



Thirty Million Words: Building a Child's Brain

By Dana Suskind



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Nominated for the Books for a Better Life Award

The founder and director of the Thirty Million Words Initiative, Professor Dana Suskind, explains why the most important—and astoundingly simple—thing you can do for your child’s future success in life is to talk to him or her, reveals the recent science behind this truth, and outlines precisely how parents can best put it into practice.

The research is in: Academic achievement begins on the first day of life with the first word said by a cooing mother just after delivery.

A study by researchers Betty Hart and Todd Risley in 1995 found that some children heard thirty million fewer words by their fourth birthdays than others. The children who heard more words were better prepared when they entered school. These same kids, when followed into third grade, had bigger vocabularies, were stronger readers, and got higher test scores. This disparity in learning is referred to as the achievement gap.

Professor Dana Suskind, MD, learned of this thirty million word gap in the course of her work as a cochlear implant surgeon at University of Chicago Medical School and began a new research program along with her sister-in-law, Beth Suskind, to find the best ways to bridge that gap. The Thirty Million Word Initiative has developed programs for parents to show the kind of parent-child communication that enables optimal neural development and has tested the programs in and around Chicago across demographic groups. They boil down to getting parents to follow the three Ts: Tune in to what your child is doing; Talk more to your child using lots of descriptive words; and Take turns with your child as you engage in conversation. Parents are shown how to make the words they serve up more enriching. For example, instead of telling a child, “Put your shoes on,” one might say instead, “It is time to go out. What do we have to do?” The lab's new five-year longitudinal research program has just received funding so they can further corroborate their results.

The neuroscience of brain plasticity is some of the most valuable and revolutionary medical science being done today. It enables us to think and do better. It is making a difference in the lives of both the old and young. If you

care for children, this landmark book is essential reading.

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Editorial Review

Review

“[Suskind has] written a book that gives parents the tools they need to maximize their children’s potential, one word at a time.” —*Pregnancy and Newborn*

“Parents, other caregivers, and early childhood educators will be moved and inspired by this work.”
—*Library Journal*, starred review

“Suskind's vision is empowering, her methods are surprisingly simple to execute, and the results have been proven to nurture children toward becoming stable, empathetic adults. Informative, exciting new data that confirms the significant benefits gained by talking to your child.”
—*Kirkus Reviews*

“Dr. Dana Suskind has written a passionate, engaging and informed account of the importance of early exposure to language in child development. It is a valuable 'call to words' for parents, educators, and anyone invested in the success and well-being of children.”
—James Heckman, University of Chicago, Nobel Laureate

“Dr. Dana Suskind is a one-person change agent. In this beautifully written book, she infuses the wisdom of a physician with the heart of a mother. Parents, policy makers and educators, this book is for you. It is informative, compassionate and a call to action designed to enrich our greatest natural resource, our children.”
—Kathy Hirsh-Pasek, Temple University, author of *Einstein Never Used Flashcards*

Can a surgeon help solve poverty and improve equality of opportunity? Dr. Dana Suskind has a simple but effective strategy: more talking, with more complex words directed at children from zero to three mainly by parents. Her lucid book will persuade you that talk and more talk directed at the developing brains of infants and toddlers can drastically improve our country. Read it and try it.
—Ezekiel Emanuel, author of *Healthcare, Guaranteed*

“Dr. Suskind weaves science and her journey from surgeon to champion for children showing the profound power of words spoken to infants. Anyone who cares about children will benefit from learning how much language shapes our very existence from the earliest age.”
—Patricia K. Kuhl, University of Washington, co-author of *The Scientist in the Crib*

“*Thirty Million Words* tells the story of a remarkable woman’s unrelenting mission to give every child the chance to thrive. Dana Suskind’s work as a pediatric surgeon with the deaf helped her to understand the amazing power that words have on a child’s development. She offers a simple but profound understanding of how language affects the brain and provides insights into how to create a rich language environment so your child can soar. Every page overflows with warmth and intelligence—share it and become part of something amazing.”
—Steven D. Levitt, University of Chicago, coauthor of *Freakonomics*

“This is a page-turner tale of birth and transformation—the birth of a medical miracle and the transformation of a compassionate surgeon. Dr. Suskind recounts her journey with humor and humility. Her remarkably intimate voice opens up a fresh path alongside those of physician writers Oliver Sacks, Atul Gawande, and

Paul Farmer. It will enthrall any reader who is exhilarated by human possibility and inspire the next generation of physicians.”

—Dr. Joshua Sparrow, Harvard Medical School, Children’s Hospital Boston

“How empowering, the realization that each of us can be our children's personal neuro-developer, that the sheer quality of our interactions can impact the attitude of inquiry and health of our kids. The practical application of Dr. Suskind's work is limitless; as a dad, and as (a “gritty”) someone invested in early child development, I’m excited to see how far it takes us.”

—Steve Nash, President, the Steve Nash Foundation and two-time National Basketball Association MVP

As a pediatrician, I want everyone to read this wonderful book--to understand how health and learning fit seamlessly together as young children develop, and to appreciate the neurological wonder and the social urgency of using language and love to nourish the brains of babies and children everywhere.

—Perri Klass, author of *Quirky Kids* and National Medical Director of Reach Out and Read

“I thank Dana Suskind for opening doors to solutions and hope. The answer to the growing problem of social inequalities in our country is to make use of America’s top two resources: its children and their parents. If we care about this country, and the children who will live in it as adults, we have to make Dr. Suskind’s advice become reality.”

—Sandra Gutierrez, Founder and National Director of Abriendo Puertas / Opening Doors

“Grounded upon experience as a cochlear implant surgeon, informed by compelling social science research, and inspired by a profound commitment to children and families, this book helps all of us understand the importance of communicating abundantly, pleasantly, and responsively with infants and toddlers. Tell everyone you know to read it! Together, we can enrich language environments for generations to come, in all types of homes and communities. The book is a gem!”

—Ronald F. Ferguson, Faculty Director, the Achievement Gap Initiative, Harvard University

“Straight from the front lines Dr. Dana Suskind tells the story of the power of talk in helping children learn. Easy to read and with striking insights on every page, this book will not only make you think differently about how you parent, but will give you the tools to help your child be at his or her best.”

—Sian Beilock, University of Chicago, author of *Choke* and *How the Body Knows its Mind*

“Suskind writes with clarity and authority to explain why parents need to talk to their infant children, and why some forms of communication are better than others. Thirty Million Words belongs on the shortlist of books that every parent, teacher, and education policymaker should read.”

—Adam Alter, New York University, author of *Drunk Tank Pink*

“Anyone who cares about children, anyone who cares about the future of this country, should read this book.”

—Barbara Bowman, Irving B. Harris Professor, Erikson Institute

“A passionate, personal account of the power all parents have to raise thriving, successful children.”

—Diana Mendley Rauner, President, Ounce of Prevention Fund

“Prepare for a revolution. This book will make you cry, laugh, and deeply reflect on what we should be doing to give everyone a chance to succeed in life. As a scholar I was in awe, as a teacher I was dazzled, and as a father I was thankful to the authors of this book. When you pick it up, have a few hours to spare because you will not put it down. Unequivocal 5 star.

—John A. List, University of Chicago, author of *The Why Axis*

“Dana Suskind hails others as heroes but she is the true hero! She stepped out of the safe harbor of her role as a pediatric cochlear implant surgeon when she realized that helping deaf children hear was not enough to help them learn language. She takes us on her compelling and page-turning journey, navigating the best research on children’s early learning, always sharing sound and extremely helpful examples of what we all must do to help children learn language and much more, always in joyful and loving ways.”

—Ellen Galinsky, President, Families and Work Institute, author of *Mind in the Making*

“Dr. Suskind’s work reveals that the greatest gift we can give our children is free. How empowering to understand that it doesn’t take money to give our children advantages in the world, it takes words. Her research is vital, and it is our responsibility to make sure Suskind’s message reaches the masses.”

—Chris Nee, Creator and Executive Producer, Doc McStuffins

"Dr. Suskind’s work is empowering--illuminating that every parent already has what it takes to give their child the best start in life: their words. This account tells the amazing impact of language development on the young child’s developing brain, and provides valuable insight on how we, as parents, educators, and caregivers can create a profound difference in our children’s lives through the simple act of talking with them. Chicago Children’s Museum has long created rich environments that naturally inspire talk—and we are thrilled that Dr. Suskind’s research provides new evidence of the deep importance and positive effects of these early interactions."

—Jennifer Farrington, President and CEO of Chicago Children’s Museum and Board President of the Association of Children’s Museums

“Three cheers for the promise of parents, prevention and neuroplasticity!”

—Dr. T. Berry Brazelton, Harvard Medical School

"Captivating! Great examples and an easy read but full of scientific information. Can we make this required reading for couples prior to conception?"

—Roberta Golinkoff, University of Delaware, author of *How Babies Talk*

About the Author

Professor Dana Suskind, MD, is both founder and director of the Thirty Million Words Initiative, which is based on scientific research that demonstrates the critical importance of early language exposure on the developing child. Dr. Suskind received the University of Chicago Medical Faculty Award as “Distinguished Leader in Program Innovation.” She is an advisor on The Clinton Foundation’s Too Small to Fail Initiative and part of the White House initiative on creating a pathway to ending the achievement gap. She lives in Chicago, Illinois.

Beth Suskind is codirector of the Thirty Million Words Initiative and is integral to translating the complexities of the science behind their research into a curriculum. She lives in Chicago, Illinois.

Leslie Lewinter-Suskind, BS, MSS, MFA, former Director of International Program, Psychiatry and Pediatrics, LSU Medical School in New Orleans, provided invaluable assistance in the writing of *Thirty Million Words*. She lives in southern California.

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PRAISE FOR *THIRTY MILLION WORDS*

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For Amelie, Asher, and Genevieve

DS

For Lily, Carter, and Michael

BS

For Bob and our wonderful family

LL-S

Praise for *Thirty Million Words*

Title Page

Copyright

Dedication

1. CONNECTIONS: Why a Pediatric Cochlear Implant Surgeon Became a Social Scientist

2. THE FIRST WORD: The Pioneers of Parent Talk

3. NEUROPLASTICITY: Riding the Revolutionary Wave in Brain Science

4. THE POWER OF PARENT TALK: From Language to an Outlook on Life

5. THE THREE Ts: Setting the Stage for Optimum Brain Development

6. THE SOCIAL CONSEQUENCES: Where the Science of Neuroplasticity Can Take Us

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CHAPTER 1

CONNECTIONS

WHY A PEDIATRIC COCHLEAR IMPLANT SURGEON BECAME A SOCIAL SCIENTIST

Blindness separates me from things; deafness separates me from people.

—Helen Keller

Parent talk is probably the most valuable resource in our world. No matter the language, the culture, the nuances of vocabulary, or the socioeconomic status, language is the element that helps develop the brain to its optimum potential. In the same way, the lack of language is the enemy of brain development. Children who are born hearing, but in an austere language environment, are almost identical to children who are born deaf who have not received a rich sign environment. Without intervention, both can suffer the critical, lifelong effects of silence. On the other hand, children in a rich language environment, whether born hearing or given the gift of hearing via cochlear implants, can soar.

MY STORY

The irony is not lost on me that a pediatric cochlear implant surgeon is writing a book on the power of parent talk. Surgeons are known for many things; talk is not among them. Rather than words, we are defined by our hands, our dexterity in the operating room, and our ability to identify problems and find solutions. To a surgeon, there is nothing more gratifying than when the puzzle pieces fit just so.

Cochlear implantation, allowing a child born deaf to hear, is an extraordinary example of all those components. Coiled two and a half times around the snail-shaped cochlea, the organ where the nerve part of hearing begins, a cochlear implant successfully skips over the defective cells, the point along the hearing pathway where sound had come to a screeching halt, going directly to the *acoustic*, or *hearing*, nerve, the superhighway that connects the ear to the brain. The amazing result is that a child born into silence now has the ability to hear, to talk, and to meld into the world both educationally and socially. The cochlear implant is a puzzle piece that fits, just so, a miraculous solution to total deafness.

At least, that's what I thought.

In medical school, it was the brain, not the ear, that captured my imagination. The brain seemed a profound mystery holding the key to all the unanswered questions about life. My dream was to be a neurosurgeon, fixing with my hands some of the most important and vexing issues facing humanity.

My first neurosurgical case in medical school did not, however, go smoothly. The chief of neurosurgery, Dr. R., had invited me to “scrub in” on a meningioma resection, the removal of a benign brain tumor. We'd been writing a textbook chapter on meningioma resection and he thought it might be helpful if I actually saw one. When I came into the operating room, Dr. R. gestured me toward the operating room table, where a shaved head, stained with the yellow and red of Betadine and blood, confronted me. Inside a large gap of missing skull, a grayish gelatinous mass pulsated rhythmically, as if trying to escape its bony confines. The patient's torso had disappeared completely, like a magician's assistant's, under long blue drapes.

As I walked toward the patient, I suddenly became aware of my own pulsations. Could this blob of overly congealed gelatin really be the epicenter of who we are? Dazzling lights crisscrossed my vision and I could barely register what Dr. R. was saying. The next thing I knew, I was being lowered onto a chair by one of the surgical nurses. Humiliating? You bet!

But that was not the reason I did not go into brain surgery. Ultimately, that was more a fantasy-meets-reality decision.

“When the air hits the brain, you’re never quite the same” was a common saying in neurosurgery back in the 1980s. At that time, surgery on the brain often left patients severely debilitated, though alive. In the intervening years, of course, things have changed for the better, but my own experience prompted me to think of other ways of working with the brain. And, in a circuitous way, I did: the ear. Under the guidance of my extraordinary mentor, Dr. Rod Lusk, during my fellowship at Washington University in St. Louis, I learned the skills necessary to help ensure the success of cochlear implantation.

Cochlear implantation is, to me, one of the most elegant of surgeries. Performed under a high-powered microscope that magnifies the inner ear from the size of a tiny pea to the size of a quarter, it relies on small, precise instruments that match its small, precise movements. I operate with the room lights off, the single light beam from the microscope a spotlight on the star of the show, the ear. The microscope’s penetrating beam has been said to cast an almost romantic halo around the patient and surgeon. And while many surgeons operate with music, I prefer my operating room to be quiet and calm, with only the hum of my drill as backdrop to my concentration on the surgical procedure.

My decision to become a pediatric head and neck surgeon specializing in cochlear implantation was serendipitous. Because the confluence of two historic medical events was about to usher in a golden age for children born deaf.

In 1993, the National Institutes of Health recommended that all newborns undergo a hearing evaluation, the universal newborn screening, before leaving the hospital. This astute public health initiative plummeted the age of the diagnosis of deafness from three years to three *months*. No longer could parents and pediatricians rest comfortably with “He’s just a slow talker” or “Her older brother does all her talking,” when, in fact, the child was deaf. But its significance was increased exponentially because it coincided with the development of a neurologic miracle, the cochlear implant. The possibility of changing the life course for millions of deaf children had arrived.

THE COCHLEAR IMPLANT

The brain and neural structures in the human body are generally unforgiving. From cerebral palsy to strokes, from spinal cord injuries to football-related head trauma, “making better” rather than “correcting” tends to be the medical dictum. Hearing loss is a spectacular instance where something can, in fact, be done.

In 1984, the first single-channel cochlear implant for adults, allowing sound detection and some awareness of voice, although not “hearing” as we know it, was approved by the FDA. This was followed, in 1990, at about the same time as the new recommendations for universal newborn screening, by a new multichannel cochlear implant with complex speech processing ability, approved for young children. For the first time in history, a child born deaf would be able to hear at an age *when the brain pathways for language were being created*.

It’s important to understand why the timing of these two coinciding events was so critical. By the end of age three, the human brain, including its one hundred billion neurons, has completed about 85 percent of its physical growth, a significant part of the foundation for all thinking and learning. The development of that brain, science shows us, is absolutely related to the language environment of the young child. This does not mean that the brain stops developing after three years, but it does emphasize those years as critical. In fact, the diagnosis of hearing loss in babies had often been called a “neurologic emergency,” essentially because of the expected negative impact on a newborn’s development.

The importance of early screening coinciding with cochlear implantation for children cannot be overstated. If

they had *not* taken place simultaneously, if, for example, diagnoses of deafness came at a later age, and the cochlear implant had been placed in older children's ears, the cochlear implant may have been deemed a fabulous piece of technology but not much more, certainly not the game changer that it is. That's because successful cochlear implantation requires *neuroplasticity*, the ability for a brain to develop with new stimuli. And although neuroplasticity for learning language may occur, to some degree, at all ages, it is integral to the young brain from birth through about three to four years of age. Exceptions are those who have gone deaf *after* having learned to talk and whose brain's language pathways are already established. Those who are born deaf and receive implantation at a much later age will hear sounds, but rarely will they gain the ability to understand their meanings.

I soon learned, however, that even when cochlear implants are put in place at an optimum time, there are other factors that may preclude their success.

THE ADVANTAGE OF STARTING SLOWLY

The University of Chicago is an island in a sea of inequality on Chicago's South Side. Adding to the overwhelming social and economic challenges facing many families on Chicago's South Side, before I began my cochlear implant program there was the added barrier of communication between children born deaf and their families. This presented both a remarkable opportunity and an extraordinary challenge for me and my incredible, dedicated cochlear implant team. It would also prove to be the experience that would entirely change the direction of my thinking and my career.

When I was an infant in the late 1960s, at the height of the civil rights conflict, my mother, a social worker, took me to work with her in inner-city Baltimore. I slept in a room near her office with someone sitting outside of the door to tell her when I woke up. Later that year, sent to Peru to do a study of the possibilities for creating infant care centers in the *barriadas* circling Lima, she would sometimes carry me through the hills on her back in an aluminum-sided baby carrier, an "in," she said, with skeptical inhabitants who had never seen a foreigner do that. Much later she told me that whatever she did, anywhere, never came close to how much she learned, especially about the wealth of untapped potential in people who never had a chance. It's the same experience I've had with my own patient population. Little did I know, when I began this journey, that one of the biggest impacts of my work would be, in fact, on me.

My cochlear implant program at the University of Chicago started slowly. Patients weren't, as I had thought they would be, lining up at my door like at a big sale day at a shopping mall. But it was the slow start that gave me a crucial perspective I might otherwise have overlooked.

Because there were so few, I tended to each patient as if he or she were my own child, noticing each milestone, a first smile, a first step, with all the pride of a parent. I was present at every activation, the moment a child's cochlear implant is turned on and sound is heard for the first time. And, like a parent, while I was rejoicing successes, I was also agonizing when things were not as they should have been.

The problems I saw bothered me tremendously; lagging responses to first hearing sound, lack of reaction to hearing their names, slowness in saying a first word or reading a first book. Adding to this burden was the fact that the profound differences I saw occurred in children who had looked very similar to the others at the outset. The path to find out why would eventually lead me into the world of children born hearing.

The truth is, at one time I would have likely dismissed my observations of the children as non-science, interesting anecdotes at best. For me, as for many others in academia, science became "true" science only when the numbers were big enough to prove or disprove something, a sample size with "power," as we say. But I soon came to realize that the power of numbers, disregarding the significance of individual experience, can obscure important insights.

ZACH AND MICHELLE

Zach was my second cochlear implant patient; Michelle, my fourth. Both diagnosed as profoundly deaf at birth, they were strikingly similar in many ways. Both showed similar innate potentials, both had mothers who loved them and wanted them to live in the speaking world, and both were recipients of some of the most powerful technology science had to offer. But that's where the similarities ended. Same potential, same surgery, but very different outcomes.

I could never have learned what I learned from Zach and Michelle in any medical textbook. It is not just that my experience with them made me become aware of the limits of technology; it also made me acknowledge a force whose potential impact I may have always known but had failed to recognize, a force that irrevocably impacts the arcs of all of our lives.

Zach

Zach was about eight months old when his parents brought him to see our team, a peanut with hair so light you barely realized he had any. He smiled easily; his blue eyes, the color of a clear sky, watched our every move. His deafness had been a shock to his parents. No one in his family had hearing loss except one cousin who had gotten hearing aids in his sixties. His sister, Emma, two years older than Zach, had normal hearing and was the definition of the chatty older sister. But although his parents had had no contact with anyone who was deaf, they knew what they wanted before they entered my office.

Zach's parents had educated themselves. No-nonsense, quietly determined, they were aware that there were communication choices and they effectively let us know their goal: to have Zach be part of the hearing and speaking world. Zach had already been wearing hearing aids almost since his diagnosis and, astonishingly, while parents often battle children to keep them on, Zach wore his easily, his tiny ears flipped over like palm trees in a hurricane by their weight.

Zach's parents were proactive in other ways, as well. From the beginning they had a therapist come to their home to work with them and Zach on techniques to enhance his language development. They even started to learn sign language because they wanted to make sure Zach would be able to communicate no matter the mode. As a result, sign language was already the connection between Zach and his family.

From the beginning, Zach's parents knew that cochlear implantation was a possibility. The problem for Zach was the timing. His auditory brainstem response (ABR) test, done when he was an infant to determine hearing, had come back "no response," a flat line streaming across his ABR tracing with no pretty neural peaks indicating a brain's response to sound. The requisite hearing aid trial had also failed; Zach had the most profound form of deafness that exists. How were hearing aids going to make a dent when ninety decibels, the sound of a motorcycle racing by, didn't register a blip in Zach's brain even *with* hearing aids? Nonetheless, Zach's parents, who never gave up, had Zach fitted with hearing aids in the hope that he was the rare exception and they would actually work. What else were they to do for a year while they waited to comply with FDA guidelines that approved implantation only for children twelve months or older?

Always proactive, Zach's mother, recognizing from the outset that the hearing aids weren't working, sought the answer on her own. When he was a baby, she would lay Zach on her chest and place his tiny hands on her voice box, hoping he would connect the vibrations of her sweet lullabies to sound. In the same spirit of finding a solution, when she brought Zach to see me there was no question of their intent to have cochlear implantation. His first birthday, his parents decided, would be his "hearing" birthday.

While implantation is the first step, the true "hearing birthday" is actually at the moment the cochlear device is activated. A very dramatic moment, it is invariably followed by, "Honey, Honey, do you hear Mommy?"

Mommy loves you so much,” then, when it’s successful, the startled expression of the child followed by a smile, laughter, or even crying. It is an extraordinarily moving experience. See for yourself. Simply search YouTube for “cochlear implant activations” and wait for the tears.

On Zach’s real “hearing birthday,” both he and his parents were cool and relaxed. So relaxed, in fact, that they didn’t even video record the occasion, one of the few regrets his mother has.

Like all first birthdays, of course, cochlear implant activation day is only the beginning step toward the goal of speech. And while parents often believe, even though they’ve been counseled to the contrary, that the ride from activation to spoken language is smooth sailing, a few days at the most, it isn’t. Just like hearing newborns, newly implanted children must spend about a year soaking in, and learning to understand, the sounds in their world. Not always that easy. Zach, before implantation, could not hear a motorcycle roaring by; after implantation, he could hear the quietest whisper. Nonetheless, while he heard the sounds, his brain didn’t have a clue what they represented. Which is what he, and all implanted children, have to learn before they can begin to speak.

Zach’s world at home was filled with talking, reading, and singing. But while his parents swore that he was progressing beautifully, this was never apparent to me. During clinic appointments, even bribery with toys, stickers, anything that might prompt a word, failed. So it was only by humorous accident, when he was three years old, that I discovered that, yes, Zach really could talk.

A violin recital, *The Gift of Sound*, was being performed by members of the Chicago Symphony Orchestra in honor of our implant program, with many of our program’s families in attendance. While music swept through our hospital lobby, people milled around, helping themselves from a long table piled high with cookies and other treats. And it was from this table that I received absolute confirmation that Zach could speak. Because, suddenly, somewhere between the brownies and the cookies, in the middle of Paganini or perhaps Beethoven, came high-pitched child’s laughter and a loud, gleeful exclamation: “Ewww! Daddy faaaarted.” And it was then that I knew all was going to be fine for Zach.

Zach is now a mainstreamed third grader in public school. The only outside educational services he receives are from a hearing specialist who ensures that his cochlear implant device is in good working order. He learns at grade level, including reading and math, plays with his friends, fights with his older sister, and gets no special treatment from his no-nonsense, loving parents. He is just a nine-year-old boy with intelligence, spirit, and every indication that he will fulfill his potential. His future is not defined by his hearing loss. He is lucky in many ways.

If Zach had been born twenty years earlier, in 1985 rather than 2005, his hearing loss *would* have defined his future. While there are many ways to live a happy and fulfilled life, even without hearing, the advent of cochlear implantation transformed Zach’s education and career choices. This is largely because the ability to hear has an impact on the ability to read and, in consequence, to learn. The domino effect, over a lifetime, is evident. In studies done on adults born deaf and educated solely with sign language, the average literacy level in the past was fourth grade; one-third of deaf adults are functionally illiterate.

These statistics are not, of course, representative of those fortunate to live in homes rich with the language of native or skilled signers. Neither do they discount those in the deaf community who have achieved beautifully in the arts, in the sciences, in life. When there *is* lack of achievement, however, it is often related to the fact that about 90 percent of deaf children are born to parents who, while loving, cannot communicate with sign language, so that during the child’s critical early years, when optimum neuroplasticity permits brain development, the necessary language environment is inadequate.

Compare this to Zach. Born deaf, yet reading at grade level in the third grade, which is often considered the

predictor of long-term academic success, Zach is evidence of the perfect alignment of the stars of parental initiative, technology, and medical policy.

Michelle

A rich language environment “is like oxygen. It’s easy to take for granted until you see someone who isn’t getting enough.”

—With apologies to Nim Tottenham for liberties with her wonderful quote

Seeing the puzzle pieces fit together perfectly allows one to see the beauty of possibility. It also puts into stark relief what happens when a puzzle piece is missing. It’s here that Michelle’s story and my turning point begin.

Michelle at seven months looked like a Japanese anime heroine; her crystal-blue-eyed gaze was soulful, intelligent, and entrancing; her laughter, joyful. Like Zach, Michelle had been born without hearing but with all the potential in the world. The puzzle piece she was missing was subtle and at first I didn’t really know it existed. In fact, if Michelle had come before Zach, I would likely have either accepted her lag in progress as technology’s limitations or simply attributed it to the fact that some “just don’t benefit.” But Zach had already set the bar, and what was happening to Michelle after her cochlear implant did not come close to my expectations of what *should* be happening.

Michelle’s father had a moderate hearing loss that was correctable with hearing aids and attributable to Waardenburg syndrome, a genetic condition that affects, among other things, hearing. Like Michelle, who also had Waardenburg syndrome, he had widely spaced blue eyes and normal intelligence. Our team counseled Michelle’s mother, Laura, at length. It was clear that as much as she loved her daughter, the weight of her world, including being unemployed with little money, and that now included a child with disabilities, was a heavy burden. It was decided that we would first attempt hearing aids, although I felt, with Michelle’s hearing loss, they would probably not be enough. If they were not successful, we all agreed that cochlear implantation would be the next option. Soon after Michelle received the hearing aids, however, Laura moved away, and our professional role with Michelle ceased. When they returned a year later, Laura confirmed that the hearing aids were not working and that she had decided to follow our original suggestion to have cochlear implantation.

I clearly remember Michelle’s “hearing birthday” at about two years of age. At that time, we celebrated activation by giving the patient a cupcake and a brightly colored balloon. It was, after all, a festive occasion; although, in Michelle’s case, a moderate one. When the cochlear implant was activated, Michelle simply continued eating her cupcake, showing very little response. But “very little response,” is quite different from “no response.” Both Michelle’s mother and I were delighted; Michelle, it seemed, could hear, which meant she could learn to talk.

Michelle’s hearing, with the implants, was eventually evaluated as in the normal range. The audiologist and speech therapist both referred to her as a “sponge,” easily responding to whatever they were trying to elicit from her. But something else was also apparent. While she responded to *sound* in the testing booth, she neither used nor seemed to understand speech. Her mother had noticed this at home, as well. Ultimately it was acknowledged that while Michelle could hear sounds, she did not understand their meanings, nor did she seem to be able to *learn* to understand their meanings.

This was very concerning to all of us who worked with Michelle professionally, including her therapists and the audiologist. During our implant team meetings, ways to support Michelle and her mother were discussed, including efforts to accelerate Michelle’s language development by exposing her to more sign and spoken

language. But none of these interventions was successful. Unlike Zach, who simply became silent in front of me, Michelle was truly silent, her problem far more serious and complex.

What had gone wrong? I had provided the gift of hearing to two deaf children. Why hadn't that been the complete answer to speaking and learning and integrating into the world? What were the salient differences that separated the outcomes of Zach and Michelle? The answer took me out of the world of the deaf into the wide world of all of us. Because the factors that differentiate Zach's and Michelle's abilities to learn are essentially the same that determine reaching learning potentials for all of us.

THE SIGNIFICANT DIFFERENCE

The reading level in third grade generally predicts the ultimate learning trajectory for all children. In the third grade, Zach is learning and functioning at grade level.

Michelle is also in the third grade, although in a Total Communication classroom. Even with a working cochlear implant she functions with minimal spoken language and only a basic grasp of sign language; the hope for true spoken language a distant dream. In addition, her third-grade reading is barely at the level of a kindergartener, a predictor of her life to come.

Why had the miraculous promise of a cochlear implant passed by this bright little girl with so much potential?

It turns out that what had gone wrong goes wrong more often than I had realized. This fact became starkly apparent when my team and I toured Chicago schools' hearing loss classrooms so that we could better understand the educational landscape our patients entered. The classrooms we visited were divided into "Oral," where spoken language was the primary form of communication, and "Total Communication," where, despite its name, sign language was the primary form of communication, with some spoken language. I, of course, had been sure that all of the children I had implanted early would be in the exclusively Oral classrooms. I was very wrong.

The Total Communication classroom had nine students in a semicircle of desks facing the teacher, who was signing to them. The silence was overwhelming.

And then I saw Michelle, whose blue eyes absolutely identified her. I went over and gave her a hug. Michelle, having no idea who I was, looked up at me with a confused, shy smile. No longer the vibrant little toddler I had first known, her sparkle seemed to have faded completely. With reason. Her teacher shared with me the hardships Michelle had gone through, including coming to school with no lunch, wearing dirty clothes and, most important, an inability to communicate well in either spoken or sign language. When I looked at her lovely face, it was hard to say whether I was seeing the tragedy of deafness or the tragedy of poverty. Without question, however, I knew that I was seeing the tragedy of wasted potential.

Two babies had come to me with very similar potentials but with very different outcomes. Yes, their backgrounds were entirely different, but socioeconomic status had never stopped a child from learning to talk. As a surgeon who had put so much faith in this magical puzzle piece that "fit just so," who had extolled a golden age for children born deaf, I was devastated, humbled, and, above all, newly determined.

Taking the Hippocratic oath meant that my obligation didn't end when I finished operating; it ended when my patient was well. I knew, absolutely, that it was time for me to step outside the comfortable world of the operating room.

THE UNIVERSITY OF CHICAGO A WONDERFUL HOME

At the University of Chicago, I am surrounded by incredible medical and social scientists, including Nobel laureates, many in search of solutions to our world's most vexing problems. It's important to acknowledge that I had never been one of them. My world was the operating room. My ultimate goal was the implanting of cochlear devices to bring hearing to deaf children, making sure they were working properly, giving a hug and a kiss, and assuming all would be well.

So much for assumptions.

The life we are born into is simply the luck of the draw. No infant emerging into this world knows what's in store; there are no checklists for what you can expect in life, no menu that says one from column A, two from column B. And yet, from day one those factors, over which we have no control, have an indelible effect on our entire lives. In addition, while there is no socioeconomic relationship to being loved as a child, or in having parents who want you to be happy and fulfilled, or to having enormous potentials, there are definitely socioeconomic factors that relate to educational attainment, health status, and disease outcome.

This I learned from stepping out of the operating room and into the wide world of social sciences.

The terms "health disparities" and "social determinants of health" relate to the fact that in virtually every disease, from cancer and diabetes to obscure problems such as presbyosmia, the age-related loss of smell, significantly worse outcomes occur in those born into poverty. What I began to understand from my wonderful and esteemed colleagues at the University of Chicago was that Michelle's problems were related to the world into which she had been born. But knowing this provoked other questions. Were we saying that there was no solution? Do we say that's that and go on to another, more promising patient? Anyone who has read Emma Lazarus's poem on the Statue of Liberty, "Give me your tired, your poor . . . the wretched refuse of your teeming shore," knows that the next step is not accepting the historical "inevitable." The next step is changing the "inevitable" by finding a solution.

For a surgeon, trying to find a solution to a social problem means having to leave the familiar confines of the hospital and the operating room, a bit like planning a trip to the moon. On my way to work, I had often crossed the beautifully landscaped historic stretch of Gothic carved stone architecture known as the "Quad," where University of Chicago research scientists, otherwise known as the "Giants," do their thinking, teaching, and studying. And it was in that community of social scientists committed to finding out the intricacies of human behavior that I would begin to understand why Michelle's language had never developed as it should have and, most important, how I might have helped.

Professor Susan Levine and Professor Susan Goldin-Meadow, otherwise known as "the Susans," are University of Chicago professors of psychology, colleagues, longtime friends, and next-door neighbors. For four decades they have been working together to understand how children learn language. They opened my eyes, or rather, provided me with a new lens with which to see the world, especially the world of language acquisition.

I audited Susan Goldin-Meadow's undergraduate class Introduction to Child Language Development during a bitter Chicago winter. Often running late from my clinic, I would rush through the Quad, a heavy down coat covering my white lab coat, which, in turn, was covering my green scrubs. In the antiquated auditorium a steep incline of desk chairs funneled down to the lecture podium. As if proximity would compensate for the neurons no longer firing as rapidly as those of the college students surrounding me, I usually sat in the front row, listening as the students enthusiastically debated the Chomsky-versus-Skinner opposing theories of language acquisition. Was Chomsky correct that each of us is born with a "language acquisition device," an internal hard drive with the grammatical rules of language already preloaded into our brains? Was learning language our innate biological destiny? Or was Skinner correct when he hypothesized that learning language

was not innate, but simply a phenomenon of adult reinforcement, eventually guiding children to acceptable language patterns? These were questions far from the cut-and-sew setting of the operating room, but they were now absolutely part of my world. I was acutely alert, waiting for the insights I needed to help the children I cared for.

HART AND RISLEY

I don't think I'd ever heard of Hart and Risley before Susan Goldin-Meadow's class and when I first heard their names in her class, I'm sure I had no idea of their ultimate importance to me. Child psychologists at the University of Kansas in the 1960s, Betty Hart and Todd Risley wanted to find a way to improve the poor academic achievement in low-income children. The program they designed, which included intense vocabulary enrichment, initially seemed to work. But when the children were tested before entering kindergarten, the positive effects had faded. Hart and Risley's determination to find out why resulted in a landmark study that was pivotal in our understanding the importance of the early language environment in a child's long-term learning trajectory.

But what makes Betty Hart and Todd Risley extraordinary is not simply the results of their study, but the fact that they did the study at all. The conventional wisdom of the time was that if you do well it's because you're smart; if you don't do well, it's because you're not. End of discussion. The differing trajectories of children born into poverty versus those born into more affluent families had long been accepted as immutable fact. Rarely were causes sought, because everyone knew why: genetics.

Hart and Risley changed that. In their groundbreaking study, they found another answer to the pivotal question "why?" The language environments of young children born into poverty, their study showed, were very different from the language environments of children born to more affluent families, and those differences could be correlated to later academic performance. In addition, while their study showed that children in lower socioeconomic homes heard far less language than their higher socioeconomic counterparts, quantity was not the only difference. Hart and Risley also found significant differences in quality, that is, *what types* of words were spoken and *how* they were spoken to a child. Finally, confirming that language exposure, not socioeconomic status, was the salient difference, Hart and Risley found that no matter how well or how poorly the children did academically, the early language environment was the significant factor. It all came down to words.

Because of Hart and Risley, the importance of the early language environment began to be understood: that the words a child heard, both the quantity and the quality, from birth through three years of age could be linked to the predictable stark disparities in ultimate educational achievement.

WHERE IT ALL COMES TOGETHER

The children in the Hart and Risley study were born hearing, yet they were no different from children born deaf who acquire cochlear implants. Children who receive cochlear implants and are in homes where the language is rich do well; those who receive cochlear implants but are in homes without adequate language do not do as well. I began to understand, thanks to the work of many dedicated scientists, that it takes more than the ability to hear sounds for language to develop; it is learning that the sounds have meaning that is critical. And for that, a young child must live in a world rich with words and words and words.

I had given all of my patients the same ability to hear, but for those children born into homes where there was less talk, less eliciting of response, less variation in vocabulary, the meaningful sounds needed to make those critical brain connections were not sufficient. The cochlear implant, as incredible as it is, is not the missing puzzle piece. Rather, it is simply a conduit, a pathway for the essential puzzle piece, the miraculous power of parent talk, a power that is the same, whether a child is born hearing or has acquired hearing via a

cochlear implant. Without that language environment, the ability to hear is a wasted gift. Without that language environment, a child will be unlikely to achieve optimally.

I believe that every baby, every child, from every home, from every socioeconomic status, deserves the chance to fulfill his or her highest potentials. We just have to make it happen.

And we can.

And that is what this book is about.

CHAPTER 2

THE FIRST WORD

THE PIONEERS OF PARENT TALK

Never doubt that a small group of thoughtful, committed, citizens can change the world. Indeed, it is the only thing that ever has.

—attributed to Margaret Mead

In 1982, two perceptive social scientists from Kansas City, Kansas, Betty Hart and Todd Risley, asked a very simple question: Why had their innovative program to help prepare high-risk preschoolers for school failed? Designed to enhance the academic potential of children by intensively increasing their vocabulary, it seemed a perfect solution to a prevailing problem. But it was not.

The initial results of Hart and Risley's project had been encouraging. Aware of the importance of language in a child's scholastic success, Hart and Risley had included a rigorous vocabulary component in the intervention. Its goal was to boost the children's lagging vocabularies so they would enter kindergarten on a par with better-prepared peers. Initially, Hart and Risley did observe a promising "spurt of new vocabulary words . . . and an abrupt acceleration in . . . cumulative vocabulary growth curves." But while the children gained vocabulary as a result of the intervention, it was soon apparent that their actual learning trajectories remained the same and, by the time they entered kindergarten, the positive effects had disappeared and they were no different from the children who had not attended the intensive preschool program.

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