Epilogue

In 2007, when this book was first published, many child development experts were genuinely puzzled over the idea that babies—even those as young as three and six months old—had become the target audience for sales of DVDs. Could there really be a market for such things?

Looks that way. My story at the beginning of this book, about my desperate dive for the Baby Einstein DVD to calm my colicky firstborn, has some company. Just a few years later, a group of researchers found 218 titles on the market. In 2010, the average family with a six-month-old had four baby DVDs. By the time their children were eighteen months old, that number had grown to more than seven.[1] The average number of minutes that infants and toddlers spend daily with TV and video has increased from forty-seven minutes in 2005 to sixty-one minutes in 2011, according to a recent Common Sense Media survey.[2] Two-thirds of children under the age of two have watched TV.[3]

But just as DVDs for babies are becoming more deeply embedded in the fabric of families' lives, they already represent old news. Touchscreen technology has arrived, with tablet computers like the iPad becoming the platform for interactive screen-based games that babies can play while sitting on Daddy's lap. One company is even selling a $389 interactive tablet—the Vinci—designed for children from six to forty-eight months. New games for babies show up in

the iTunes App Store every day. Six-month-olds in homes across America are now served up brightly colored graphics of touch-to-listen barnyards, with mooing cows that sound eerily lifelike.

Older tots—toddlers and preschoolers—are the beneficiaries of the touchscreen revolution too. ABC preschool apps are now a dime a dozen (actually, it's more like 99 cents apiece). And even two- and three-year-olds are thought to be part of the audience for motion-sensing gaming systems like the Nintendo Wii and Microsoft Kinect—products that require parents to clear their living rooms, lest a child engaged in virtual snowboarding find herself leaping off a cliff and into the coffee table.

Keeping up with all this technology is not easy. Keeping up with the way it changes child-rearing adds another layer of complexity. In our house, where our two daughters are now seven and nine, my husband and I alternate between astonishment at the amazing experiences our kids have at their fingertips and chagrin at how routinely they co-opt our iPads and become oblivious to the world around them.

What is the impact of this new phase of screen time for young children? What should we be worried about? When are we allowed to let down our guard? Many of the same scientists you read about in the previous pages are still trying to unearth some answers. In fact, the research on screen time for young children has become deeper—and even more interesting—than ever before. Happily, the latest studies reaffirm the mantra that echoes through this book. The advice still holds: remember the Three Cs. Think about the *content* of what your children see on screen. Think about the *context*—who is with them, how are they talking about what they see, how much the DVD or online game dominates their day. And think about what makes sense for your individual *child,* whose needs and interests will be unique to him or her alone.

I still run the Three Cs mantra through my head whenever I'm faced with a question about technology and kids. And I keep dig-

ging to learn more. Following are a few of the new insights that scientists have unearthed over the past few years. As with the book as a whole, I hope they will trigger insights for you too—or at least fuel some animated dinner table conversations about what is or isn't best for the kids living under your roof.

Just as the first edition of this book was appearing in bookstores, a new study emerged that splashed cold water on the claims of "educational" value that were attached to baby videos. Three researchers at the University of Washington—Frederick Zimmerman, Dimitri Christakis, and Andrew Meltzoff—published an article that showed a link between watching more than an hour of baby videos a day and reduced language development in babies. The data came from a telephone survey of approximately one thousand parents who were asked about what kind of videos or television, if any, their babies and toddlers watched. The survey also asked about the number of words their babies already understood. Parents responded yes or no to an inventory of ninety common words that babies may know, such as "cup" or "fast." When the researchers analyzed the answers, they discovered that 17 percent of parents reported that their babies watched an hour or more of baby videos a day—and that those babies knew significantly fewer words than the other children in the study.[4]

As far as children's research goes, the study had many weaknesses. It was based on parents' reports of what their children knew, instead of observations and assessments conducted by trained professionals. And it represented only a snapshot in time. There was no way to know what caused what. Did the videos cause the decrease in vocabulary or was the reduced vocabulary already there, perhaps even leading parents to think they needed videos to help their children learn more words? Was there something about

parenting styles that might be contributing to the difference in vocabulary growth? Could it be that those parents were not so good at paying attention to how many words their babies were learning in the first place?

The University of Washington study struck a chord nevertheless,[5] probably because it was among the first to try to determine whether infants and toddlers could learn anything from baby videos. In its wake, more child advocates started vocalizing their concerns about videos that claimed to be good for babies. The Campaign for Commercial-Free Childhood had already filed a complaint with the Federal Trade Commission, protesting the marketing as deceptive. It soon followed with a class-action lawsuit against Baby Einstein and Brainy Baby, two of the most well-known makers of videos for the very young. Within a year of the study, Baby Einstein changed the taglines on its products, eliminating references to making babies smart. And by 2009 the Disney Company, which owned the Baby Einstein brand, had settled the lawsuit by offering refunds to parents who purchased the DVDs between June 2004 and September 2009. (Want to recoup your $15.99? Too late. The refund offer expired in 2010.)[6]

There's nothing like a juicy little controversy involving Disney to capture people's attention. During those years, I was visiting preschools and libraries around the country to talk about the ideas in this book. The Baby Einstein saga came up at nearly every event. I sensed parents were becoming savvier about what to expect from baby videos. But I am not convinced that most parents have stopped buying the baby videos, nor do I sense that they are much more inclined to avoid baby TV-viewing than they were before. The American Academy of Pediatrics still encourages parents to avoid screen time before age two,[7] but a study in 2010 showed how difficult it is for us to abide. The study asked parents of infants and toddlers if they had any rules about TV or videos. Only 8.6 percent specified a "no TV" policy. Parents were also asked to keep diaries,

hour by hour, of how they used media in a twenty-four-hour period. Half of the parents who reported a no-TV policy had exposed their child to television the day before. "The American Academy of Pediatrics recommendation is not being followed even by those who adopted it," the researchers wrote.[8]

One aspect of the University of Washington study that got little attention, however, was a finding related to older children. Researchers had grouped the kids into two discrete age categories. They didn't have one category called "two and under." Instead they compared the responses from parents of babies (eight to sixteen months old) to parents of toddlers (seventeen to twenty-four months old). When the researchers crunched the numbers for the toddlers, they found no relationship between baby videos and language development. The baby videos weren't having any effect whatsoever, neither helping nor hurting vocabulary growth. What did this mean? Some researchers hypothesized that by seventeen months children typically undergo a growth spurt in language development and may be in a better position to understand the content on the screen. They may be able to withstand the negative impact—if there is one—of the baby videos.

To me, this study provided another reminder of the need for all of us—parents, researchers, media producers—to be more specific about age groups and the content of the media. Let's get precise about exactly what ages we're talking about, given that so much brain development occurs across the span of a month or two. And let's learn more about whether different types of dialogue and character-to-character interactions make sense to children at these different ages. If media is going to be part of their lives, shouldn't we know a little more about when it can or cannot be useful to them?

Going deep on age differences and delving into exactly what is shown on screen are among the many contributions made by researchers in the past four years. Social scientists have started to put baby videos and preschool TV under a microscope—examining

About Baby Videos, the Latest Science Says . . .

- Beware of claims that videos can make babies smarter.
- Based on parents' responses to a 2007 survey, researchers found a connection between lower levels of word learning and high levels of baby-video watching among children eight- to sixteen months old.
- Videos that include labeling and pointing to objects are likely to make more sense to babies than the appearance of printed text.
- Text on screen may be helpful to parents but is highly unlikely to be genuinely read by babies.

features of different types of videos and how those features may relate to learning at different ages. For example, one analysis of baby DVDs showed that the majority of the DVDs on the market featured print on screen[9]: typed text with words like "ball" or "baby." As cognitive scientists and child development experts will tell you, print means very little to babies. They certainly see the vertical lines or humps in a word like "ball," and, depending on their age, they may even memorize the letters. But they do not appear to be cognitively equipped to associate the letters with specific sounds, decode those sounds to form words, and recognize that those words are symbols for actual objects of different sizes and colors. Given what is known about how infants develop language, it may be much more helpful for babies to see a human being on screen pointing to a ball, naming it, and asking open-ended questions about its color and shape.

This quest to get specific about on-screen *content* has led scientists into new terrain regarding *context* as well: Could science get more precise about how much a child might be able to learn from media with a little assistance from mom and dad? And once we put

parents back into the picture, could that defuse concerns about videos having a negative impact? What if a baby might actually be able to learn quite a bit from a video if mom is using that video as a conversation starter, a spark for songs and stories, or even a simple screen-based equivalent to a book?

But I'm getting ahead of myself. Let's first check in with researchers who have looked at whether mom or dad can keep the negatives in check before we think about the potential for learning.

Alan L. Mendelsohn, a pediatrician and professor in the school of medicine at New York University, came to study screen time in a roundabout way. The overarching theme of his work is to examine the connections between a child's healthy development in infancy and the ability to succeed at reading in elementary school. In 2005, he started the Bellevue Project for Early Language, Literacy and Education Success centered at a public hospital in New York City that serves mostly low-income Latino patients. That's where he and his colleagues met with nearly three hundred mothers who agreed, just after delivering their babies, to participate in a study to track their baby's health and development, as well as their parenting skills, for at least three years.

What's interesting is how Mendelsohn asked those mothers about screen time when their infants were six months old. Instead of simply recording tallies of hours of TV watched, or even names of programs, the researchers were also looking for evidence of what they called *verbal media interactions*: Was the TV mostly for watching or just background noise? Did you talk to the child about the program while it was on?

Child development research in the past ten years has zoomed in on the importance of those little moments of connection between parents and their children. Studies show that when parents talk to their offspring—including infants too young to talk back—they are stimulating the child's brain, preparing it for learning and eventually speaking and reading words. And when parents talk to their

children about something both of them are looking at—whether it's a dog at their feet or a character on TV—they are prepping their children for even more language development. These are the kinds of processes that Mendelsohn was probing by asking these mothers whether they talked to their six-month-olds about what was on the screen. Could they be counterbalancing the harm by chatting them up?

To see how children fared, research assistants tested the children's language skills at fourteen months. What they found confirmed Mendelsohn's hunch: The babies with mothers who talked to them about TV did better than those who were exposed to TV at six months without any input from mom. The study also found that the verbal media interactions with educational programming were significantly related to better language skills eight months later. Putting six-month-olds in front of a screen is not recommended, the researchers stress, but if that's what parents are going to do anyway, talking about what they see on the telly seemed to serve a protective role.[10]

At the same time that Mendelsohn was conducting these studies in New York, Rachel Barr, a developmental psychologist at Georgetown University, was collecting data from hundreds of parents in the Washington, DC, area about whether they watched baby videos with their babies—and if they talked to them while doing so. The results, captured in hour-by-hour diaries by mostly middle-class white moms, showed that parents were in the room with their babies during DVD time for about an hour a day, on average, and that 70 percent of the time the parents were sitting and talking with their infants.[11]

Barr wanted to know more about the impact of the co-viewing on these babies. If parents talked with their infants or toddlers during a video, did that cause the children to pay attention? Were they more engaged? Barr and her colleagues Ashley Fidler and Elizabeth Zack, both at Georgetown, visited the homes of one hundred

parents with babies of various ages to find out. They arrived with a *Baby Mozart* DVD and a videocamera to record how parents interacted with their children while watching the thirteen-minute show. Some parents were highly involved—pointing to and labeling people or objects on the screen. Their infants responded by directing their attention to the screen, as if trying to process what mom was talking about. By contrast, in cases where parents were less engaged, their children were too.[12]

There's almost a "no-duh" quality to these findings. Babies like watching and interacting with their parents. The science seems to be confirming that videos, if used the right way, could be considered in the same realm as books: vehicles for strengthening learning language. Barr and others are now interested in what happens when you apply the lessons of book-reading to video.

"You wouldn't just leave a baby with a book," Barr said. A twelve-month-old might glance at pictures or try to chew on the spine, but he wouldn't be able to access and understand the story without some help. In the same way, she continued, "you wouldn't just leave a baby with a video." Just because a video can enable images to move past a child's face and sounds to reach a child's ears doesn't mean the child is getting it.

Even at older ages—with preschool and elementary school children—books are not the end-all-be-all by themselves. In the field of reading research, scientists have established that adults can make a major impact on young children's learning if they disengage from autopilot, in which they simply read words and turn pages, and instead become guides and partners throughout the book-reading journey, pausing and asking children questions before, during, and after the book is read. This strategy, known as *dialogic reading*, is widely accepted as a way to improve children's later reading skills and comprehension. It includes techniques such as questioning what's going to happen next and prompting children to think about how the story relates to them.

Wouldn't it be interesting to set up an experiment? Get a DVD that is essentially a book on video. Put parents in different groups: One group simply plays the DVD for their young children. Another group uses specific dialogic reading techniques while playing the DVD. Another group is asked to interact with their children in a less intentional way, by pausing the on-screen action and talking about it. A fourth group is shown a DVD that features an actress doing the reading, using those same dialogic techniques, posing questions about the story. In which condition would the children be most likely to learn from what they saw?

That experiment is almost exactly what Gabrielle Strouse designed in 2009 as part of her dissertation research at Vanderbilt University, where she and her advisers are trying to determine what mix of parent involvement and social interaction is necessary to ensure that very young children are helped and not harmed by screen time. Strouse used Scholastic DVDs that were video versions of books that most children don't have at home. (For example, they included *A Weekend with Wendell* by Kevin Henkes and *The Wizard* by Jack Kent.) She recruited parents of three-year-olds, assigned them to one of the four groups, and asked them to view the DVDs three to five times a week. At the end of the experiment, Strouse brought the children into the Vanderbilt lab and tested whether they had learned vocabulary words from DVDs, whether their vocabulary in general had improved, and whether they comprehended the stories.

The results, not yet published, showed significant differences among the groups, Strouse said. Children from the dialogic video group—the parents who were trained to ask their children questions—were able to learn words from the DVD at a significantly higher rate than the other groups. Story comprehension was higher too.

But the parents who were told to simply interact with their three-year-olds didn't do as well. Strouse surmises that those par-

ents were interacting in some basic ways—making comments about what was on the screen, for example—but because they weren't trained, they didn't think to ask questions or employ other techniques that characterize dialogic reading. A University of Virginia study with younger children ages twelve months and fifteen months—showed a similar result: When parents were asked to watch a commercial baby DVD with their children for four weeks and "interact with their child in whatever way seemed natural to them," the DVD viewing did not make any difference in their children's ability to learn new words.[13]

Another surprise from Strouse's study is that children in the fourth group—the one with the DVD that featured an actress on the screen reading the book—didn't benefit as much as might be expected. Previous research, much of it highlighted in this book, has shown that by age three, children are certainly capable of learning words from video. In fact, a few studies have shown that video-based word-learning may be possible as early as fifteen and eighteen months under certain conditions in lab settings.[14] But clearly, learning from video at such young ages is not easy. Researchers theorize that the "video deficit" could still be having an impact even among two- and three-year-olds, depending on what sort of learning is expected of them. The video deficit, as you'll recall from chapter 3, is a phenomenon that has been replicated in multiple studies of media and children around the world. It refers to the finding that young children are slower to learn from a videotaped activity (like a vocabulary lesson or hide-and-seek game) than from the exact same activity conducted live in front of them. Evidently, when it comes to book-reading techniques used with videos, it's hard to beat the presence of an adult who knows the child asking questions and prompting responses.

Advances in technology, however, are ensuring that social scientists have yet more scenarios to test before declaring that children will always need a person by their side to get the most benefit from

Engage Your Children in Conversations About What You're Both Watching

- Conversing with your children—even when they are infants—is stimulating the child's brain, preparing it for learning and eventually speaking and reading words.
- New studies are pointing to the importance of *verbal media interactions,* which are moments when parents talk with their babies and toddlers about what they both are watching on the screen.
- Just as with books, young children learn the most from videos and TV shows when a parent or teacher uses dialogic reading techniques. These techniques include asking questions about what is shown on the page and prompting children to talk about what might happen next.

screen time. What would happen if that adult wasn't sitting next to the child, but instead present via a video link, through Skype or Face Time? The story of Georgene Troseth's web-cam study in chapter 6 hints at this possibility, showing that when twenty-four-month-olds are guided by a social partner on the screen they can overcome the video deficit in a hide-and-seek game. A new study by Marina Krcmar of Wake Forest University takes the social-partner concept even further. Krcmar created customized videos for children that featured their own mothers demonstrating specific actions and introducing them to new words. She found that a group of six- to twelve-month-old children did not seem to learn from their own mothers on screen, but an older group—thirteen- to twenty months of age—could. They performed significantly better watching videos of mom than watching videos of strangers, and they could learn from mom on TV almost as well as if mom had

been in the room.[15] (The videos—dubbed "Mama TV" by the families in the study—became such a hit with the children that many parents asked to take copies home.)

All this talk about book-reading compared to video-viewing might lead one to think that we're still back in 2007, when books were books and videos were videos, and it was pretty easy to tell which was which.

Alas. If only it were still so easy. One of the most profound changes since the first edition of this book has been the appearance of touchscreen tablets, such as the iPad and the Nook, which are blurring the boundaries between what were once discrete types of media. Yes, books that are downloaded to these devices can be static, pixelated versions of what we see on printed paper. But now they don't have to be. The graphics can become animated, the stories can be narrated by a disembodied voice, the text can be pressed to repeat itself—and all of this can happen while a child is relaxing on the sofa, instead of uncomfortably situated in front of desktop computer made for adults.

Pat the Bunny, the children's classic, is now one of hundreds of picture books that can be delivered to these tablets. The cottontail is no longer soft and fuzzy—defeating the beauty of the book, if you ask me. As compensation, children now can tuck bunny into bed by pushing their finger across the screen. They can also blow bubbles and pop balloons while lively music plays in the background. Is the book still a book?

Or take another example: *Toy Story*. It's a movie, right? But there's a book-like version available for smartphones and tablets that features text, page-turning, audio, and animated clips that can feel a lot like watching the movie. In fact, is this just an abridged and subtitled form of the movie? Or is this a new kind of book?

How parents answer these questions could change the practice of reading books with young children. For many child development experts, picture books should lead to those magical, quiet, one-on-one moments between an adult and a child. What will happen to those interactions when the picture book becomes a busy box?

In chapter 10, I introduced you to Julia Parish, a doctoral student at Temple University who was studying how preschoolers were affected by electronic console books, such as the Fisher Price Power Touch Learning System. (These systems use paper books that are specially designed to be inserted into an electronic console. The consoles come with a stylus that, when pressed on certain areas of the page, activates an electronic narrator.) One of her experiments asked whether the consoles would cause parents to interact differently with their children compared to reading the same story in a traditional paper book. Preliminary data showed that yes, indeed, the interaction was completely different. Instead of talking about the content of the book, parents were most likely to direct their kids' behaviors: "Don't press that button! Wait to turn the page!" Final results of the study, soon to be published, include data on how well the children comprehended the books in each case. Both types of book-reading led children to correctly identify characters and settings. But among the three-year-olds, only those who read the traditional book with their parents could correctly answer questions about the sequence of events and the plot. They were significantly better at comprehending the story.

There's an interesting side story to Parish's study, however. When she and her colleagues at Temple started to design these experiments, they invited children in the lab to play with the electronic consoles and reading books. The kids were so enamored with the electronic consoles that they showed little interest in the regular books. It was as if they couldn't get enough of being able to press buttons and make things happen.

The dawn of the touchscreen—a device so much easier to use than an electronic console—shows just how compelling that interactivity is. Parents are finding that their toddlers can be well occupied in the backseat of the car if they simply pass back their smartphones. (There's even a name for this phenomenon: the Pass-Back Effect.[16]) YouTube is filled with videos of children as young as nine months old giggling and smiling while touching and sliding their fingers over their parents' iPads. Warren Buckleitner, the editor of the *Children's Technology Review,* has built an online archive of those videos, many of which show parents giddy with excitement over all the touching, swiping, and screen-jiggling that their children can do. As Buckleitner quipped: "Back in the good ol' days, you videotaped your child's first steps. Today it seems it's your child's first app."[17]

Touchscreen devices are probably going to blow a few holes in current theories about what babies, toddlers, and preschoolers are capable of. Until these interfaces arrived, a young child had to move a mouse or push buttons on a remote control to make something happen on the screen. They were required to keep at least three dynamics in mind at one time: the movement of the device in their hands, the changes on the screen, and the way that one affected the other. That's a lot of cognitive juggling for a young brain. But with a touchscreen, action and reaction are about as tightly coupled as possible. Touching a picture of a balloon can make it pop right under a child's fingertip. The physical interface is no longer a barrier to what's possible.[18]

Can young children learn more easily when interactivity is this seamless? Science has not caught up with technology on this question. Published peer-reviewed research of whether toddlers or preschoolers can learn more readily from touchscreens is still to come.

But there are several new studies that get us much closer to real answers than four years ago. One is based on an experiment at

Georgetown University that requires children to simply touch a space bar to interact with a screen, and it shows that interactivity holds real promise for three-year-olds—at least for the type of learning tested in the Georgetown lab. Here's how it worked: Researchers created three conditions that revolved around puppets playing hide and seek in a laundry room. (The scenarios were adapted from an online game from Nick Jr. based on *Curious Buddies*, a video program for toddlers.) In the first condition, children would watch the hide-and-seek game on video. In the second, they would play the game themselves by pressing on a space bar on a computer to change the action on screen. And in a third, they would observe a live-action version of the game by watching through a window. Seventy-two children, ages thirty months and thirty-six months, were randomly assigned to one of these three conditions. After they watched, they were brought into the room where the live action had played out—a room designed to mimic the exact scene from the video and computer. Could the children find the puppets in the same hiding places they saw on the screen? For example, if the dog puppet had been hiding behind pants that were hanging on a laundry line, would the children know to run up to the real laundry line and pull back the pants to find the dog? In short, would they be able to learn from the screen and transfer that learning to the real world?

When unleashed to the room to find the puppets themselves, the kids in each condition scampered to and fro, excitedly rifling through the laundry baskets to show researchers that they knew where each puppet was hiding. But not all children could do the task: on average, the children who had watched the game on video had a tough time, while the kids who had played the interactive game or watched the live action performed quite well. Their ability to retrieve the puppets was significantly better than those who had just watched the video. Even the younger children—the thirty-month-olds—had success. "Interactivity may be an important part

The Blessings, and Limitations, of Interactive Touchscreens

- With touchscreens, young children no longer have to divide their attention between operating an input device (such as a mouse) and the screen.
- Touchscreens may give us a much more accurate view of what young children are capable of as they use screen media, but scientific studies have yet to provide information on their impact.
- In a study that compared the impact of an interactive computer game, a passive video, and a live-action demonstration, children could learn from the interactive game and the live-action demo at thirty months of age. But they could not learn from the video.
- Reflect on whether computer interactivity is leading you to issue a bunch of directives to your children (such as "press that button" or "don't click there!") instead of authentic conversations about stories and ideas.

of the puzzle that has been missing in understanding the video deficit," wrote Alexis Lauricella, a postdoctoral researcher at Northwestern University and lead author of the study.

The preceding experiments all assume that the content that children see on screen is designed for them. But the sad truth is that too many toddlers and preschoolers are still watching TV shows, viewing DVDs, and playing online games that were not made by people who understand how young kids think. One might also assume, given the arrival of touchscreens and the plethora of online

games now made for young kids, that screen time for young children is all about interactivity. But that's not the case either.

So let's pause for a reality check. TV time is still a huge part of the lives of young children. A recent Common Sense Media report showed that of all the screen time that young children experience, 74 percent of it comes through the TV set, while less than 13 percent comes through the computer, and an even smaller percentage appears on smartphones or videogame players.

And what are these young children watching on TV? Unfortunately, a large proportion of it includes shows made for older children and adults. This *adult-directed media*, as researchers call it, can be highly challenging for toddlers and preschoolers to follow and therefore it is less likely to help them learn or develop their language skills. What's more, background television is still ubiquitous, with 79 percent of families of children ages zero to eight reporting that the television is on some, most, or all of the time regardless of whether anyone is watching it.[19] Research continues to show that these always-on TV sets could be having a negative effect on the way children play with toys and interact with their parents.

In 2011, a study on *SpongeBob Squarepants* shined a spotlight on why these facts are so troubling. *SpongeBob* wasn't designed for preschoolers—Nickelodeon says it is aiming for ages six to eleven—but that hasn't stopped it from becoming part of the American media diet for some preschoolers. The show has been known to turn up near the top of cable and broadcast ratings for two- to five-year-old viewers, and studies by marketing firms have shown that SpongeBob is well recognized by preschoolers. Even toddler sippy cups are sold emblazoned with his bright yellow, googly-eyed image.

The study, led by psychologist Angeline Lillard at the University of Virginia, found that *SpongeBob* has a negative impact on four-year-old children's short-term thinking skills.[20]

Lillard randomly assigned sixty four-year-olds to one of three nine-minute activities. One group of children watched a *SpongeBob* episode, another group watched an episode of *Caillou* (that preschool show about a four-year-old boy that I've described before), and a third group was invited to color with crayons. Before the experiment, each group seemed pretty similar. They came from relatively well-off families, and their parents had reported no differences in their behavior or ability to pay attention. There was no significant difference in how much TV they watched at home.

Immediately after watching the shows, the children were asked to perform four tasks that tested their "executive function"—the scientific catchall term for the cognitive work involved in paying attention, focusing on, and following through with activities, and being able to hold back impulses. Good executive functioning has been increasingly connected to a child's ability to do well in school, and scientists have designed some short tests to determine whether children are developing these skills. One, for example, is a "game" called Head-Toes-Knees-Shoulders, which requires a level of mental discipline. When the test administrator directs the children to touch their heads, they are supposed to touch their toes, and vice versa. Children listen and react to a repeated series of directives and are scored on their ability to follow the game's rules. It's all about paying close attention and thinking before you act.

In this test and three others, *SpongeBob* watchers didn't do so well. Compared to the other two groups, the *SpongeBob* audience performed significantly worse on all four tasks. It was as if something had impaired their ability to focus on what they had been asked to do.

Could it have been that *SpongeBob* was just so hysterically funny that it temporarily rewired their brains? "Everyone keeps saying, maybe the children have just been laughing so much while they've seen *SpongeBob* that they can't focus," Lillard said. "Trust me, they

weren't laughing. Their facial expressions looked just the same as when they were watching *Caillou*: transfixed and serious."[21]

Another study on adult-directed television found a similar impact, and it deserves even more attention because it used evidence gathered over a period of time, instead of in a short-term snapshot. The study, led by Barr at Georgetown, found connections between exposure to *adult-directed* television at age one and children's cognitive functioning at age four. The data in that study came from home visits conducted with sixty children from middle-income families during a three-year period. Researchers gathered information on how much TV their children watched at age one and age four and what TV programs they saw. They also surveyed parents on how well their children were able to pay attention and persist with tasks. When the children were four, the researchers sat down with the children and administered a series of tests and games to measure their level of executive functioning and cognitive skills.

One of their first findings was that, on average, infants were put in front of adult-directed television an hour a day. They experienced almost four times as much adult-directed TV as preschoolers. But most important were their findings on the negative links between adult-directed television and children's thinking skills. The children with poor attention skills—according to parents' reports and as shown in the scores from the tests—were the ones who experienced high levels of adult-directed TV as infants. Poor scores on the tests also coincided with watching a lot of adult-directed TV at age four. When the researchers controlled for a parent's level of education, the results still held. Watching these kinds of shows was significantly associated with poor cognitive performance.

What constitutes adult-directed TV? According to the researchers, *SpongeBob* would fit in that category, as would sitcoms, game shows, pre-teen programming like *That's So Raven*, nature

shows for adults and the news, as well as *Power Rangers* or other cartoons that are not designed to be followed by young children.

Shows that were designed for infants, toddlers, and preschool children were in a separate "child-directed TV" category that included PBS preschool programs like *Arthur, Sesame Street*, and *Clifford*; Nickelodeon preschool programs like *Blues Clues* and *Dora the Explorer*; baby-directed videos like *Baby Mozart*; and Disney movies, such as *Finding Nemo*. (That last subgroup—the Disney movies—surprised me, given that many Disney movies include flashbacks and abstract dialogue that are more characteristic of adult-directed programs. It would be interesting to learn if some of these child-directed programs were more associated with cognitive skills than others, a question that would require a much larger sample size to answer.) When researchers examined the data in this category, they found no correlation between children's performance on executive functioning tests and the amount of child-directed television they had watched.

In short, social scientists are finally paying attention to the *content* of what's on screen.

Remember the study that led me to write this book? I was curious—and alarmed—about a 2004 study in *Pediatrics* that showed a connection between poor attention skills at age seven and television viewing at ages one and three. As became clear in my journey through the research, that study had a fatal flaw: it didn't make any distinctions between what kind of television viewing these children were exposed to. This latest study by Barr on executive functioning and adult-directed television was designed to fill that gap. Yes, the sample size is small and much more research is needed to tease out what is causing what, but Barr's study lends support to one theory that explains the negative impact of TV discovered in the 2004 *Pediatrics* report: perhaps the attention problems came from one-and three-year-olds watching television that was not designed

for them. Given that the data in the *Pediatrics* study came from the 1980s and 1990s when fewer toddler- and preschool-oriented programs were on TV, there is a good chance that those kids were watching adult-directed TV.

It can be tempting to take these results as a license to simply let our the kids watch child-directed TV and be done with it. That's a lot easier than enforcing rules about the quantity of programming, such as how much time a child is allowed to play on a computer or watch videos. (In our house, whenever I declare that computer time is coming to an end, I still get howls of protest.) But experts on child obesity and pediatricians who specialize in sleep problems continue to sound warning bells about the need for young children to be physically active each day and turn off screens before bedtime to ensure a good night's sleep. Parents need to help children recognize when enough is enough, no matter how well-designed the on-screen content may be.

We can take a cue from Dash, the cartoon character on PBSKids.org. Dash shows site visitors which videos they can watch and which games they can play. But he isn't just a media pusher. When the Web site first launched streaming videos in 2009, developers were stunned—and more than a little worried—about how many videos their young viewers were gobbling up. They had expected visitors to watch about four million video streams per month, because that was the norm at the Web site for older children. But in the first month, the number of video streams skyrocketed to 87 million[22]—an astonishing sign of the popularity of the PBS videos and the online "player" that serves them up. It was becoming evident that children at these ages were not terribly good at knowing when to call it quits. So the developers introduced a nudge: after children have watched several video clips, Dash appears on the screen with a friendly reminder: Isn't it time to take a break?

More Reasons to Avoid TV That Isn't Designed for Young Children

- Several studies show a connection between exposure to adult-directed television and reduced "executive functioning," meaning a child's ability to focus, persist in tasks, and follow directions.
- Adult-directed television, as defined by researchers, are any shows that are not designed to be followed by preschoolers and toddlers. They include soap operas, game shows, *SpongeBob*, and *Power Rangers*.
- Studies have not uncovered links to attention problems when children watch programs that are designed for them, such as educational children's television shows.
- But even when the screen-based shows or games are designed for young children, parents must ensure that their children get enough physical exercise and sleep. Parents will need to closely monitor how much time their children have been on the computer or watching TV.

Four years from the first publication of this book, we now have more confirmation of the importance of two of our Three Cs: We know that *content* really matters (sorry, SpongeBob). We know that *context* is even more important and complicated than we may have thought, demanding that parents come up with thoughtful ways to balance screen time with other activities and engage in back-and-forth conversations with their children about what they see on screen.

What about the third C—the individual child? Certainly the latest science is showing why it is critical for parents to consider

their children's age and stage of development. As the word-learning research has shown, for example, learning something from the screen at eighteen months appears to be a lot more difficult than at twenty-four months. But there are still many questions hanging out there about specific subgroups of children and their specific needs. When I visit preschools, I hear from parents who are asking for more help. They want to know whether a child who has trouble falling asleep should watch *The Good Night Show* on PBS Sprout. They wonder whether their two-year-olds who are not yet speaking should be introduced to specific videos or iPad games that the family can play together. They ask about whether children from disadvantaged families may now be exposed to online storytelling and books that they might not get at home. They ask for advice on which movies might be best to calm their asthmatic children when it's time to pull out the nebulizer.

The scientists I've met while writing this book will be working hard to find answers. But in the meantime, those of us with young children should continue to do our jobs: tuning in to what our children need. In the razzle-dazzle of new iPhone apps and touch-screen toys, we cannot forget how much our presence makes a difference. If there is one thing that continues to show up in the research, it is that adults' engagement with children while they watch and interact with e-media leads to far more learning than when the kids are using the technology by themselves. Advances in technology are not pointing to a day in which young children can simply plug in and learn without us. On the contrary, we parents are more necessary than ever.

NOTES

1. Vaala et al., 2010, pp. 628–648.

2. Common Sense Media, 2011, p. 24. Note that the number of minutes for infants' and toddlers' daily screen time in 2011 is slightly less (53 minutes) on p. 18 of the report where the age range is zero months to twenty-three

months, not six months to twenty-three months, as was the case in the 2005 survey.

3. Ibid., p. 18.

4. Zimmerman, Christakis, and Meltzoff, 2007, pp. 364–368.

5. Many newspapers covered the findings, and I wrote about the results in an op-ed for the *New York Times,* "The Genius of 'Baby Einstein,'" on August 16, 2007.

6. Lewin, 2009, p. A1.

7. Brown, 2011, *Pediatrics* 128.

8. Barr et al., 2010, p. 117.

9. Vaala et al., 2010, p. 643.

10. Mendelsohn et al., 2010, pp. 577–593.

11. Barr et al., 2010, pp. 107–122.

12. Fidler, Zack, and Barr, 2010, pp. 1–21.

13. DeLoache et al., 2010, p. 1572.

14. Vandewater et al., 2010, p. 4; Koenig, 1996, pp. 63–64.

15. Krcmar, 2010, pp. 31–53.

16. Chiong and Shuler, 2010, p. 7.

17. Buckleitner, 2010, "Taxonomy of Touch," pp. 36–37.

18. For more on children's physical development and touchscreens, see again Buckleitner.

19. Common Sense Media, 2011, p. 35.

20. Lillard and Peterson, 2011, pp. 772–774.

21. For more, see "Your Kid's Brain, SpongeBob-ed," *Zócalo Public Square*, September 28, 2011.

22. In-person interview and e-mail correspondence with Sara Dewitt, vice-president for PBS Kids Interactive, September 23, 2011 and October 4, 2011. Dewitt said that recent numbers are even higher: in August 2011, the PBS Kids video player served 132 million video streams to online computers and other devices, including iPads.