bottle at one year," "Joint and growing pains"), he says what he thinks and why, then moves on. He is against walk-

ers, in favor of two or three hours of fresh air each day and prefers pacifiers over thumb-sucking. Skeptical of professional advice givers, he tells new parents, "Don't be overawed by what the experts say. Don't be afraid to trust your own common sense." Ironically, though, he is particularly good on illnesses and other questions where common sense alone won't cut it.

Just as good are the "What to Expect" books, by Arlene Eisenberg, Heidi E. Murkoff and Sandee E. Hathaway (Workman-Publishing, \$12.95). **What to Expect the First Year** and **What to Expect the Toddler Years** are organized chronologically by month—helpfully



Good Q&A

letting you in on what the devious little tyke has in store next. There are excellent sections on topics ranging from breast-feeding to special-needs children, and a handy chart detailing common child illnesses (see if yours can get them all!). What makes these books stand out are the long question-and-answer sections. "My baby suddenly turned two colors—reddish blue on the bottom and pale on the top. What's wrong with her?" At one time or another every parent is convinced his kid is breaking new ground in weirdness. It's reassuring to learn that plenty of others have been there before.

Penelope Leach's classic, **Your Baby & Child** (Knopf, \$19.95), is by far the most pleasurable to read.



Kid-centric

Unlike the others, Leach explains things from the baby's point of view. This leads her to reject some of the advice in other books. Take getting the kid to sleep. Spock advises letting him cry it out. Leach finds that ridiculous. Sending a baby the message that "it's no good crying because I'm not going to come back no matter how sad you are," she writes, "can only make him more sure that it is

dangerous to let you go at all." Leach is particularly good on fussy children, and coaxing hunger-strikers to eat.

T. Berry Brazelton's best seller, **Touchpoints** (Addison Wesley, \$14.95), is becoming a

night-stand staple. Don't turn to this "map of behavioral and emotional development" when your kid has the mumps. It isn't a medical guide. But if you're going nuts because she won't stop saying "no" or refuses to speak to anyone but her imaginary cat, Brazelton can help. Drawing on his own pediatric practice and research, he elegantly explains how children learn to interact with the people and things around them—and how to tell a potential problem from behavior that may seem odd, but is actually normal.



A staple



Links to Related Web Sites

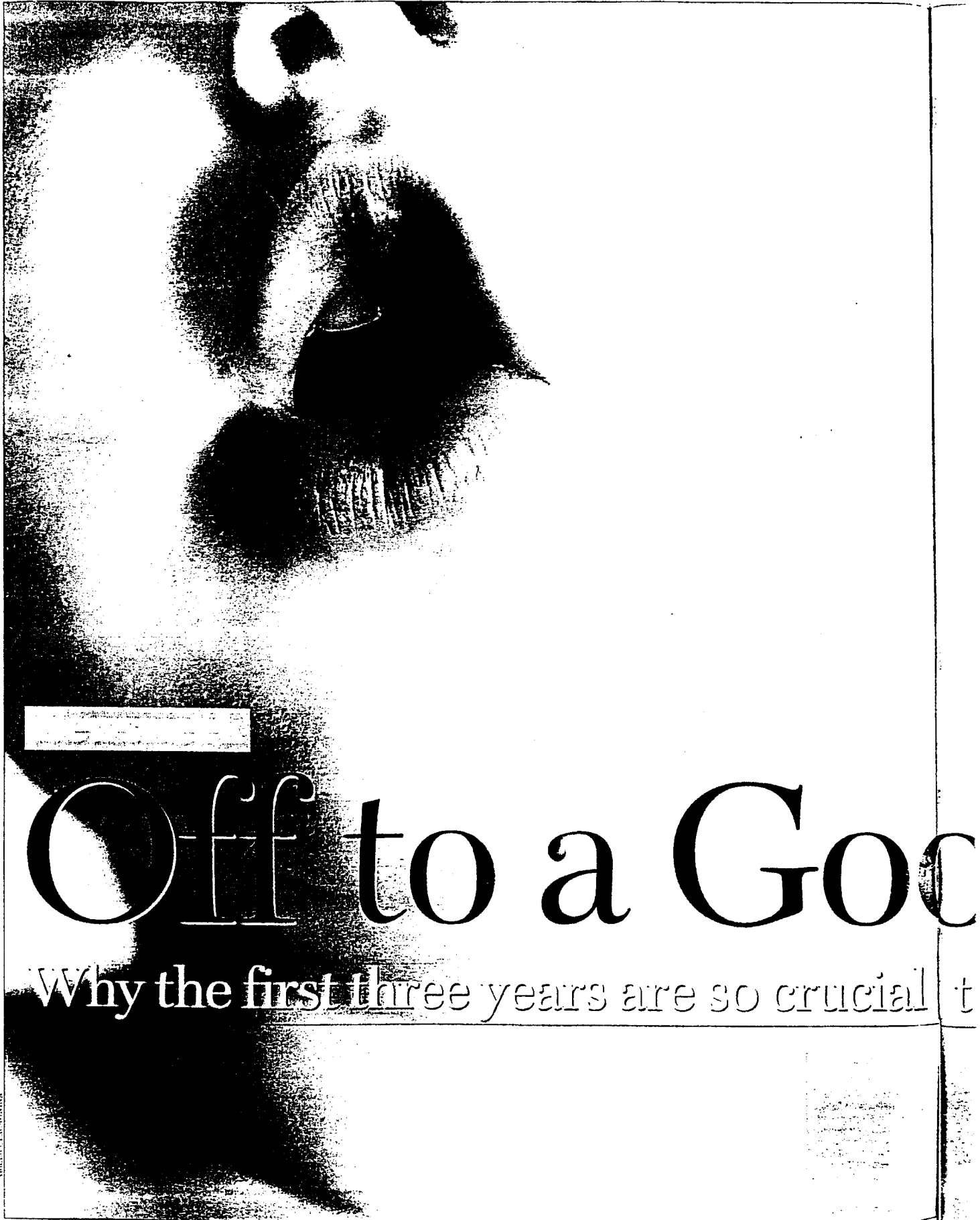
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Several links to Web sites related to early intervention are included below. Send suggestions for additions to: isei@u.washington.edu

- [Aspen Publishers](#)--serving the publication needs of health care professionals for over 40 years, including publication of the interdisciplinary journal, *Infants and Young Children*. (USA)
- [Brookes Publishing Company](#)--the premier publisher in the early intervention field in the United States with close ties and affiliations with publishers in numerous countries throughout the world. (USA)
- [CLAS Institute](#)--Culturally and Linguistically Appropriate Services, Early Childhood Research Institute at University of Illinois at Urbana-Champaign. (USA)
- [The Division for Early Childhood \(DEC\)](#)--of the Council for Exceptional Children (CEC). (USA)
- [Downside Up, Ltd.](#)--A charity dedicated to improving the quality of life for Russian children with Down syndrome. (Russia)
- [Early Childhood Care and Development](#)--Site of The Consultative Group on Early Childhood Care and Development (USA)
- [Early Childhood Research Institute on Measuring Growth and Development](#)--a comprehensive, individualized measurement system for children with disabilities from birth to eight years of age (USA)
- [EIRI](#)--Early Intervention Research Institute at the Center for Persons with Disabilities, Utah State University. (USA)
- [Eleanor Roosevelt Institute](#)--an independent facility for basic biomedical research in Denver, CO. (USA)
- [Frank Porter Graham Child Development Center](#)--This Center, located at the University of North Carolina at Chapel Hill, is a multidisciplinary center for the study of young children and their families. (USA)
- [Global Early Intervention Network](#)--to provide a supportive and collaborative community network to facilitate continuous learning about early intervention. (USA)
- [Infants and Young Children](#) -- An interdisciplinary journal of special care practices (Aspen Publishers, Inc.) (USA)
- [The Journal of Early Intervention](#)--published by the International Division for Early Childhood of the Council for Exceptional Children (USA)
- [National Center for Early Development and Learning \(NCEDL\)](#)--This Center focuses on enhancing the cognitive, social, and emotional development of children from birth through age eight. (USA)
- [New Mexico's Support NETWORK for Early Intervention](#)--the Network for Effective Training and Technical Assistance for New Mexico's Early Intervention programs (USA)
- [NICHCY](#)--The National Information Center for Children and Youth with Disabilities (USA)
- [The Ontario Association for Infant Development](#)--(Canada)
- [Waisman Center Early Intervention Program](#)--This site includes an extensive set of links to policy, research and programmatic resources. (USA)
- [ZERO TO THREE](#)--This site contains two tracks, one for parents and one for professionals. (USA)

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For more information on the importance of early childhood education, visit www.nce.org.

Off to a Good

Why the first three years are so crucial to

PHOTO: EMILIO GEMELLI



Good Start

to a child's development

By Barbara Kantrowitz

IT IS A MOMENT YOU never forget—the first time you hold your baby in your arms. Who is this mysterious new person? Before long, you will know the difference between a cry of hunger and a cry for comfort, a genuine grin and the grimace produced by an upset stomach. But here's the amazing part: as much as you are learning (and at times it seems like more than any human could handle), your baby is learning a thousandfold more. Every lullaby, every giggle and peek-a-boo, triggers a crackling along his neural pathways, laying the groundwork for what could someday be a love of art or a talent for soccer or a gift for making and keeping friends.

Cutting-edge science is confirming what wise parents have always known instinctively: young children need lots of time and attention from the significant adults in their lives. This does *not* mean that parents have to go out and spend a small fortune on specially designed infant-stimulation toys or flashcards for babies or any of the other dubious developmental aids that prey

Science confirms what wise parents have long known

on parental insecurities. What it *does* mean is that parents should take advantage of their child's natural curiosity. Babies are learning machines; everything is interesting to them. Shadows on the sidewalk, the distant barking of a dog, a voice on the telephone: these are miracles to an infant. If parents share a baby's wonder and laughter, children will grow up feeling that their observations and responses are valid and that people listen to them.

Researchers looking for new answers to old questions about the importance of heredity and environment have discovered that much of what makes a person unique is the result of experiences in the first three years of life. New technology, such as positron emission tomography (PET) imaging of the brain, has provided hard data on the importance of these years. Simple activities, like cuddling and rocking a baby, stimulate growth. The long-term effects of inadequate nurturing can be devastating. In profoundly deprived children—for example, orphans left to languish in an institutional nursery—critical areas of the brain remain undeveloped. Psychologists say that language development begins early, as well.



Even at 9 months, babies are learning machines

The building blocks are games like peek-a-boo, which teach babies about face-to-face communication, and the seemingly incomprehensible babble known as parentese, the beginning of verbal interaction. The first years also shape a child's personality. Although some characteristics, such as a tendency toward shyness, may be genetically determined, studies have

shown that babies who are hugged often and feel loved and cared for are much more likely to grow up confident and optimistic. In other words, genetics provides the raw material; life molds the spirit and the soul.

Studies have also shown that family connections are at the core of a child's social development. Despite widespread reports about the demise of the extended family, a new NEWSWEEK Poll of parents of children under 4 showed that grandparents and in-laws still play a huge

role in child rearing. The vast majority of parents surveyed said they turned to their own parents or other family members when they needed advice rather than books, videos or classes. Fifty-nine percent said that grandparents were "very" involved in their child's life. Traditional values also seem to be alive and

What Matters Most: A NEWSWEEK Poll

In our poll on this and the following pages, we asked parents of kids under 4 about their goals and worries for the future, how they discipline their kids and how they view their own families.

Which of the following is your most important goal as a parent?

- 48% Making sure he/she grows up to be a moral person
- 38% Making sure he/she is happy

9% Making sure he/she does well in school

4% Making sure he/she makes friends and gets along well with others

1% Making sure he/she is good at sports

Do you worry about the following when you think about your child's future?

- 54% He/she will be kidnapped or the victim of a violent crime
- 52% You won't be

able to afford his/her college costs

51% He/she will have a serious accident or illness

41% He/she will be a victim of sexual abuse

36% You won't have enough money to buy him/her the things he/she needs

35% You won't be able to find or

afford good health care for him/her

29% He/she won't grow up to share your values

22% He/she will develop a learning disability

22% You won't be able to find or afford good day care

14% He/she will have trouble making friends at school

Where do you turn for advice and guidance about how to raise your child?

- 87% Your child's father/mother
- 69% Your mother or mother-in-law
- 66% Doctors, nurses and other health professionals
- 52% Other family members or relatives

Known: kids need lots of time and attention

healthy. Nearly half (48 percent) of the parents said that making sure that their child grew up to be a moral person was their most important goal.

New attention to the early years presents a challenge for parents, educators and policymakers. According to the landmark 1994 Carnegie Corporation study "Starting Points," only half of infants and toddlers are routinely read to by their parents. The effects are serious: teachers report that more than a third of kindergartners are not ready to learn when they arrive at school. Day care is another pressing issue. Fifty-six percent of mothers of children under 4 are in the work force, yet there are no national child-care standards. As a result, too many children spend their days in unsafe facilities under the supervision of inadequately trained caregivers. Nearly a quarter of families with children under 3 live in poverty. Most of these are families headed by single parents (usually the mother) without access to regular health care or other social services.

According to the NEWSWEEK Poll, more than half of the parents surveyed said they did not believe that the policies of government and business were

supportive of families with very young children. But can leaders and legislators break out of their old ways of thinking and be as innovative as the scientists?

There are some hopeful signs. In the absence of a clear national mandate, states and municipalities have started their own initiatives. Generally, the goal is to help children by reaching out to the whole family,

including parents and often grandparents. Some states target specific groups—at-risk children or teen parents, for example—and offer such services as home visits by nurses, or parenting classes. Schools can also take advantage of the research. In the last few years, many districts have cut art and music classes even though studying these subjects can help children learn in other areas. Art and music are not just luxuries, as financially strapped school administrators sometimes claim.

There are more than 15 million American children under the age of 4. A child born this year will graduate from high school in 2015 and college in 2019. Think of these infants and toddlers as the architects of the 21st century. They are heading toward that future now, one baby step at a time. ■



Toddlers who feel loved grow up confident and optimistic

47% Books about parenting
41% Magazines about parenting
36% Religious leaders like priests, ministers or rabbis
34% Friends or neighbors
23% Babysitters or other child-care workers
19% Television shows or videos

Asked of parents with children 1 to 3 years old: How often do you use the following disciplinary methods when your child misbehaves?
Explaining why behavior is not appropriate:
73% often
16% sometimes
4% hardly ever
7% never

Giving a timeout—that is, making child take a break from whatever activity he/she is involved in:
35% often
36% sometimes
12% hardly ever
17% never
Taking away a toy or treat:
27% often
42% sometimes

16% hardly ever
15% never
Yelling at child:
10% often
31% sometimes
38% hardly ever
21% never
Spanking child:
7% often
24% sometimes
36% hardly ever
32% never

Compared with your own father/mother, how do you think you rate as a parent?
46% the same
27% better
21% much better
4% worse

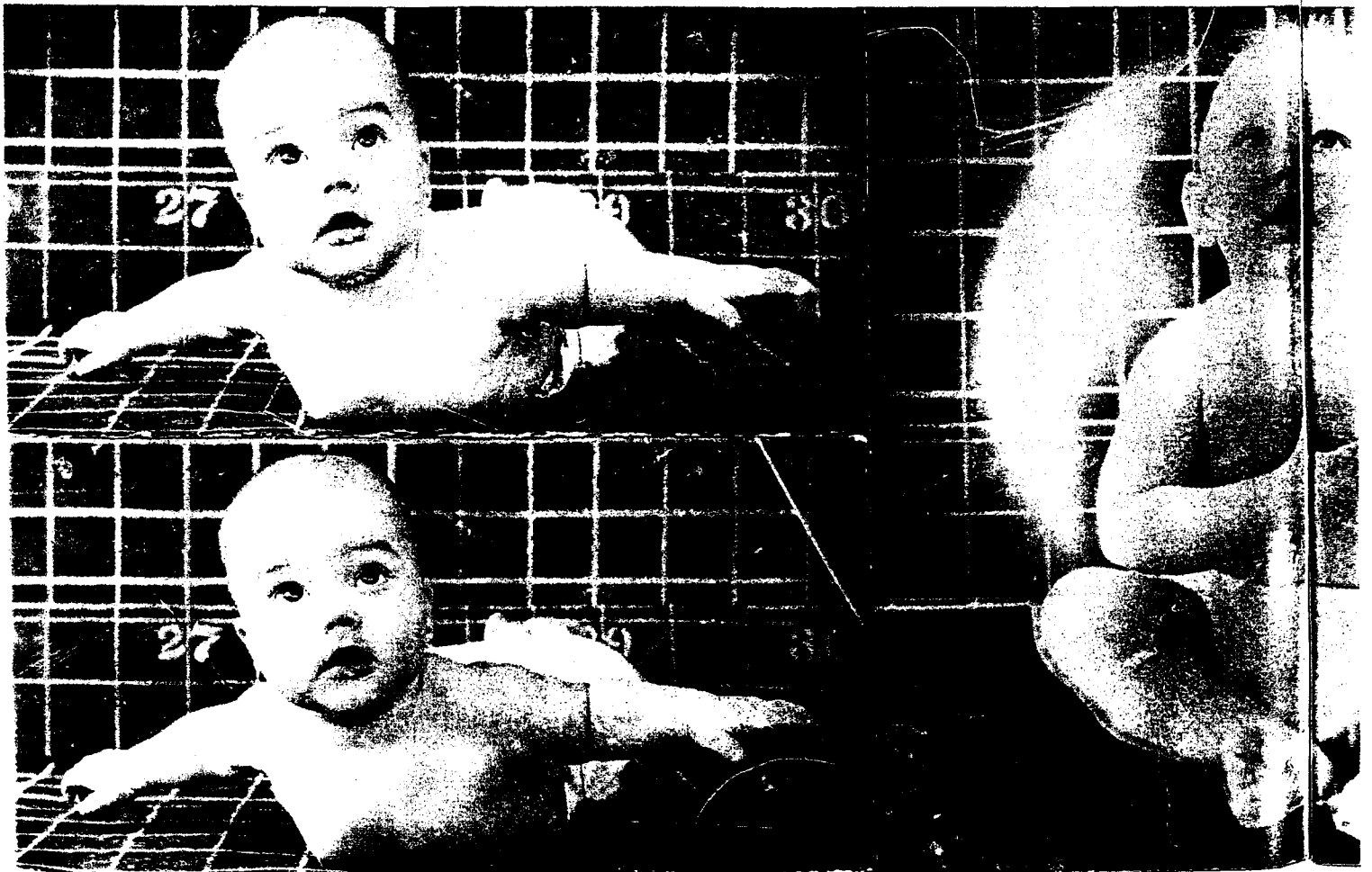
Are the policies of government and businesses generally supportive of families with very young children?
55% Not supportive
39% Supportive

FOR THIS NEWSWEEK POLL, PRINCETON SURVEY RESEARCH ASSOCIATES INTERVIEWED 506 PARENTS BETWEEN THE AGES OF 15 AND 34 WITH CHILDREN 0-3 YEARS OLD (322 MOTHERS AND 184 FATHERS) BY TELEPHONE FEB. 25-MARCH 2, 1997. THE MARGIN OF ERROR IS +/- 3 PERCENTAGE POINTS. THE NEWSWEEK POLL © 1997 BY NEWSWEEK, INC.

FIRST STEPS

Scientists now understand in greater detail than ever before the various anatomical and neurological changes that allow children to develop motor and sensory abilities. The new research findings are calling into question the very idea of developmental milestones.

Hey—Look World, Here I



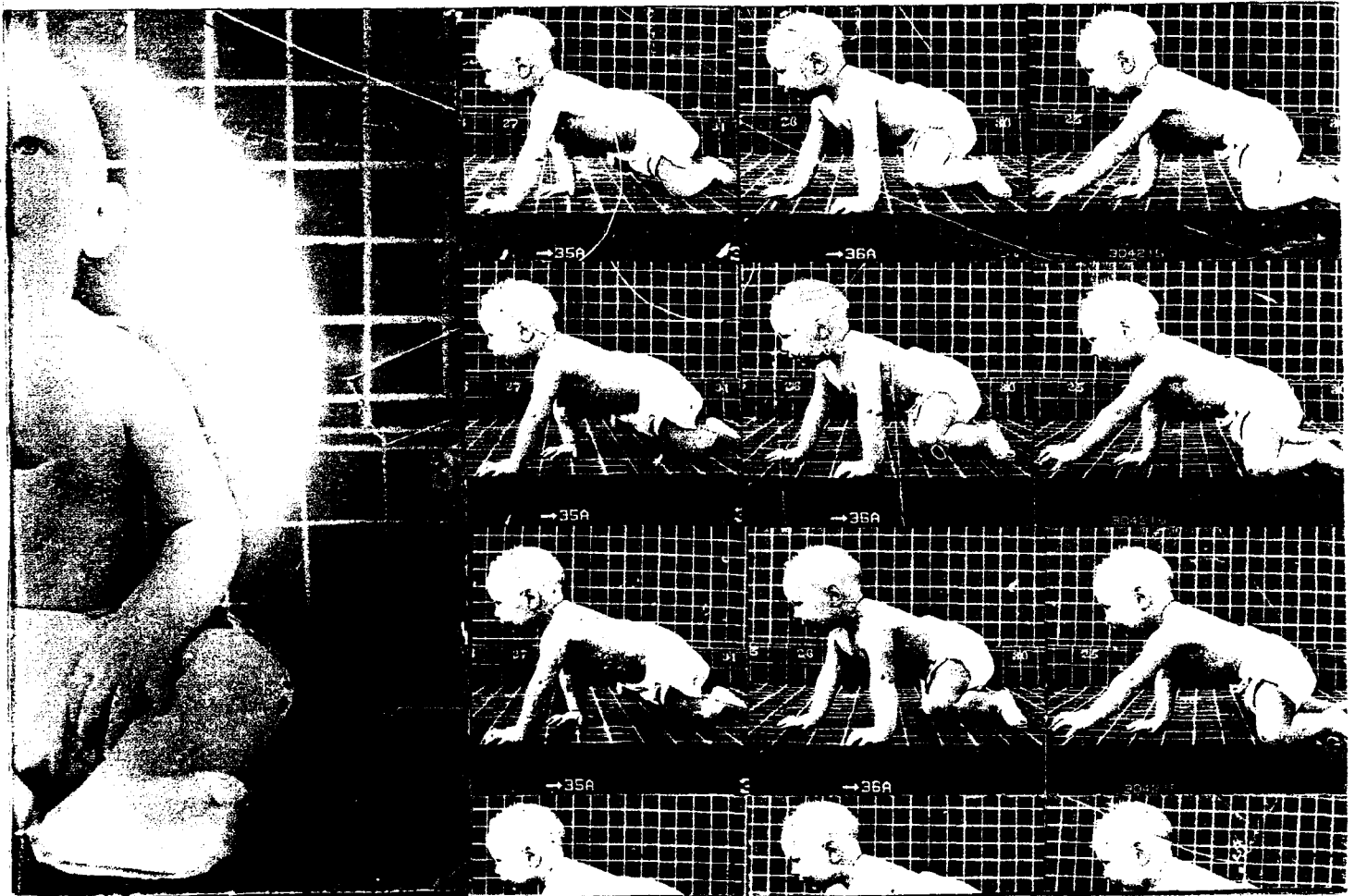
ELIANA. 14 MONTHS OLD, REFUSES TO WALK. SHE has never attempted to stand alone, much less take a step. The other four children in her play group, however, have all earned the right to be called toddler: they started staggering on two feet right around their first birthdays. Even Eliana's friend Rachel, not yet 10 months old, has taken a few precarious steps. But Eliana is seemingly

oblivious to her playmates' advanced locomotion. A demon crawler, she is still perfectly content to navigate her Washington, D.C., house on hands and knees. Her parents, of course, are certain that they have the first healthy kid in human history who will never learn to walk.

They shouldn't worry. And not only because the annals of child development are replete with stories of "late walkers" or "delayed talkers." For generations, anxious new parents have sat up nights comparing their child's accomplishments with the all-important "milestones" mapped out by pediatricians and development researchers. Babies sit up at 6 months, for instance; they blurt out "ma-ma" and "da-da" by 9 months, and start walking at a year. But scientists now understand in more detail than ever before how motor and sensory skills develop. The new findings call into question the very idea of developmental milestones and suggest that it is not meaningful to

By Pat Wingert & Anne Underwood

Out, Come



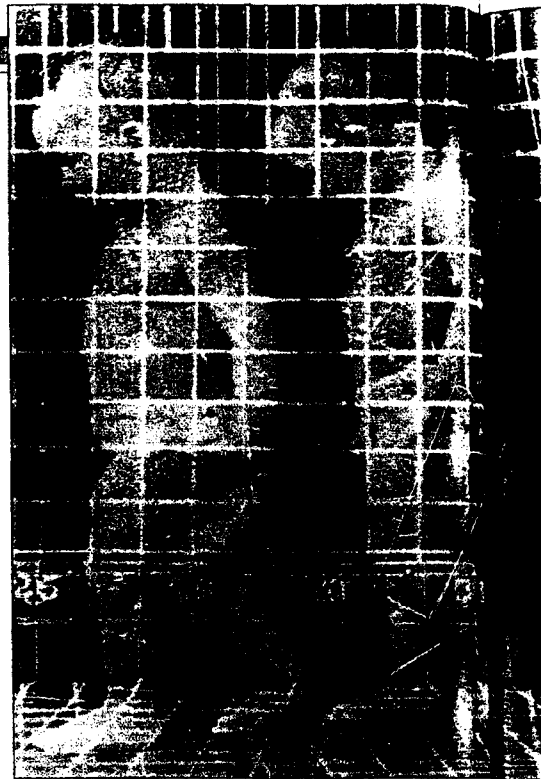
use the labels "early" and "late" when it comes to a baby's accomplishments. That isn't to say broad guidelines are useless. Parents should be concerned if, say, their 10-month-old can't sit up by himself. But the best evidence now shows that each young brain forms the neuronal and muscular connections required for sitting and crawling, walking and talking, at its own pace. There is no prize for finishing first—and, in most cases, no need to panic just because your tot isn't keeping up with the junior Joneses.

Considering how cruelly uncoordinated humans are at birth, it's a wonder babies learn to walk at all. A newborn has virtually no control over his limbs. Except for the most primitive reflexes, like sucking and grasping, he cannot will his arms or legs in any direction. These reflexes originate in the brain stem, the only part of the brain that is fully functional at birth. But between the fourth and seventh months, as the cortex of the brain develops, these reflexes become inhibited. After a while, the primitive reflexes seem to disappear altogether, allowing an increasingly sophisticated progression of motor skills to take their place.

Before that can happen, the brain must learn to deliver precise commands to the muscles. And for that, neurons must be myelinated. A white, fatty substance that coats nerve cells like the plastic insulation on telephone wires, myelin keeps electrical signals traveling along a neuron rather than leaking out and dissipating. Myelin also prevents "cross talk," in which the electrical signal in one neuron interferes with that of a nearby one: thanks to myelin, a nerve impulse telling the right hand to reach up and scratch the nose doesn't accidentally move the left foot instead. At the same time that nerves are being myelinated, the rapidly maturing brain is forming and pruning synapses (junctions between neurons), creating well-organized networks out of a chaotic jumble of billions of nerve cells. It will be two years before all of a child's nerves are fully myelinated.

Sensory skills at birth are just as rudimentary. Newborns can usually distinguish between faces and other objects—and they can recognize their parents' voices even in the womb. A newborn can focus on objects no farther than 13 inches away, about the distance to his mother's face when he's bottle- or breast-feeding. He can track slow-moving objects, but loses them if they are more than 18 inches away. For the first few weeks, this is all the vision he needs—and about all his brain can handle. From there, vision improves gradually. By the seventh month, he has developed binocular vision, the ability to see in three dimensions. But it will take seven to nine years before he can score 20-20 on an eye chart.

As her neuromuscular and sensory systems mature, a baby at last gains some control over her wayward body by the age of 1 or



2 months. Placed on her stomach, she'll struggle to hoist her bowling ball of a head from the floor. Not long after that she will bring her chest off the ground. It makes intuitive sense that children develop control over their heads first. Without a steady visual field, they cannot develop hand-eye coordination and balance, both of which are prerequisites for crawling and walking. At 3 or so months, the baby will prop herself up on her forearms. She'll get control of her upper arms before her lower arms, her wrists before her fingers, her legs before her feet.



Papa, don't push: Violin prodigy Yeou-Cheng Ma (left) 'traded my childhood'

CRADLING A NEWBORN, said playwright Sebastian Barry in "The Steward of Christendom," is like "holding a three-pound bag of loose corn": the baby has about as much motor control as the sack of kernels and is equally incapable of any intentional movement. Yet to many parents it seems like only

an instant between this period of almost comic uncoordination and the moment their teenage violinist masters the precise fingering required for rapid arpeggios, or their adolescent jock musters all the coordination in her quadriceps to nail the triple jump. How much do these later feats owe to early-childhood practice and precocity?

The development of fine and gross motor skills proceeds independently. Although they require the same physical founda-

tions—formation of brain synapses, myelination of nerves (main story)—the two skills proceed in fits and starts. If a baby is putting lots of effort into gross motor skills one week, he won't be working much on fine motor skills. And every new move has to be repeated over and over to strengthen neural circuits that wind from the brain's thinking areas into the motor cortex and out to nerves that move muscles. But how quickly a child acquires motor skills is hardly a harbinger of achievement. "How early a

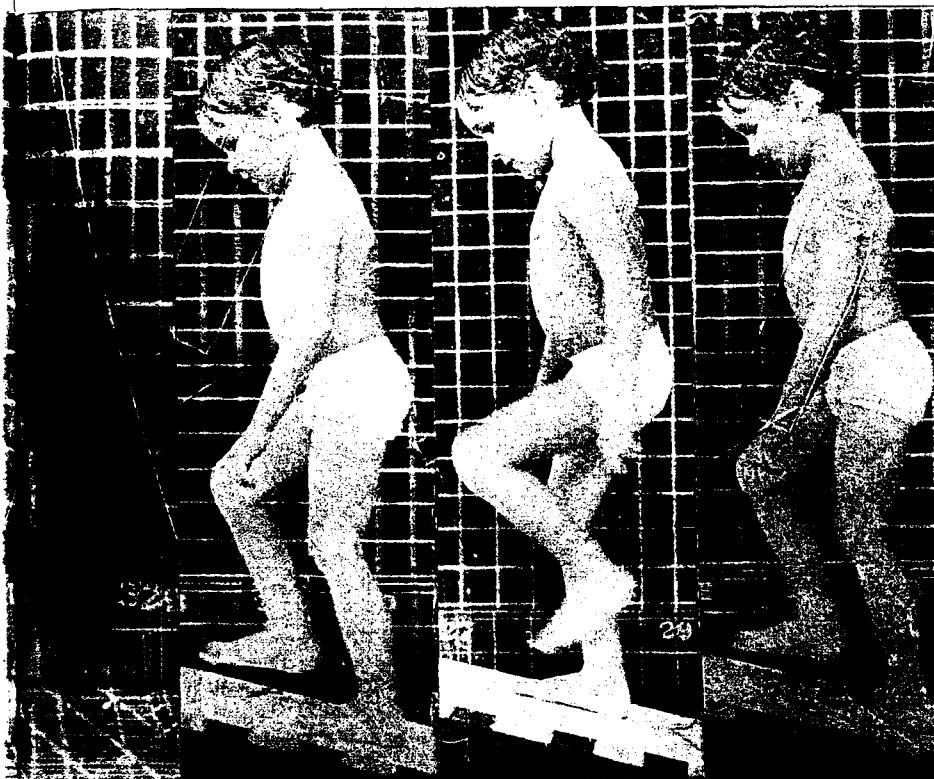
baby walks has little to do with future athletic ability," says Laurie Walther Nathanson, author of "The Portable Pediatrician for Parents."

Yet stories abound of how athletic greatness was foreshadowed by childhood flair. Olympic soccer gold medalist Mia Hamm says she "began kicking a ball at the age of 2." She lived in Italy and copied the older kids in the park. And the story of how Tiger Woods swung his first golf club at 10 months has taken on the status of legend. Whether such preco-

Little Artists and Athletes

Fine and gross motor skills may not forecast the future

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Overriding reflexes, a baby's nerves and muscles master sophisticated moves

by 7 or 8 months, it's usually not long before they're tipping forward on all fours for a little crawling practice. Most kids start out by rocking back and forth on their arms and legs. Eventually, they learn to put enough weight on one side that they free up one arm, then the other. Some never quite master the traditional crawl. They scoot along on their bottoms or drag their bellies across the floor using only their arms. "It's all part of baby problem solving," says Esther Thelen, professor of psychology at Indiana University. The point isn't to crawl for its own sake, "but to get someplace." About 15 percent of kids skip crawling altogether and move right on to walking. "Rather than go through gross motor development in some specific sequence," says Johns Hopkins neurodevelopmental researcher Bruce Shapiro, toddlers often "reach for their functional threshold"—even if that means skipping milestones. In the case of early walkers, he says, "by the time the muscle tone comes in, they're ready to stand up."

All of this is good practice for the next big step: rolling over, which a baby usually masters at anywhere from 2 to 6 months. To get it right, she must develop the ability to rotate her spine, something she's prepared herself to do with all the kicking and flopping over she's been doing since her earliest days. Eventually she shifts her weight so far to one side that momentum takes her completely over. The first few rolls are usually accidents. But by now she has enough control to repeat actions she likes. Much to her delight—and her par-

ents'—she can soon flip at will. Using muscles repeatedly gives them the strength and elasticity known as "muscle tone," which is as important as the development of the nervous system in producing intentional movement.

With muscles and coordination working in concert, babies can start working up to more demanding skills, like sitting up and crawling. This requires much more strength and balance than the relatively simple movements they've done up until now. Once they get the hang of it, typically

THE PHYSICAL AND CONCEPTUAL leap to walking can happen anywhere from 10 to 17 months. Why such a long span? It's a feat of balance and coordination that the brains and bodies of some children simply need longer to master. "It takes everything, including the big toe," says John Hopkins pediatrician Paul Lipkin. To prepare for the big step, most kids spend a few months "cruising" from one

piece of furniture to the next, before shoving off from the coffee table and taking those first drunken steps.

What makes this elegant succession of skills all the more impressive is that otherwise helpless babies do so much of it completely on their own. "Blind children learn to walk," says Harold Klawans, a neurologist at Chicago's Rush Medical College. "They're not imitating anyone. The nervous system acquires that skill all by itself, as the body develops the anatomical and physiological sophistication to perform these tasks." Children are motivated by an irrepressible desire to reach beyond themselves. Sure, some get there a little quicker than others; but five years down the road you won't be able to tell which ones they were. ■

cious moments set Hamm and Woods on the road to stardom is debatable, but there is no question that down the road there is a "too late." No world-champion skater or golfer took up the sport after 12. And in his 1996 book "Why Michael Couldn't Hit," neurologist Harold Klawans of Rush Medical College in Chicago describes how, at 31, basketball megastar Jordan couldn't retool his visual-motor synapses enough to whack a curve ball. "The brain has to learn how to recognize the spin and speed and direction of the [pitched] ball," explains Klawans, "and then to swing the bat at just the right speed and in precisely the proper location." If the brain's visual and motor neurons are

not trained between the ages of 2 and 11 to do that, by adulthood the neurons are simply not "plastic" enough to be rewired for the job.

If parents want to raise a prodigy, the best they can do is make experiences available to the child. Kids who get to handle paintbrushes and Prince racquets early on figure out that art and tennis are considered cool in the household, for instance. But sometimes it is not the obvious experiences that sculpt excellence: Walter Payton, one of the NFL's greatest running backs, took ballet as a child. Still, physical skill is only one ingredient in artistic or athletic achievement; the rest is mental. Olympic swimmer Amy van Dyken says, "You can't

teach mental toughness. You can teach concentration, but the child won't be happy if that's not what the kid wants to do."

Ambitious parents might heed the case of Yeou-Cheng Ma. She started the violin at 2½ and, tutored by her father, won youth-competitions galore. Then younger brother Yo-Yo, who took up the cello at 4½, eclipsed her. Yeou-Cheng suffered a breakdown at 15 over the loss of a solo career. Now a pediatrician, she doesn't hate music—she also runs New York's Children's Orchestra. But Ma has little patience with parents who push their children. "The job of a child is to play," she says. "I traded my childhood for my left hand."

ANNE UNDERWOOD
and PETER PLAGENS

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Infants & Young Children: An Interdisciplinary Journal of Special Care Practices

Hands-on guidance, sound information and expert insights.

Infants & Young Children: An Interdisciplinary Journal of Special Care Practices

James A. Blackman



The only journal devoted to clinical management of infants and young children (birth to three years of age) with, or at risk for, developmental disabilities, IYC provides current applications of educational, therapeutic, diagnostic, and family support concepts to practice settings. This peer-reviewed quarterly journal blends theory, consensus, and controversy and recommends specific actions -- how to identify and assess problems, when to start treatment, which techniques to use, and much more. Infants and Young Children is cited in the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Current Contents/Social and Behavioral Sciences, Research Alert, Social SciSearch, Current Abstracts, OT BibSys (selectively index), Sociological Abstracts, Social Planning/Policy & Development Abstracts, Linguistics and Language Behavior Abstracts, and National Early Childhood Technical Assistance System (NECTAS).

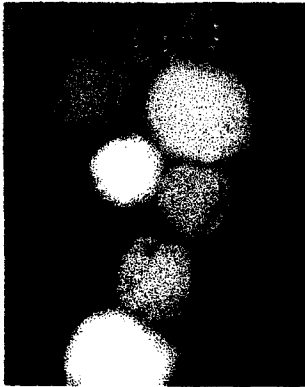
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Frank Porter Graham Child Development Center

The University of North Carolina at Chapel Hill

FPG is one of the nation's oldest multidisciplinary centers for the study of young children and their families. Research and education activities focus on child development and health, especially factors that may put children at risk for developmental problems.

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October 2000 Highlights

Doctoral Training in Early Intervention and Family Support

Ph.D. Programs

Frank Porter Graham Child Development Center is pleased to announce the launch of a new web site for the Doctoral Training Program in Early Intervention and Family Support. The training program is ope...[More Info]

The Carolina Fragile X Project

A new web site describes the Carolina Fragile X Project, which studies children with fragile X syndrome (the leading inherited cause of mental retardation). The web site is to increase public aware...[More Info]

More Training Opportunities – Short Courses

Assessing Environments with the ECERS-R and ITERS

The Short Course: Assessing Environments with the ECERS-R and ITERS, October 23-25, is full. Follow this link for more training opportunities on the Harms-Clifford-Cryer environment rating scales...[More Info]

Field Techniques in Educational Research

Coursework Info – Distance Learning

The class will focus on case study and qualitative methodology. Data collection methods will include: observation protocols, focus groups, document reviews, structured interviews, and f...[More Info]

Walking the Walk

Promoting Diversity in Early Childhood Intervention

The demographics of young children in the U.S. are changing dramatically. By the year 2005, children and adolescents of color will make up as much as 40% of the U.S. youth population. Large numbers of...[More Info]

LEEP - The Literacy Environment Enrichment Program

A new literacy training project for early childhood teachers and supervisors is

NCEEL
National Center
for Early Development
& Learning

NECTAS
National Early Childhood
Technical Assistance
System

Rating Scales
ECERS-R
ITERS
FDCRS
SACERS

UNC-CH
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Revised: 10/10/2000

being conducted in conjunction with the Frank Porter Graham Child Development Center. The project, Literacy Environment ...[More Info]

New Scripts for 21st Century Services

Highlights of June 2000 institute

The New Scripts institute, a four day event offering new methods, models, and materials for preparing personnel to work with young children, families, and each other, was held June 3-7, 2000 at the ...[More Info]

Reaching for the Stars II -- Summer Institute 2000

Project U-STARs Teachers Achieve New Heights

Project U-STARs, Using Science Talents and Abilities to Recognize Students, held it's second annual Summer Institute June 12-16 at the William and Ida Friday Center on the University of North ...[More Info]

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www.depts.washington.edu/isei/journal.htm

Journal publication in collaboration with Infants and Young Children--Editorial Statement

The International Society on Early Intervention (ISEI) has established a collaboration with the journal, **INFANTS AND YOUNG CHILDREN (IYC** -- <http://www.aspenpublishers.com/pgiyc.html>). Published by Aspen in the United States, IYC is the premier interdisciplinary journal providing timely reviews and descriptions of research, training, program development, practices, and policy issues in the field of early childhood intervention. A separate section of IYC will be devoted to international issues under the auspices of ISEI. ISEI members are invited to consider submitting articles for this peer-reviewed journal. Descriptions of new models, the influence of policy changes and socio-political issues on early intervention in various countries, summaries of the status of early intervention practices in particular countries or regions of the world, or reports of training or research collaborations with an international focus would certainly be of interest. Strictly empirical studies should be submitted to other peer-reviewed journals.

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Monographs of the International Society on Early Intervention-- Editorial Statement

[BACK TO ISEI PUBLICATIONS PAGE](#)

The Monograph Series published under the auspices of the International Society on Early Intervention is intended to provide researchers, clinicians, and policy-makers with a forum for presenting information and ideas on early interventions of interest to an international audience. The range of topics that can be considered is extensive, including reports of programmatic research, timely reviews of important areas, advances in early intervention practices, policy statements with international implications, and innovative training techniques or approaches. When multiple contributors are involved, an Issue Editor will be identified to work with the Editor-in-Chief. For co-authored issues, a Lead Author must be identified.

Potential Issue Editors or Lead Authors should contact the Editor-in-Chief to discuss the appropriateness of the submission for the Monograph Series and to further develop the topic. Submissions should be no longer than 160 manuscript pages, all inclusive (80 printed pages). All submissions will undergo a peer review process utilizing Editorial Advisory Board members from the International Society on Early Intervention and ad hoc reviewers.

Submissions must have relevance to an international audience; including authors representing different countries is encouraged. For submissions focusing on a single country, the implications of the work for other countries should be established. In the latter case, solicitation of commentaries from representatives from other countries should be considered.

For additional information, please contact:

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Effective Practices for Preparing Young Children with Disabilities for School. ERIC Digest #E519.

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RESEARCH SHOWS CHILDHOOD INTERVENTION MAKES A DIFFERENCE

Over 50 years of research on children with many types of disabilities receiving a range of specialized services in many different settings has produced evidence that early intervention can: (1) ameliorate, and in some cases, prevent developmental problems; (2) result in fewer children being retained in later grades; (3) reduce educational costs to school programs; and (4) improve the quality of parent, child, and family relationships. Much of what we know about early intervention effectiveness is drawn from this diverse historical base of information.

More recently, researchers have begun asking a more rigorous and differentiated question: For whom and under what conditions is early childhood intervention most effective? This more sophisticated question focuses on the effects of various interventions for specific groups of children relative to the type of program they received. Data from well-controlled research studies indicate that young children with disabilities (e.g., Down syndrome, autism, cerebral palsy, sensory impairments), and those who evidence biological (e.g., low birth weight, premature) and environmental risk factors make significant gains on both qualitative and quantitative measures of development when provided

appropriate services. The involvement of their parents in reinforcing critical skills in natural contexts is an important factor associated with the magnitude of the child's progress (Guralnick, 1989).

In addition to encouraging parent involvement it has been found that the most effective interventions are those that also:

- (1) occur early in the child's life,
- (2) operate from a more structured and systematic instructional base,
- (3) prescriptively address each child's assessed needs, and
- (4) include normally developing children as models.

Programs with these characteristics produce the most reliable, significant, and stable results in child and family functioning (DeStefano, Howe, Horn, & Smith, 1991; Hanson & Lynch, 1989; McDonnell & Hardman, 1988).

THE "BEST PROGRAM" DEPENDS UPON THE SPECIFIC NEEDS OF THE CHILD

Conceptually, the fields of early childhood and early childhood special education promote the incorporation of instructional goals and curriculum content into normally occurring routines in the home, preschool, daycare center, and kindergarten settings (Bredenkamp, 1987; Rainforth & Salisbury, 1988). Recognizing that children with special needs require efficient, effective, and functional instruction directed at achieving socially and educationally valid outcomes (Carta, Schwartz, Atwater, & McConnell, 1991), it is important that practitioners identify the nature of each child's needs and the extent to which accommodations and supports will be necessary for each child to be successful. Instructional arrangements, curriculum content, and instructional procedures can and should be varied to coincide with the intensity of each child's learning needs. Such accommodations increase the likelihood that children with special needs can be included in a vast array of typical classroom activities.

While many state and local agencies are still grappling with the issue of what kind of service delivery models they will endorse, it is clear that the special education and related services needs of young children with identified or at-risk conditions can be appropriately met in settings that include normally developing children (e.g., daycare, typical preschools, Head Start, regular classrooms) (Guralnick, 1990; Hanson & Hanline, 1989; Templeman, Fredericks, & Udell, 1989). Integrated settings have, in fact, been found to produce higher proportions, rates, and levels of social, cognitive, and linguistic skills in children with disabilities than segregated settings (Brinker, 1985; Guralnick, 1990).

GENERAL PRINCIPLES TO HELP GUIDE THE SELECTION OF PRACTICES

Five general principles can be used to guide the selection of effective practices: least restrictive environment, family-centered services, transdisciplinary service delivery, inclusion of both empirical and value-driven practices, and inclusion of both developmentally and individually appropriate practices.

1. Least Restrictive And Most Natural Environment

Individuals with Disabilities Education Act (PL 99-457) states that children should be placed in the least restrictive environment or the most natural setting. This is not simply a placement issue, however; the method of providing services, regardless of setting, should allow for maximum participation in the "mainstream." Despite the limitations that a

disability might place on a child's and family's ability to lead an ordinary existence, good services should promote the potential for "normal" rather than "disabled" routines by providing fun environments that stimulate children's initiations, choices, and engagement with the social and material ecology. Programs should focus on preparing children for the next, less restrictive, environment.

2. Family-Centered Services

A second principle is that service delivery models should (a) recognize that the child is part of a family unit; (b) be responsive to the family's priorities, concerns, and needs; and (c) allow the family to participate in early intervention with their child as much as they desire (Bailey, McWilliam, & Winton, 1992). Services that previously might have been geared almost exclusively toward children must have the flexibility, expertise, and resources to meet the needs of other members of the family as those needs relate to the child's development (Public Law 99-457). It is strongly recommended that service providers give families choices in the nature of services; match the level of intensity of services desired by the family; and provide center-based services close to where families live.

3. Transdisciplinary Service Delivery

One model for increasing the opportunity for family members to make meaningful decisions and participate in early intervention is transdisciplinary service delivery (Raver, 1991). This model involves team members sharing roles: each specialist helps other members to acquire skills related to the specialist's area of expertise. This requires both role release (accepting that others can do what the specialist was trained specifically to do) and role acceptance (accepting that one's job can include more than what one was specifically trained to do). Transdisciplinary service delivery encourages a whole-child and whole-family approach, allows for the efficient use of the primary interventionist (i.e., the child and family do not always need to see many different specialists), and fosters skill development in everyone.

4. Inclusion of Both Empirically and Value-Driven Practices

Empirical research has shown that practices should include such features as adult:children ratios that maximize safety, health, and promotion of identified goals; barrier-free environments; and environments that promote high levels of engagement. Practices guided by values include having someone available to speak the family's preferred language; basing communication with family members upon principles of mutual respect, caring, and sensitivity; making environments safe and clean; employing clinic-based services only when they are identified as the least restrictive option; and giving opportunities for the family to have access to medical decision-makers.

5. Inclusion of Both Developmentally and Individually Appropriate Practice

"Developmentally appropriate practice" (DAP) refers to educational methods that promote children's self-initiated learning (Bredenkamp, 1987) with emphasis on individualization of services in response to children's characteristics, preferences, interests, abilities, and health status and curricula that are unbiased and nondiscriminatory around issues of disability, sex, race, religion, and ethnic/cultural origin.

The reality of today's society is that any child, on a given day, may be a child with special needs. Recognizing this fact, it is important that local preschool and early education programs tailor curriculum and instructional practices to fit the diversity represented in their classrooms. Adapting the "standard" to fit those who may not fall within expected margins is a strategy necessary for effective teaching and learning and one that enhances the likelihood that children will feel and be successful.

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In research and evaluation, a sample of subjects typically receives some form of programmatic treatment then outcome scores for these students are compared with outcome scores of a control or comparison group. Lewis and McGurk (1972) point out some of the implicit assumptions when this design is applied to programs for infants and toddlers: 1) "infant intelligence is a general unitary capacity," 2) "mental development can be enhanced by enriching the infant's experience in a few specific areas," and 3) infant scales can "reflect any improvement in competence that results from a specific enrichment experience." The traditional control group-comparison group design adopts the viewpoint that frequency and nature of observable cognitive activities increase at a steady rate as a result of the growth process.

The contrasting viewpoint is that infants and toddlers are going through a period of rapid, non-linear growth and change along many interwoven lines of development (Horner, 1980). Accordingly, different levels and kinds of cognitive development would be presented by different individuals during different stages of development, short-term consistency of individual traits would be low, traits measured during infancy would have low correlations with later skills, broad programmatic treatment effects will be small, and a different research and evaluation paradigm is needed.

This digest examines these contrasting assumptions. We start by examining the short and long term consistency of test scores. We then relate this consistency to the literature on the cognitive development of infants and toddlers. We then identify gains associated with some particularly effective programs for infants and toddlers and the statistical implications of those gains. We end with a set of recommendations for the design of research and evaluation studies.

SHORT TERM CONSISTENCY

Different types of reliability estimates are used to estimate the contributions of different sources of measurement error. Inter-rater reliability coefficients provide estimates of errors due to inconsistencies in judgment between raters. Estimates of internal consistency (Cronbach's alpha, Kuder Richardson formula 20 and 21) account for error due to content sampling, usually the largest single component of measurement error when testing older children and adults. Of primary interest with infants and toddlers is test-retest reliability which measures the consistency of the trait for groups of individuals.

Test-retest reliability tends to be quite low when scales are administered to infants. As the child gets older, test-retest reliabilities tend to improve. Werner and Bayley (1966) summarized studies examining the test-retest reliability of various infant measures and noted wide variations in scale scores. One study, for example, found 1 day test-retest reliabilities on the Buher Baby tests to range from .40 to .96 depending on the age of the infants. Another study found 2 day test-retest reliabilities on the Linfert-Hierholzer scales for 1-2- and 3-month-olds to be .24, .44 and .69 respectively. Horner (1980) found 4-10 day test-retest reliabilities on the Bayley for 9 month old females, 9 month old males, 15 month old females and 15 month old males to be .42, .67, .96, and .76 respectively. Werner and Bayley (1966) found the percentage of agreement across two administrations of the Bayley to 8-month-olds varied from 41% to 95% with a mean of 76%. With 9- and 16-month-olds, Horner (1980) found slightly higher consistencies on the same items, with means of 85% for both age groups.

Thus, test-retest reliability is extremely low for infants and increases moderately for toddlers. The lack of test-retest reliability is consistent with the view of the child going through non-linear growth. It is inconsistent with the notion that the cognitive activity in infants increases at a steady rate as a result of growth.

LONG TERM CONSISTENCY

The classic studies of mental growth in normal infants and toddlers show inconsistent and unpredictable growth rates of these observable skills and traits. Bayley, for example, reported correlations between -.04 and .09 between scores during the first 3 months of life and scores at 18 to 36 months. Looking at race and gender with a sizeable sample, Goffeney, Henderson and Butler (1971) later found virtual no correlation between 8 month and 7 year measures. Escalona and Moriarty (1961) found virtually no correlation between 20 month and 6 to 9 year scores.

"The findings of these early studies of mental growth of infants has been repeated sufficiently often so that it is now well established that test scores earned in the first year or two have relatively little predictive validity" (Bayley, 1970). Comprehensive reviews of the literature by Stott and Ball (1965), and Thomas (1970) fully support Bayley's view and draw the same conclusion. There are notable exceptions, however. Many developmental inventories are excellent screening devices capable of identifying students with permanent cognitive disabilities.

EARLY CHILDHOOD DEVELOPMENT

Bayley (1958) outlines the skills and behaviors that we can observe during the first years. In the early months of life, we can only observe variations in sensory-motor coordination and simple adaptive responses. These adaptive responses develop into rudimentary forms of interpersonal communication in the form of gestures, vocalizations, and basic emotional responses. Then we have language gradually developing. At first, language is tied to the immediate and concrete; later, it becomes more symbolic. The child begins to abstract and generalize his experience.

Through factor analysis, Bayley (1955) identified three distinct kinds of intellectual behaviors: sensory motor which is dominant during the first year, persistence which tends to be dominant during the second and third year, and a general intelligence which is dominant at age 4 and the only operating factor after age 6. This third, general intelligence factor of Bayley appears to be the stable intelligence factor discussed by Binet and Cyril Burt.

The important consideration for research and evaluation is that there is no continuity across these three developmental stages. Rather, infants and toddlers develop a composite of skills that are not necessarily covariant. Scores obtained when a child is in one stage of development will be uncorrelated to scores obtained when the child is in different stage.

STATISTICAL IMPLICATIONS

We now turn to a key statistical consideration of the control group-comparison group model. Are our statistical tools powerful enough to detect differences when they do exist?

The power of a statistical test refers to the probability that it will lead to the rejection of a null hypothesis given that there is indeed a difference in the population (Cohen, (1988). Power depends on three parameters: the significance criterion, the reliability of the sample results, and the effect size. The significance level is usually set at $\alpha = .05$ or $.01$. The reliability of the sample results is a function of sample size and the reliability of the chosen measure. The effect size is the degree to which the phenomenon exists and is typically expressed as the standardized difference between group means. Given sample size, alpha level, and expected effect size, we can compute the probably of finding a significant difference in our samples.

Critical in the analysis of power is the expected effect size. How much of an effect can we expect of quality early intervention programs? Ottenbacher (1992), examined 237 effect sizes from 59 such studies. Applegate (1986) conducted a meta-analysis of 114 effect sizes from thirteen studies. One large Head Start evaluation (ACYF, 1983) coded 71 studies to look at 148 comparisons and 449 effect sizes. Depending on the age and the variables being considered, the typical effect size for infants and toddlers appears to be about .25 standard deviations.

With an effect size of .25, an alpha of .05, and a sample size of 100 subjects per group, the power of a t-test is .35. That is, there is only a 35% chance of finding an existing significant difference. If we take into account that many of the measures only have a reliability coefficient of .7, the odds of finding a significant difference drop to 28%.

Thus, the researcher or evaluator is not likely to find significant differences even when they do exist. Further, in light of the lack of long term consistency, significant differences are of little practical value.

RECOMMENDATIONS

We fully concur with Lewis and McGurk (1972) who wrote in their classic Science article that infant development scales "are unsuitable instruments for assessing the effects of specific intervention programs" (p 1176) and that "the success of specific intervention programs must be assessed according to specific criteria related to the content of the program" (p 1177).

Few early childhood programs seek to improve overall intelligence or to hasten the general cognitive development of infants and toddlers. Rather most programs seek to provide interventions for specific identified needs, either for the family or child or both. The typical early childhood program can be accurately viewed as a collection of individually tailored programs. Thus, the individual intended outcomes should be identified and the program's success gauged against whether those outcomes are worthwhile and whether they were attained.

The measures used to describe the development of program participants should not be accepted at face value. They are not necessarily reliable or valid for specific programs. Do the measures assess the relevant outcomes? Were they developed and normed on a population similar to that being served? If not, then a local item analysis and perhaps test recalibration is needed.

In lieu of control-comparison group hypothesis testing, we advocate the use of case studies, the computation of effect sizes, and the examination of growth curves. Case studies can provide rich data to help policy makers and researchers understand interventions. Effect sizes help gauge the relative contributions of the intervention. Growth curves can help identify trends and control for some error.

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Core Concepts in Child Development

Do infants follow a smooth, predictable path or is early growth and development characterized by bumps and detours? Are babies passive creatures or are they born with an active capability to learn? Drawing on the extensive body of available research, the committee that wrote the report identified 10 core concepts of early childhood development that should help guide parents, caregivers, and policy-makers.



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Core Concepts of Development

From

*From Neurons to Neighborhoods:
The Science of Early Childhood Development*

- Human development is shaped by a dynamic and continuous interaction between biology and experience.
- Culture influences every aspect of human development and is reflected in childrearing beliefs and practices designed to promote healthy adaptation.
- The growth of self-regulation is a cornerstone of early childhood development that cuts across all domains of behavior.
- Children are active participants in their own development, reflecting the intrinsic human drive to explore and master one's environment.
- Human relationships and the effect of relationships on relationships, are the building blocks of healthy human development.
- The broad range of individual differences among children often makes it difficult to distinguish typical variations and maturational delays from transient disorders and persistent impairments.
- The development of young children unfolds along individual development pathways whose trajectories are characterized by continuities and discontinuities, as well as by a series of significant transitions.
- The development of young children is shaped by the ongoing interplay among sources of vulnerability and sources of resilience.
- The timing of early experiences can matter, but, more often than not, the developing child remains vulnerable to risks and open to protective influences throughout the early years of life and into adulthood.
- The course of development can be altered in early childhood effective interventions that change the balance between risk and protection, thereby shifting the odds in favor of more adaptive outcomes.

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Core Concept # 1

From

*From Neurons to Neighborhoods:
The Science of Early Childhood Development*

Human development is shaped by a dynamic and continuous interaction between biology and experience. Early pioneers in the field of child study approached the complexity of human development by devising simple models and testing them. Some, such as Arnold Gesell (1925, 1929), believed that the emergence of skills is driven primarily by genes. Others, such as John B. Watson (1928), believed that all behaviors are determined by the environment. These early models reflected a mechanistic conceptualization of development that was derived from the physical sciences. Over time, it became increasingly clear that humans do not behave like machines (neither the prewired nor the programmable type), and children began to be viewed through the lens of modern biology, rather than that of classical physics or chemistry. Consequently, human development is now described in interactive terms (i.e., "dynamic"), reflecting the essential characteristic of a living organism. Virtually all contemporary researchers agree that the development of children is a highly complex process that is influenced by the interplay of nature and nurture. The influence of nurture consists of the multiple nested contexts in which children are reared, which include their home, extended family, child care settings, community, and society, each of which is embedded in the values, beliefs, and practices of a given culture. The influence of nature is deeply affected by these environments and, in turn, shapes how children respond to their experiences. In simple terms, children affect their environments at the same time that their environments are affecting them. Moreover, no two children share the same environment, and no environment is experienced in exactly the same way by two different children. Two youngsters living in the same home influence each other and are affected by the other members of the family in unique ways. If one child is active and aggressive and the other is passive and subdued, each will elicit different responses from the parents -- and each will be influenced differently by the behavior of the other.

These concepts reflect what Sameroff and Chandler (1975) characterized as the transactional nature of the developmental process and what Bronfenbrenner (1979) described as the ecology of human development (also see Horowitz, 1999). This transactional-ecological model of development provides a useful framework that moves far beyond the misleading and tired old nature-nurture debate. It helps people think in more sophisticated ways about the complex determinants of successful adaptation and health as well as those of maladaptation and disorder. It offers insights into how the same behavioral disposition may be adaptive in one context and not in another. It also fits well with what scientists are learning about the dynamic nature of the development of the brain.

Children vary in their behavioral style. Some are high-strung and some are laid-back; some are agile and some are clumsy. Children are raised in a wide variety of social circumstances and cultural contexts. Some conditions are secure and others are unstable; some encourage competition and others promote cooperation. Behaviors that are highly adaptive in one society (e.g., competitiveness among preschoolers in the United States) may not be so in another (e.g., individual assertiveness among preschoolers in Japan). Different childrearing environments promote distinctive patterns of skill development in some children and not in others

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Core Concept # 2

From

*From Neurons to Neighborhoods:
The Science of Early Childhood Development*

Culture influences every aspect of human development and is reflected in childrearing beliefs and practices designed to promote healthy adaptation. The influence of culture on the rearing of children is fundamental and encompasses values, aspirations, expectations, and practices. Understanding this realm of influence is central to efforts to understand the nature of early experience, what shapes it, and how young children and the culture they share jointly influence each other over the course of development. The effects of culture on child development are pervasive. It prescribes how and when babies are fed, as well as where and with whom they sleep. It affects the customary response to an infant's crying and a toddler's temper tantrums. It sets the rules for discipline and expectations for developmental attainments. It affects what parents worry about and when they begin to become concerned. It influences how illness is treated and disability is perceived. It approves certain arrangements for child care and disapproves others. In short, culture provides a virtual how-to manual for rearing children and establishes role expectations for mothers, fathers, grandparents, older siblings, extended family members, and friends.

Given the magnitude of its influence on the daily experiences of children, the relative disregard for cultural influences in traditional child development research is striking. The literature on typical development is based overwhelmingly on studies of middle-class children of European-American ancestry, often involving samples drawn from university communities. In contrast, much of the research on children of color has focused on the impacts of poverty, drawing its samples from homogeneous communities in high-risk urban environments. Moreover, relatively little is known about the impacts of racism and other forms of systematic discrimination on early childhood development, independent of the adverse effects of low maternal education and socioeconomic status. Consequently, knowledge of the full range of environmental influences on young children and their relation to typical variations during early childhood is highly skewed and incomplete. Similarly, the ability to disentangle the confounding impacts of economic hardship and minority group status is severely compromised (García Coll and Magnuson, 2000).

The influence of cultural context on early childhood development is widely acknowledged. The empirical literature in this area, however, is underdeveloped. This weakness in the knowledge base is particularly problematic in view of the increasing racial and ethnic diversity of the population of the United States. In short, the basic concept is compelling, the database is thin, and the imperative for extensive research is clear.

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(e.g., some may reinforce active, physical performance while others encourage quiet, artistic expression).

At every level of analysis, from neurons to neighborhoods, genetic and environmental effects operate in both directions (Gottlieb, 1992). On one hand, the gene-environment interactions of the earliest years set an important initial course for all of the adaptive variations that follow. On the other hand, this early trajectory is by no means chiseled in stone. The considerable degree of developmental plasticity that characterizes an immature organism is embodied in the capacity of its cells to adapt in very specific ways, in both the short and the long run, to changing demands. Neurons grow new axons, sprout new dendrites, form new synapses, and modify the strength of some established connections while eliminating others selectively over time. The impacts of varied experiences are also reflected in observed differences in the brain's blood supply, its cellular (glial) support systems, its intercellular insulation (myelin), the neurochemicals that it produces, and the specific receptors that recognize each individual substance.

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Core Concept # 3

From

*From Neurons to Neighborhoods:
The Science of Early Childhood Development*

The growth of self-regulation is a cornerstone of early childhood development that cuts across all domains of behavior. Regulation is a fundamental property of all living organisms. It includes physiological and behavioral regulations that sustain life (e.g., maintenance of body temperature and conversion of food into energy), as well as those that influence complex behaviors (e.g., the capacity to pay attention, express feelings, and control impulses). Regulatory processes modulate a wide variety of functions to keep them within adaptive ranges. The simultaneous operation of these multiple systems at different levels of organization is an essential feature of human development.

A broad range of everyday experiences in early childhood are subject to regulation. In addition, for some children, atypical stresses can overwhelm their baseline regulatory capacities. Experience with manageable challenges (e.g., briefly having to wait to be fed or soothed) promotes healthy regulatory abilities. Repeated exposure to stresses that are overwhelming (e.g., severe malnutrition, chronic abuse) may result in significant maladaptation or disorder. Individual differences in regulatory capacities are rooted in both biological endowment and life experience. For example, the underlying neurobiology of irritability and poor attention may be affected by neurotransmitters in the central nervous system that are determined by either genetics or a chaotic environment. More commonly, regulatory dispositions involve the interplay between both endowment and experience.

As children mature, their capacity to exert their own autonomous control over key regulatory functions is essential. Advances in motor skills make it possible for preschoolers to feed themselves when they are hungry and put on a sweater when they are cold. Cognitive and emotional maturation signals a greater ability to delay gratification, to sit still to read a book, and to cope with the stresses of separation or loss. Thus, development may be viewed as an increasing capacity for self-regulation, not so much in the specifics of individual behaviors but in the child's ability to function more independently in personal and social contexts (Bronson, 2000; Kopp, 2000; Sameroff, 1989; Sroufe and Waters, 1977). The behaviors children use to regulate themselves and their environments change in meaning as they get older. What is considered typical and adaptive at one age may not necessarily be viewed in a comparable fashion at another age. Crying, for example, is an early regulatory behavior that in infancy sends important signals to caregivers, yet it may become a sign of social immaturity if it is used repeatedly to express frustration in middle childhood. Adaptive behaviors also can have costs, such as the hyper-vigilance needed to survive in a physically dangerous environment. Finally, the socialization process and meaning of some regulatory behaviors, such as physical aggression and delayed gratification, differ across cultures. Consequently, adaptations essential to survival in one context may be maladaptive in another.

The influence of cultural context on early childhood development is widely acknowledged. The empirical literature in this area, however, is underdeveloped. This weakness in the knowledge base is particularly problematic in view of the increasing racial and ethnic diversity of the population of the United States. In

short, the basic concept is compelling, the database is thin, and the imperative for extensive research is clear.

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Core Concept # 4

From

*From Neurons to Neighborhoods:
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Children are active participants in their own development, reflecting the intrinsic human drive to explore and master one's environment. The inborn drive to master the environment is a basic feature of human development throughout the life cycle (White, 1959), as we illustrate throughout Part II of this volume. Shortly after birth, children begin to learn about the world through their remarkable capacities to create their own knowledge from early experience. This inborn thrust is facilitated by the extent to which their environments provide opportunities and supports for growth. Parents and the general public wonder about which experiences are necessary for healthy development to unfold. Must these experiences be costly? Do they require expensive educational toys and early access to computers? The simple answer to such questions is generally "no." Given the drive of young children to master their world, most developmentalists agree that the full range of early childhood competencies can be achieved in typical, everyday environments. A cabinet with pots and pans, for example, seems to serve the same purpose as a fancy, "made for baby" musical instrument.

An extensive body of multidisciplinary research supports the notion of powerful inborn tendencies toward mastery that are apparent in earliest infancy. Piaget (1952) labeled this characteristic cognitive assimilation and considered it to be a basic fact of life. Others have called it mastery motivation (e.g., MacTurk and Morgan, 1995), emphasizing the experience of pleasure in performing newly acquired behaviors and skills. Fraiberg pointed out that this developmental thrust enhances efforts to direct development along positive pathways, commenting, "it's a little bit like having God on your side" (Fraiberg et al., 1980, p. 53). Reviewing previous research on early development, Emde (1990) specified aspects of this developmental thrust and proposed that they act as key ingredients for behavioral interventions throughout the life span. In this regard, all forms of early childhood intervention are most effective when they counteract obstacles to growth and promote the expression of a child's natural drive toward mastery.

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Core Concept # 5

From

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Human relationships, and the effects of relationships on relationships, are the building blocks of healthy development. From the moment of conception to the finality of death, intimate and caring relationships are the fundamental mediators of successful human adaptation. Those that are created in the earliest years are believed to differ from later relationships in that they are formative and constitute a basic structure within which all meaningful development unfolds. Because many of the regulatory systems that are essential for infant survival and emotional organization require consistent caregiving attention, it has been said (perhaps too dramatically) that without the caregiver-infant relationship, there would be no infant (Winnicott, 1965). The essential features of healthy, growth-promoting relationships in early childhood are best embodied in the concepts of contingency and reciprocity. That is to say, when young children and their caregivers are tuned in to each other, and when caregivers can read the child's emotional cues and respond appropriately to his or her needs in a timely fashion, their interactions tend to be successful and the relationship is likely to support healthy development in multiple domains, including communication, cognition, social-emotional competence, and moral understanding (Brazelton et al., 1974; Emde, 1980; Stern, 1977).

Developmental or behavioral disturbances in infants and toddlers are embedded in disturbances of the caregiver-infant relationship (Ainsworth, 1973; Bowlby, 1973; Sameroff and Emde, 1989). Because babies depend for their survival on the care of adults, it is difficult, if not impossible, to consider their problems independent from their relationships with their primary caregivers. For example, a young child may be difficult to soothe, but whether this characteristic expresses itself as a disorder that requires therapeutic attention will depend on the way it affects and is handled by the child's primary caregivers. Some adults may view such behavior as overwhelmingly negative ("he is spoiled, selfish, and unreasonable"), whereas others may see it as a positive trait ("she knows her own mind and won't settle for less than what she wants"). Most successful interventions, whether they are primarily preventive or therapeutic, are based on facilitating that relationship and helping both the child and the caregiver learn to adapt successfully to each other's individuality.

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Core Concept # 6

From
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The broad range of individual differences among young children often makes it difficult to distinguish normal variations and maturational delays from transient disorders and persistent impairments. Developmental competencies vary significantly across a wide range of individual differences, and the rank ordering of children according to their abilities changes over time. Within this broad continuum, it often can be difficult to make clear distinctions among individual differences within a normative or typical range (e.g., variations in communication skills), transient delays related to maturational lags (e.g., speech articulation errors), and diagnosed developmental disabilities (e.g., true disorders of language or cognition), especially in the early childhood years. A related issue is the fact that so many defining symptoms for disorders are also nonspecific indications that something is not quite right. This applies to depression, inattention, overactivity, and anxiety—all of which can be displayed by a child who has a fever or is overly tired, as well as by a child with a specific disorder. In part, these difficulties are related to the limitations of existing developmental measures. To a large extent, however, diagnostic dilemmas are inherent in the complex and unpredictable nature of early childhood development (Boyce, 1996).

All children have built-in capacities to attain developmental goals in multiple ways and under varying conditions. This is illustrated in the phenomenon of alternative developmental pathways, which provides a useful model for understanding the distinctive competencies that children develop in diverse cultural contexts, as well as the different family patterns of interaction that promote their unfolding (Erikson, 1950; Pumariega and Cross, 1997).

The concept of alternative developmental pathways offers a framework for viewing individual differences, maturational delays, and actual disabilities as part of a unified continuum that applies to the development of all children. The early child-caregiver relationship, for example, can be stressed by either biological or environmental threats, yet the processes governing the relationship are organized in a comparable manner, even for children with significant impairments or for those whose development is at very high risk (Cicchetti and Beeghly, 1990; Sameroff and Emde, 1989). Similarly, all developmental transitions are susceptible to the adverse impacts of a wide range of risk factors that can produce a sense of elevated uncertainty, regardless of the nature of the child or the caregiving context (Wishart, 1993). Ultimately, such patterns are understood best when they are viewed as variations within a common developmental framework. Children born with significant biological impairments (e.g., blindness, deafness, severe motor deficits) also attain a range of basic abilities, such as representational thinking and language competence, in ways different from those experienced by children without such limitations. Greater understanding of these alternative pathways can provide guidance for interventionists in their attempts to facilitate the adaptive development of young children with a wide variety of special needs, as well as in their efforts to extend constructive support to their parents (Decarie, 1969; Fraiberg, 1977; Gleitman, 1986).

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Core Concept # 7

From

*From Neurons to Neighborhoods:
The Science of Early Childhood Development*

The development of children unfolds along individual pathways whose trajectories are characterized by continuities and discontinuities, as well as by a series of significant transitions. The process of development is essentially a process of change. In some cases (e.g., increasing memory functions), that change appears to be gradual, cumulative, and continuous. In other cases (e.g., the beginning of expressive language and self-awareness in the second year), the gains are so far-reaching that they represent a qualitative discontinuity from what has come before (Brim and Kagan, 1980; Rutter and Rutter, 1993). Such transformations are often referred to as developmental transitions. These transitional phases, which may be either smooth or characterized by stress and turmoil, have been viewed as important periods of psychological reorganization that provide useful opportunities for intervention (Brazelton, 1992). Developmental transitions occur throughout the life span, but in the early childhood years they are more frequent and involve profound psychobiological changes.

A developmental transition can be thought of as a time when change is pervasive and enduring, and when it involves a major reorientation in how a child relates to the environment. It is a time when the emotional communication between children and caregivers is particularly significant (Emde, 1998). Developmental transitions are periods of psychological disequilibrium that reflect elements of both the stage that is being completed and the stage that is about to begin. The intense negativism of toddlers, who are attempting to reconcile strong feelings of attachment to their parents and a powerful drive for personal autonomy, is a familiar example of this complex phenomenon.

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Core Concept # 8

From

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Human development is shaped by the ongoing interplay among sources of vulnerability and sources of resilience. Individual developmental pathways throughout the life cycle are influenced by interactions among risk factors that increase the probability of a poor outcome and protective factors that increase the probability of a positive outcome (Garmezy et al., 1984; Rutter, 2000; Werner, 2000). Risk factors may be found within the individual (e.g., a temperamental difficulty, a chromosomal abnormality) or the environment (e.g., poverty, family violence). Protective factors also may be constitutional (e.g., good health, physical attractiveness) or environmental (e.g., loving parents, a strong social network). The cumulative burden of multiple risk factors is associated with greater developmental vulnerability; the cumulative buffer of multiple protective factors is associated with greater developmental resilience. Sameroff, Seifer, Barocas, Zax, and Greenspan (1987) have demonstrated that the total number of risk factors in a child's life is a better predictor of IQ scores than the specific nature of those factors. The double burden of both biological and environmental risk produces an unusually high level of vulnerability (Escalona, 1982; Parker et al., 1988; Shonkoff, 1982).

Some developmental pathways follow trajectories or patterns that are deeply ingrained and thus less amenable to influences that may deflect them in a positive or negative direction. Others are highly susceptible to such risks and protective influences. Waddington (1966) compared these pathways to the valleys and ridges that are formed by a ball rolling downhill. The further the ball rolls along a given path, the deeper are the valleys and the steeper are the ridges. Developmental characteristics that are embedded in deeply chiseled trajectories (e.g., basic motor capacities, such as crawling and walking) are less amenable to environmental modification and are described as canalized. Other trajectories have valleys that are more shallow or ridges that are less steep, which leave them more susceptible to change (e.g., basic self-care skills, early literacy). Ultimately, the extent to which any existing pathway can be modified or redirected is determined by both biological and environmental influences. The child's own expectations, and those of the significant people in his or her life, often play an important role in maintaining or changing direction. These concepts are especially pertinent to the literature reviewed in Part III regarding the contexts for early development.

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Core Concept # 9

From

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The timing of early experiences can matter, but, more often than not, the developing child remains vulnerable to risks and open to protective influences throughout the early years of life and into adulthood. Human adaptation derives from both the rapid consolidation of essential capacities and lifelong flexibility to adjust to changing circumstances (see Chapter 8). Efforts to understand which aspects of development become set early on and which remain open to change have been shaped by notions of critical and sensitive periods, as well as by a growing research literature on the malleability or plasticity of the human organism.

The concepts of both critical and sensitive periods refer to unique episodes in development when specific structures or functions become especially susceptible to the influence of particular experiences (Bornstein, 1989; Thompson, in press(a)). Although critical periods have been well described for several behaviors in a variety of animal species (e.g., imprinting in newborn geese), the term "sensitive period" is preferred when studying humans because it implies less rigidity in the nature and timing of the required experiences, as well as less inevitability in its developmental outcome (Immelmann and Suomi, 1982). Current knowledge suggests that, although developmental progress in some domains may be relatively more amenable to facilitation or vulnerable to harm during certain periods in comparison to others (see, for example, the discussion of institutionalization in Chapter 9 and of family income in Chapter 10), advances can occur at virtually any age.

The concept of developmental plasticity refers to the capacity of the brain to reorganize its structure or function, generally in response to a specific event or perturbation. Although it is determined fundamentally by genetic modification, plasticity often comes about as a result of a change in the environment (see Chapters 2 and 8). Times of developmental transition, which are often characterized by major alterations in person-environment relationships, provide important opportunities for understanding this critical adaptive phenomenon. Neurodevelopmental plasticity varies inversely with maturation. That is to say, there is more multipotentiality (i.e., greater capacity for alternative developmental adaptations) in the early childhood period than in the later years.

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Core Concept # 10

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The course of development can be altered in early childhood by effective interventions that change the balance between risk and protection, thereby shifting the odds in favor of more adaptive outcomes. Although the desire to learn, grow, and "become" is inherent in the biology of early childhood, it is also a characteristic that is open to modification based on individual experience. When the environment supports a child's emerging sense of agency (i.e., the feeling of being able to influence events and thus having an impact on one's own life), his or her motivation to act on the world flourishes. When experience fails to support (or punishes) such action, a child's motivation diminishes, shifts, or finds problematic outlets. Early environments that facilitate competence and a sense of personal efficacy are more likely to foster children who do well. When opportunities for agency are limited, psychological growth is more likely to be compromised. A wide variety of early intervention policies and programs have been designed to create growth-promoting environments for young children whose development is threatened by biological vulnerability or adverse life circumstances (see Chapter 13). Different models employ varying combinations of strategies focused on providing direct experiences for the child, influencing the behaviors of the child's primary caregivers and/or working directly on the child-caregiver relationship. The basic objective underlying all interventions in the early childhood years is to increase the probability of a more favorable developmental trajectory for each child. This is accomplished by attempting to identify and mitigate the influence of existing risk factors, as well as to identify and enhance the buffering capacity of available protective factors. This often occurs in the context of specific therapeutic or educational services. Individual goals are determined in terms of each child's and family's baseline status in conjunction with an assessment of the extent to which relevant risk and protective factors are susceptible to change. In the final analysis, early childhood intervention is viewed most appropriately as an individualized strategy designed to increase the probability of a desired outcome, and not as a developmental panacea for all children under all circumstances. It is the art of the possible, based on the science of early childhood development.

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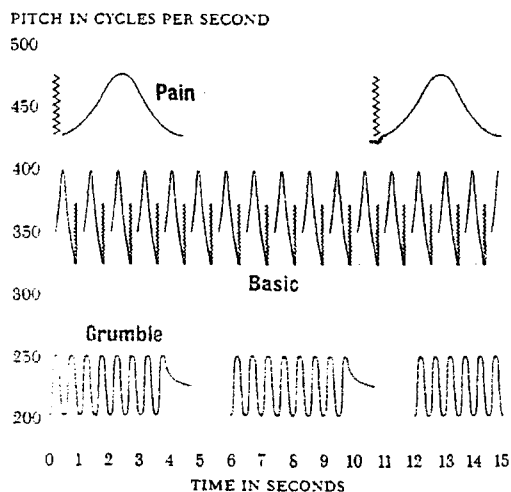
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A Bundle of Emotions

Whether by smiling or screaming, crying or cuddling, babies find ways early on to tell us how they feel. Good behavior comes along later. What to watch and listen for:

Ⓜ A Repertoire of Cries

All babies cry, and usually for good reason. Before they learn to talk, crying is one way to express their needs and send out signals of distress. Examples of three typical cries, and their differences in volume, pitch and rhythm:



Pain A cry of pain or distress usually begins with an inward gasp followed by a long, rising shriek. There is a long pause until the next painful scream. Soothe the baby by rocking or with music.

Basic A basic cry rises and falls rhythmically, broken up with a breath and a pause. The child may cry this way when demanding food or attention.

Grumble A grumble cry is the first attempt at communication. It has a lower pitch and volume, often sounding whimpery and whiny. It is a signal that the child may be getting restless. Move the child to a different environment and provide new stimulation.

0-2 months old

1 month old

Behavior Alert to stimuli like loud sounds and bright patterns. Quiets to holding or cuddling.

Interaction Child may recognize parent's voice or make eye-to-eye contact.

Tip Spend special time with siblings who may feel abandoned or jealous.

2 months old

Emotions Cries to show distress or pain, coos when happy or excited.

Tips If leaving child with a sitter, choose someone both you and the baby know, like a grandparent or close friend. Keep a list of emergency numbers handy.

Ⓛ Toys and Games for Curious Tots

Children love playtime, especially when parents or siblings join in the fun. Look for educational toys and games that encourage development:

1-3 months old Mobiles, unbreakable mirrors and activity centers attached to crib. rattles, stuffed toys with black and white patterns, music boxes, large colorful rings.

4-6 months old Beach balls, chunky bracelets, building blocks, squeaky toys, paper streamers, books made of cloth or vinyl, playing peekaboo or come-and-get-me with others.

7-9 months old Stuffed animals, balls, nesting cylinders, pop-up toys, large dolls and puppets, bath toys, performing "so big" or pat-a-cake.

10-12 months old Push-and-pull toys like miniature cars, ordinary household objects like empty egg cartons and large spoons, stacked rings on a spindle, playing simple ball games.

13-15 months old Toy telephones, acrobatics, pushing a carriage or toy horse, playing with cups and clothespins.

16-18 months old Sandbox, simple musical

instruments like a drum or tambourine, large colored beads, jack-in-the-boxes, blowing bubbles.

19-21 months old Rocking horse, toys to take apart and fit back together, small rubber balls, digging toys, large crayons, kiddie cars, water games, easy jigsaw puzzles, making mud pies, playing tag or hide-and-seek.

22-24 months old Kiddie lawn mowers and kitchen sets for make-believe play, modeling clay, construction sets, action toys like trains, telephones, dump trucks and fire engines, old magazines, baskets, tubes and containers with lids.

2-3 years Beginner tricycle, mini-trampoline, roller skates or Rollerblades, dolls and accessories like strollers and baby bottles, dress-up clothes, coloring books, easel, crayons and markers, music, kiddie cassette player, swing sets, books, finger paint, mini basketball hoop, woodworking bench, kiddie swimming pool.

3-8 months old

3 months old

Behavior Smiles often to others or while sleeping.

Interaction May cry differently when mother leaves the room than with other people. Begins to sort out who's who in his life. May prefer certain people.

4 months old

Behavior Laughs while playing and may cry if playtime is interrupted. May still act passively, taking in whatever toy or face comes near.

Emotions Shows curiosity when inspecting rattle and dependency when wanting to be held. Moods may change rapidly.

Interaction Tries to get parent's attention by banging rattle or crying.

5 months old

Behavior Child may become more assertive as he learns to reach for objects.

Emotions Shows anger when someone tries to take away his toy. May begin to handle stresses better because of maturing nervous system.

Tips Set clear rules if sibling tries to hurt baby. Give child responsibilities as big brother or sister.

6 months old

Interaction May fear strangers. Responds positively to other children.

Tip When baby repeatedly puts an object in his mouth that he should not, gently pull his arm away, say no and distract with another activity.

7 months old

Behavior May test parents' authority by refusing to follow their directions.

Emotions Shows humor and laughs at funny expressions or positions.

Interaction May give familiar people hugs and kisses. May raise his arms to be picked up.

8 months old

Behavior Smiles at, pats or even kisses his mirror image. May distinguish between baby and image.

Interaction May reject being alone or confined in a crib or playpen. May fear being separated from parents as he learns to crawl. Buries head in parent's shoulder when meeting new people.

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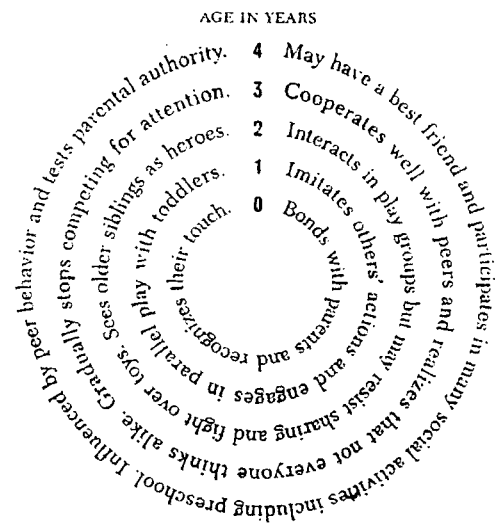
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Gircles of Friends

A baby's first friends are his parents, and interaction with them prepares the child for future relationships in larger social circles:



9-16 months old

9 months old

Interaction May perform tricks like "so big" and peekaboo for familiar people. May repeat act if applauded. Near the end of the first year, child may learn to assess moods and imitate them. If baby sees someone crying, he may cry too.

10 months old

Emotions Shows twinges of jealousy. May cry or whimper when sibling is at center of attention.
Interaction Starts to become aware of social approval and disapproval.

11 months old

Behavior May use a security blanket for comfort in strange places.
Interaction May assert himself among siblings. Likes to imitate gestures and sounds.

12 months old

Tips Try not to fuss when leaving child at home. Allow time for him to adjust to sitter. Distract baby with another activity and give a quick good-night kiss. Crying will probably stop after parents depart.

13 months old

Behavior Laughs when chased. May become more demanding and seek constant attention.
Emotions After the first year, personality begins to emerge. May be an explorer, a tease, a showoff.

14 months old

Behavior Child may turn more aggressive as she learns to walk. May throw objects in anger.
Interaction May enjoy playing alone, but still likes to act for an audience (toy chart, above left).
Tips Time to baby-proof your house.

15 months old

Emotions May communicate feelings with a clear intent or purpose.
Interaction By midyear, some babies may recognize when familiar people are missing. May offer toys to others but will quickly want them back.

16 months old

Behavior Instead of using words, child flings arms or moves away to say no.
Interaction May hit parents in anger.

C

Many organizations offer advice on parenting and child development. Check with your public school for local groups. A few notable programs:

Home Instruction Program for Preschool Youngsters (HIPPI USA):
212-678-3500

MELD (Minnesota Early Learning Design):
612-332-7563

Parents as Teachers National Center:
314-432-4330

Birth To Three:
800-680-7888

Family Resources:
800-641-4546

17-24 months old

17 months old

Interaction May respond correctly to what parents say. If scolded, child cries; if praised, she smiles.
Tips Some toddlers shy away from others. Give child time to adapt to new situations and hold her hand.

18 months old

Behavior Frustration may trigger tantrums. At this age, child acts on impulse due to limited understanding of good and bad, rules and warnings.
Interaction Communicates desire for closeness by plopping on parent's lap. Still has no sense of sharing with others.

19 months old

Behavior Enjoys getting out of the house and exploring new environments.
Interaction Some children will play among others in a group. May engage in parallel play.
Tips Praise will motivate child to obey the simple rules set. Give precedence to rules that keep her safe, as well as ones that prohibit hitting and kicking.

20 months old

Behavior During pretend play, child acts out what happens around her.
Emotions May fear thunder, lightning, big animals and the dark. Install night light if sleep is consistently disrupted.
Interaction Slowly warms to a new babysitter, but may still cling to mother around people she was comfortable with earlier.

21 months old

Emotions May sympathize with other people or recognize their feelings. Expresses love for parents by hugging and smiling.
Interaction Still possessive of toys but may give up objects that belong to someone else.

22 months old

Interaction Cooperates with others. Language development facilitates communication. Engages in parallel play with toddlers, often back to back.
Tips To build self-reliance, encourage child to separate from parents for short periods of time.

23 months old

Emotions May fear rejection and become frustrated with new activities.
Interaction May be willing to play alone. Likes to follow siblings and imitate their actions.
Tips Try to give siblings some privacy and designate a special time to spend with them.

24 months old

Behavior May become manipulative and bossy. Learns rules through trial and error.
Emotions Able to explain feelings and desires using gestures and simple phrases. Trusts adults.
Interaction Plays well with older children. May hand toy to another child. Imitates others through pretend play. May show signs of jealousy or revert to babyish actions when a new sibling arrives.

2-3 years old

25-29 months old

Behavior Sees the world almost exclusively through his needs. Assumes everyone thinks and acts like him. May throw tantrum when angry or frustrated.

Emotions May have frequent mood swings. May pout or feel guilty when scolded. Learns how to express sadness or stress.
Interaction May pull away from familiar children or adults. Siblings take on a greater role in daily life. May enjoy play groups; the concept of "friend" evolves.

Tips Do not give child an audience during a tirade. Try not to scream back or dwell on the tantrum after it's finished.

30-36 months old

Behavior Toddler slowly begins to realize what's acceptable and what's not. May find it difficult to concentrate on new tasks.
Interaction Child may be conscious of being a member of a family. May show pity or sympathy to familiar people. Sharing parent's attention with siblings can be difficult. Insists on being at the center of play and may dislike sharing limelight with peers. May be ready for nursery school, which can create separation anxiety. In nursery school, child learns to follow rules, to cooperate with others and to spend a few hours away from home.
Tips Encourage child to act responsibly by setting limits on dangerous or antisocial behavior. Time-outs may help defuse anger. Be consistent with rules. Praise child when he plays well with others.

By JENNIFER LACH

SOURCES: "THE EARLY CHILDHOOD YEARS: THE 2 TO 6 YEAR OLD," "THE SECOND TWELVE MONTHS OF LIFE," "THE FIRST TWELVE MONTHS OF LIFE" BY THERESA AND FRANK CAPLAN; "CARING FOR YOUR BABY AND YOUNG CHILD" BY STEVEN P. SHELLEY, M.D.; "FIRST FEELINGS" BY STANLEY GREENSPAN; "YOUR BABY & CHILD" BY PENELOPE LEACH.

October 12, 2000

My name is Lori J Berzonski
4815 Josephine Dr
Gibsonia, PA 15044
(412) 492-0627
Mom to Andrew J Berzonski age 3

To whom it may concern.

I am writing this letter in regards to the proposal of changing the terminology to "Mentally Disabled" As a mother of a physically handicapped child I have a great deal to say; even though my son is out of the EI system. For one thing, my son is NOT "Mentally Disabled". He has Cerebral Palsy and Hydrocephalus with a Ventricular Peritoneal shunt. He has Right Hemiplegia which resulted from a stroke in utero. He is physically delayed. He needs/needed physical, occupational, speech and developmental (for behavior and social /emotional) therapy. Since my son is not "Mentally Disabled" he would not get the services he needs/needed, or better yet deserved if the new terminology were to be implemented.

If the children with no "Mental Disability" have other issues they would be affected and treated unfairly. My son had been evaluated in the beginning of Nov. but did not receive services until Jan. (but that is a different story) Had this proposal been in effect back then, my son would probably still not be walking and would be way behind in all areas. This correlates in with another phrase "As soon as possible" Whose "as soon as possible" does that refer to? The person in supervision, administration, government. someone whom has never seen the child, or the child and his/her family? "As soon as possible" is another impediment. Immediately would be a more valuable, more appreciated, engaging and knowing no confines phrase.

The wording change will only make loopholes. What if a child who has a "Mental Disability" ie..Down syndrome, gets evaluated for services but she/he tests higher than the "standards" then what.... the child does not receive services? Not Fair. Here is a situation.. My son, has CP and Hydro, my girlfriends daughter has D.S. My son has no "Mental Disability" but my girlfriends daughter has the label of mental retardation because of the DS dx.. My son is so much farther behind in physical, occupational, speech and social/emotional than my friends daughter. Therefor neither one of the kids get any therapy. They are about equal on their cognitive level. My son has a cognitive delay, not because he has a "Mental Disability", but because he has no form of verbal communication, and limited use of sign .

This whole proposed change APPALLS me as a mother. I WOULD NOT want and DO NOT want my son to have a label that is going to diminish his rights to services needed. Nor do I want him to go through school or life with a label that does not fit true to him. I also do not think it is fair to label other kids with some degree of cognitive delay with "Mental Disability" Some of us parents with children with disabilities do not have the resources to get help other places. Insurance companies only pay for so much and give allotted time frames and allotted services. I for one know about the services Ins. Co. do not pay for. Many do not have the monetary income to go out on our own.

Many people will try to tell us parents that the wording will not change anything . My family is testimony that wording can and does change things. It makes loopholes, invites deceptive scenarios and impedes many things. Words are easy to get around. When my son was ready for transitioning into Preschool, The evals were done in an appropriate time frame.... but the AIU went on their vacation before taking care of my sons IEP. Therefore, the IEP was late and it still had to go through the state. This was not going to get him in school by his 3rd Birthday (at which time services from EI would STOP) Finally his IEP for Easter Seals.... At which time I asked for an addendum. to continue with his therapies until he entered school. At that time Andy was scheduled for heel cord release surgery. The AIU representative kept asking me if I really thought he would be up to services after surgery. My response was "Yes he had brain surgery and it didn't slow him down" I felt I was being persuaded into not using the therapies he deserved: Another example of words not spoken. Also at the IEP, Andrews service Coordinator from ARC asked the question, (knowing what had happened so far) "what IF he doesn't get into school by Oct 2nd?" : (the promised date to start) and she was hushed so-to -speak with an abrupt..."OH he will" Guess what he was not permitted to go on the 2nd. Paper work was not sent in... Yet another example of spoken

words not carried out (an "as soon as possible"). I had a hard time with this, It set him back in his social/emotional and behavioral areas. He was screaming and having a fit. (He did not want to go) When I took him home, in his mind he thought "I won, I will do this all the time and I will get to come home"

All this change is going to do is impair the children and make Families doubt our system. Deaf children not getting speech cause they are not "Mentally Disabled" CP children not getting physical or occupational therapy cause they are not "Mentally Disabled" Where will it stop. How far will it go?

In my parental surmise, the changes that are being proposed are incomplete, intolerable, disheartening, uncarefully thought up, and very restrictive.

I am asking to take into consideration and heed the words spoken here.

How many of us want our children having a label of "Mentally Disabled"? I for one can say "I don't". How many of our kids can embrace that label. Especially as they go through their later years in school? How many parents of "Mentally Disabled" want their child not getting services cause they test out? Please leave well enough alone.

Loopholes will be made and our system will betray us as all. We will deceive our children. This will only limit the services to a select few and the other children will go underachieved because the system failed them. Please do not allow this change to go through.

If/When this happens where do we turn? Where do our children turn? How do they get the help they so very much need and deserve? What happens next? We the parents, of ALL disabilities, want the rights of our children (the worlds future) to be protected, cherished and secured in a way we ALL deserve.

Sincerely Lori J Berzonski

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2000 OCT 24 AM 11:22
REGULATORY
REVIEW COMMISSION

C.C.I.C.C.
C.C.I.C.C.

CHESTER COUNTY INTERAGENCY COORDINATING COUNCIL
749 Springdale Drive, Exton, PA 19341 (610)524-5850

October 11, 2000

Mr. Mel Knowlton
Office of Mental Retardation
P.O. Box 2675
Harrisburg, PA 17105-2675

Dear Mr. Mel Knowlton:

We are writing you in reference to the Department of Public Welfare's draft of the Early Intervention Regulations. We appreciate that the comment period has been extended until the end of this month allowing groups like us the time to appropriately comment on the proposed regulations.

The Chester County Interagency Coordinating Council is composed of parents and professionals who have an interest in early intervention services and practices. The following is a list of suggested changes that the CCICC is recommending as changes to the regulations.

Section 4226.54 Requirements for Service Coordinators

An associate's degree is an insufficient requirement for the duties of a Service Coordinator; we suggest that a four-year college degree in a human service field, with knowledge of children and family related issues be the requirement.

Section 42126.25 Initial Screenings

We suggest that the Federal IDEA standards apply and that every child referred to Early Intervention received a MDE.

Section 4226.74 (5) Natural Environment

We suggest that the language include that the IFSP team holds the decision on where the services are to be provided.

Section 4226.74 (7) (I) IFSP services - start dates

We strongly recommend that “as soon as possible” be replaced with language “not to exceed 21 calendar days”.

Section 4226.74 (9) Transition from Early Intervention System

We strongly recommend that the current IFSP should continue if a family is not in agreement with services and the IEP that the MAWA offers. Also, the regulations should be in agreement with the transition policy of the Pennsylvania Department of Education.

Section 4226.75 Provisions of services before evaluation

We would caution against identifying services prior to evaluation and the definition of outcomes.

Section 4226.36 Training requirements

Although we agree that 24 hours of training per year is appropriate for staff working in Early Intervention, we request that there is a provision for providers to be given additional funding to cover the cost of training and the cost of personnel attending the trainings. Also, we suggest that this training be built into the calendar so that it does not interfere with IFSP service compliance.

Section 4226.55 Early Interventionist

We recommend that this section be removed. It is confusing as to who this person is and how they can implement the IFSP. We suggest that DPW institute a waiver given on a case by case basis for counties who are having difficulty finding qualified personnel.

Section 4226.14 Other Funding sources

We strongly recommend that the “private funding” should be taken out as a mandatory requirement for exhausting other resources.

Section 4226.38 **Criminal History**

We suggest that this include a child abuse clearance (Act 33 and 24).

Section 4226.91 **Procedural Safeguards**

We suggest that a complaint management system should be included.

On behalf of the Chester County Interagency Coordination Council, we thank you for the opportunity to comment on the regulations and look forward to the final draft.

Sincerely,

A handwritten signature in cursive script that reads "Margaret Rybinski".

Margaret Rybinski
Subcommittee on EI regulations
CCICC Member

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October 11, 2000

2000 OCT 24 AM 11:23

Good morning, and thank you for giving me this opportunity to testify at these hearings. I would like to take the next few minutes to tell you a little about my personal experience with Early Intervention.

5 ½ years ago, my husband and I received unexpected news from a Children's Hospital audiologist. Our nine-month old son had a profound hearing loss. This news came as a complete shock since there is no deafness in our family. Even more surprising and unexpected were the following words from our medical professional. She said, "Your child will never talk." This was unimaginable to us. We felt there had to be another option.

My husband and I took it upon ourselves to look at the options available to our son, Johnny, and to us. We wanted our son to have the opportunity to learn to talk. Yes, by having Johnny learn to talk, that meant that we were going against a professional in the field. We decided that DePaul Institute, an oral school for the hearing impaired, was the place for Johnny. Johnny began at Depaul just two weeks after an ABR confirmed a profound hearing loss. There was no delay in starting services. There was no response that services will start "as soon as possible." Johnny began to receive weekly Early Intervention from a qualified teacher of the deaf at nine months old.

DePaul began the first steps for Johnny to learn to talk. He received instruction on utilizing his facial muscles, learning to listen with his hearing aids, learning to look at a speaker's mouth to realize that something was coming out of it. And yes, Johnny was learning to make sounds. Johnny was slowly progressing, but receiving little if anything from his hearing aids. At the age of two, Johnny received a cochlear implant. All the pre-implant evaluations and play preparation was done at DePaul. Once the implant was activated, rehabilitation started at the school in their Early Intervention program. Johnny had to learn to use his new hearing. The easiest way for me to describe it is that he was basically a newborn, hearing for the first time and you must remember not hearing like you and I. Johnny had to learn to make sense of the new sounds and use them to develop both his receptive and expressive language. This process was made much easier with all the help, support and services from DePaul. Johnny received instruction from a certified teacher of the deaf and individual speech therapy from a certified speech pathologist two to three times per week.

When Johnny turned three, he experienced no transition or disruption in service. We continued at DePaul with the same teachers, speech therapists, and friends. This was very important to us. We did not have to worry about any new adjustment period and precious time lost in Johnny's rehabilitation by taking the time for him to get acquainted with new teachers and new surroundings.

DePaul helped to lay a wonderful foundation for Johnny in his speech and language. This past April Johnny turned six, and I am happy to say that he is currently

mainstreamed back to his home school district in an age appropriate first grade classroom without support. His most recent speech scores have him in speech categories above his age and grade level. Thank goodness we did not listen to our medical professional that made our son's diagnosis and limited all the possibilities for him. If we had listened, we would not be able to hear him read the following poem for us entitled Faith, author unknown.

The more faith you have, the more you believe,
The more goals you set, the more you'll achieve...
So reach for the stars, pick a mountain to climb,
Dare to think big, and give yourself time...
And, remember no matter how futile things seem,
With faith, there is no IMPOSSIBLE DREAM!

I must state once again that Johnny is a profoundly deaf child, given the initial diagnosis that he would never say a word. Johnny can now use his implant to hear almost everything. However, without his implant, Johnny's hearing loss is so profound that he was unable to hear three fire trucks with their sirens blaring during a parade. He took off his implant since the sound was too loud. Once we passed the trucks, I asked him what he heard without his implant. His reply was "nothing."

You have to understand that early diagnosis of a child's disability and taking immediate action to provide services is critical. Children are our greatest resource. We must have regulations in place that will guarantee appropriate services immediately to children so that success and achievement is possible for all children. Parents need to be made aware of all options available to their child's specific disability so an informed decision may be made to provide the best benefit to the child and the family.

We were lucky. But, I wonder how many parents and their precious children have not been so lucky and even more importantly, how many children in the future won't be lucky. A young child receiving necessary services for their disability should not be a matter of luck. We need to create a system to allow all children and their parents to be able to reach for the stars and dream. As parents of children with a disability, I would have to guess that the majority of us fell into our situations. We did not have an education or training in our child's disability and we were not working in the field of special education. We had to learn all we could at the same time we were raising our children. We need our state and federal system to help make things easier for parents and not more complicated. As a parent of a child with a disability, I am on a different path than I expected, but my child and I still deserve the opportunity to dream and achieve all our goals!

Ann Agreppoli

10-13-00

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