BRAIN SCIENCE PODCAST

With Ginger Campbell, MD

Episode #29

Interview with Dr. Maryanne Wolf, Author of *Proust and the Squid*

Aired January 25, 2008

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INTRODUCTION

This is the *Brain Science Podcast* – the podcast for everyone who has a brain – and I'm your host, Dr. Ginger Campbell. On the *Brain Science Podcast* we explore how recent discoveries in neuroscience are unraveling the mysteries of how our brains make us who we are. For more information including Show Notes, links to previous episodes, and information about how to subscribe please go to the website brainsciencepodcast.com. We also have a Discussion Forum at brainscienceforum.com and you can send me email at docartemis@gmail.com.

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"Different peoples in different ways were discovering the second big principle, which was you can make a system to communicate and it can preserve your culture over time. That's a beautiful thing."

"Language is what prepares a child to read."

"Nothing is better in the very beginning than the simple act of reading and speaking to your child. That does not take money; it just takes your time and love."

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"Every child can learn to read. It is not the case that children with very severe dyslexia can't learn to read—they can."

This is Episode 29 of the *Brain Science Podcast* and you just heard a few excerpts from the interview that I did with Dr. Maryanne Wolf, author of *Proust and the Squid*. I discussed *Proust and the Squid* back in Episode 24, so after you listen to this interview I hope you will go back and listen to that episode if you haven't heard it already. In the interview I try to take a slightly different focus from Episode 24 in talking a little bit more about helping children learn how to read.

Dr. Wolf has ten years of experience in helping children learn how to read and in developing programs for helping children with dyslexia and other reading disabilities, and she shares some of the important ideas that she has learned from this experience. We also talked a little bit about what her motivations were for writing this book and about her concerns for the future.

[music]

I want to take just a moment to tell you that I have posted a new episode of my other podcast *Books and Ideas*. Episode 16 is an interview of Dr. Steven Novella. Dr. Novella is a neurologist at Yale, but he is also one of the hosts of the popular podcast *Skeptics Guide to the Universe*. You can find *Books and Ideas* in iTunes or at the website booksandideas.com.

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I'm going to get on into the interview. I think that you will agree that Dr. Wolf brings up some ideas that are worth giving thought to.

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INTERVIEW

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GC: I want to welcome Dr. Maryanne Wolf to the *Brain Science Podcast* today. Maryanne, I really appreciate you coming on my podcast.

MW: Well, it's a delight. I had heard about it and I had seen it, but I had never really begun to listen. And now that I have it's just going to be an added part of my weekly—or at least we hope twice a month—life. So, it's a delight.

GC: Well, thanks, Maryanne. I appreciate that encouragement. Can you just tell us a little bit about yourself before we start talking about your book?

MW: Sure. I'm what is called a cognitive neuroscientist and that's a person who is really interested in figuring out how a particular cognitive process—and in my case it's reading—works; and how it works at many levels. I'm interested in the behaviors of reading: things as little as how we name a letter to things as complicated as how we comprehend Proust. And then I want to go underneath all the layers down to ultimately someday the genes that underlie some of these processes.

So, I'm interested in the structures of the brain that allow us to read. I'm interested in how these various structures are connected to make a circuit for reading. And someday I hope to be working with colleagues like Elena Grigorenko from Yale to figure out what are some of the genetic profiles of children who cannot read. So, I'm interested in everything from the behavior to the genes underlying particular behaviors. And that's my work as a cognitive neuroscientist.

GC: What kind of training did you have to do to become a cognitive neuroscientist?

MW: Well, the word has changed over the years. When I first began I did my training at what was then called the Harvard Reading Laboratory, and we were a group of young Turks at the time who believed that the answers to our most

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important questions—like what are the sources of dyslexia, for me—that those sources lay in a better understanding of the human brain. And so we did work at the medical school. Some of my most important mentors and teachers were behavioral neurologists: Martha Denckla, who's a pediatric neurologist, and Norman Geshwind.

And then we did work in linguistics. And I was just speaking to Noam Chomsky about his wife, Carol, who was a very special mentor of mine in linguistics. And then we did work in normal psychology, developmental psychology, really trying to understand human development over the lifespan. And finally I was part of a group that really wanted to apply this particular kind of knowledge to the classroom. What does it all mean for children who in this area are not learning to read? Can we take those models of how the brain processes reading and translate them into better curricula for children?

So, my life goal has really been putting together that knowledge base as it evolves. And, oh my heavens, Ginger, you know how much it has evolved. It evolves minute by minute. But my task is to take that knowledge and translate it so that other people understand it and teachers ultimately can use it in better diagnostic measures and in curricula. So, for the last 10 years I've been working on curricula for children with dyslexia that's called RAVO, and it quite literally my effort to simulate what the brain does when we read. That's a long-winded story.

GC: That's OK. We're going to come back specifically to your work with helping kids learn how to read a little bit later on. But one question I wanted to ask you was what motivated you to write *Proust and the Squid*?

MW: Ah. That's a good question. For many years I have been teaching wonderful groups of students, and after about 10 to 15 years of teaching I felt I needed to get this information disseminated to a wider group of people, particularly people who don't understand the preciousness of reading and also

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particularly to parents of children who may struggle to read. So, those two very, in some ways, different groups converged in my goals.

I saw that the human being as we are now historically is, in my view, lurching towards becoming a different creature, immersed in a digital culture. And by different creature I mean we are so much the product of what we do, how we behave, that literally changes our brain circuits. What we use in the brain makes us think in particular ways. And what I saw—for me an ever-increasing worry—was a generation that was coming into the educational world more and more immersed, and more and more reliant on digital media and presentation of print.

And I began to worry about how human beings think and whether or not they will think differently when the mass of information available in digital stream media makes them think they have it all at their fingertips. The idea of the too easy, too quick access to knowledge began to worry me. And I decided I really want to understand the history, the development of reading in our species.

I want to think about how it changed the brain. I want to think about what I have taught all these years: how reading develops across time. I want to put it together in one place, and I want to use that information to make us as a society—in my own humble and modest way; I know it can only be one little step—but I want us to think as a society about how precious a treasure it is to have this expert reading brain. And I don't want us to lose some aspects of it as we lurch—in some ways mindlessly—into our next iteration.

And that iteration, of course, is what's in front of us all. And we use it every day; we are in many ways within the digital culture already. But I don't want us to become so immersed that we don't even stop to reflect upon what we might lose if we really move our children into this digital reading brain and not think about what that past brain—which you and I use, Ginger; this expert reading brain—it has particular functions. Will we lose some of them with too immediate, too

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voluminous information that causes us to attend to it and to have a set towards knowledge that may be quite different from what brought us into this culture in the first place?

So, the end of all this long story is to say I was worried about the future of reading. I have always been worried about how ignorant most members of our society are about children who are dyslexic. And I wanted to change both of those situations in a modest way. So, my book is my effort to have people stop this moment, think about reading, and for anyone with dyslexia in their family or in their own history to realize what an extraordinary brain they have. And both of those are my goals.

GC: I think one of the things that comes through in your book and in what you just said is your own personal love of reading. And that's something I resonated with immediately when I started reading your book. So, that brings us to the title —or the main part of the title—of your book, *Proust and the Squid*. Did you pick that title?

MW: Yes and no. Here's the truth for the small number of people who will ever want to know this. *Proust and the Squid* was the title of my first chapter which originally was called "Reading Lessons from Proust and the Squid." And the title of my book was actually quite different. It was using a quote from Darwin, and it was not wanted by my publisher. They were very kind but they said, 'We love Proust and the Squid.' And I said, 'It will be impenetrable to most people.' And they said, 'No, people will understand and they will appreciate it.'

So, basically my first chapter's title became the title of my book. And after I realized how serious, or how earnest, the publishers were about keeping it I made peace with it; for a different reason than the publisher. I think the publishers thought it was interesting, creative, thought-provoking. But for me the reason

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why I made peace with it and began actually to enjoy it again in the way I had before was because it causes the reader to go below the surface.

I never tell them what 'Proust and the Squid' means, even in the inside cover flap. I want them literally to go below the surface. And that's what I want for everyone in reading. 'Proust' is a metaphor for a particular aspect of the reading process; its great extraordinary generativity. And Proust said that in a beautiful quote that I use in the beginning of the book. And I can read it for you if you'd like. 'Squid' is interesting. *The New Yorker* just had an essay called, "Twilight of the Books," in which they said they were very grateful that in terms of *Proust and the Squid,* Wolf was more of the cold-blooded variety.

GC: I thought that was completely off the mark.

MW: Wasn't that funny! Well, I don't consider myself cold-blooded but I know what they meant; that the book has potentially—at least for some people—a great deal of science in it. And 'squid' refers to the use of the squid by neuroscientists in the 50's and 60's as a way of studying the central nervous system. So, I was using 'Proust' as a metaphor for generativity and I was using 'squid' as an analogy for a method of using one thing to study the brain. And we can study reading to understand how the brain learns something new. So, the title is really pretty complicated. It's a metaphor and it's an analogy for two different aspects of reading.

GC: So, then I guess it's OK that I took the squid in an entirely different way when I read it.

MW: Oh, well you know when I was listening to you, that is also a use that I made of it. So, it's a very plastic analogy, because you used it in terms of when something goes wrong—let's say with the wiring—you can study that great long axon, and in the same sense you can study what goes wrong in reading in dyslexia

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and understand the process even better. So, I actually used the squid in several ways in the book, and you highlighted one of them.

[music]

GC: Not all the people listening to this interview are going to have already listened to the episode where I talked about your book, so I'm just going to say a few things about that to help them out. The discussion of Dr. Wolf's book is in Episode 24, and in that episode I talked a little bit about how she organized the book. She has her book divided into three parts. One is the discussion of how written language evolved, because obviously we can't read until there's something to read. Secondly she goes into what happens in our brain when we learn how to read. And finally she talks about what happens when the brain can't learn to read.

In Episode 24 I kind of concentrated on the first two sections, so I'm hoping to get into the last part in more detail today. But I do have a few questions about the earlier parts of your book, so I'm going to start there. OK?

MW: Sure.

GC: In terms of how written language developed—actually that, to me, was a very fascinating part of the book because I'm very interested in the history of ideas and this relates to that—what do you think is the significance of the fact that written language has emerged only a handful of times in the last few thousand years?

MW: Reading is complex. Reading, to me, once you understand what it actually is doing, which is rearranging existing parts of the brain, is like a little miracle. And in fact that's one of the things I say to people just to pull them out of the way they take written language for granted. Reading is a kind of human miracle. It's an invention. And it, as you in your podcast highlighted, has three major steps.

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The first step is the particular peoples have to have understood the symbolic capacity: the idea that some thing, some object, some abstract entity can stand for something else; can signify. That's a really important concept. And we have found that we as a species about 77,000 years ago probably had the symbolic capacity. At least that's how far it goes back, it seems, to have found markings on stones. It's so far, Ginger. I mean we may well discover that it went back even further; but that's a long time.

So, we had this symbolic capacity. But then that second big stepping stone, if you will, is to realize that you can make a system of symbols and that that can be a form of communication. The first most primitive basic system was a system of tokens. I always find it rather ironic that the first letters, really, were in the service of numbers. And they really weren't letters but were tokens, which lasted for about 5000 years. We saw them all over what would have now been the mid-East. That area had thousands of tokens everywhere being used for economy: numbers of wine, numbers of sheep and goats, etc.

The next step of these communicative systems took place really relatively just an eye blink in terms of time ago. And that was when the Sumerians and the Egyptians – and as you rightly said it's a little contentious at this moment, because we have long thought that the Sumerians were the first peoples who invented writing and now it looks like there is evidence that there were Egyptian hieroglyphs even before Sumerian. It's still being debated which came first. And it doesn't matter for us in this conversation.

What matters is that human beings between 3000 and 3500 BCE—that's 5500 years ago—invented a system, and this was new in terms of our intellectual development. It meant that ideas could be communicated beyond the time frame of that group of people; that ideas could last, could be built upon, could be classified, could be coded. So, in the history of ideas, from my perspective, this was one of the greatest achievements of the species, to have an entire system that

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could preserve its thought, its history. It is the beginning of history. So, that was about 3500-3000 BCE.

Now, it took about 1500 years of different kinds of writing systems, between 3000 and, let's say, 1500 BCE—just around that—then up to the Greek alphabet, which is around 750 BCE. You know you have 1500 to 2000 years of time in which you had different writing systems being used. And your question is why were there so few. And Ginger, from my standpoint I'm amazed at how many different ones emerged. I think it's so extraordinary that it happened at all, that I'm amazed that there were different kinds of systems.

Now, the third big aspect of this history of writing is what happened somewhere between 1800-1500 BCE and 750 BCE. There used to be a consensus that the alphabet was really based on the Greek system. And the alphabet as we know it was. But there is increasing evidence in these wonderful and strange places—Wadi el-Hol is one of them, which translates into 'The Gulch of Terror'; I love that one—this strange, desolate, barren place is where some archaeologists have found traces, or the remnants of what looks to be an alphabet-like system.

It's small, it's primitive, it certainly doesn't have vowels. But there's a Harvard scholar, Frank Moore Cross, who when he saw this really felt that it looked like it could be something like a missing link between what was a tiny subsystem in Egyptian hieroglyphs just for consonants, and what came later which was a more Semitic system which was an alphabet-like system. It was something between a syllabary and an alphabet.

So, you have this set of little tiny systems that are merging with one concept that's beginning to shine through, and that came into great being with the alphabet. And that's the idea that each word we have in our language is composed of discrete sounds. And when you think of that you think, oh, but of course. There's no 'of course' to it. That is an amazing understanding of speech. And when you

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realize that these discrete sounds can be signified by individual symbols, there you have what is called sound-symbol correspondence.

That concept is at the heart of the alphabet. That's the principle of the alphabet. And it took really, when you look at it historically – you know I said this in the book, Ginger, and people sort of look at me aghast—but it took us almost 2000 years to really come to a fully realized alphabet in the Greek system, and children get 2000 days to understand all those concepts. And that's not fair.

GC: So, it is an amazing accomplishment, learning how to read.

MW: It's fantastic. I mean your original question, how did this happen; this is not my area of scholarship, but you have books like Michael Coe's *Breaking the Maya Code,* which may not be a page-turner for everyone but it certainly was for me, just to realize what the Mayans were doing. And you see that different peoples in different ways were discovering the second big principle, which was you can make a system to communicate and it can preserve your culture over time. That's a beautiful thing.

GC: And it used to be assumed that the alphabet was somehow the superior way of doing so.

MW: The apex. Yes.

GC: But I think that you argued persuasively that the example of the Chinese argues against this. I mean some of the most complicated thoughts ever described were written by some of the ancient Chinese writers.

MW: That's absolutely correct. And similarly, if you look at the Code of Hammurabi, you look at these medical codices, laws, you look at some of these Akkadian works, they're extraordinary. Using a writing system that's difficult and potentially not as – well it isn't as easy to learn by any means. It took years

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for the peoples to learn it. But the point of all these systems is that they became a vehicle for thought. They became a vehicle for transcribing, classifying, codifying thought, and with that platform for developing new thought.

Eric Havelock was the classicist scholar who really saw the alphabet as the apex. And he was following actually some of the work of an earlier linguist by the name of Gelb. But it is not the case that the alphabet isn't extraordinary; it is. And it may have been one of the single best ways of democratizing the reading brain. It makes it so accessible, so efficient in such a short amount of time. But it doesn't mean that great thought can't and hasn't occurred in other writing systems.

[music]

GC: One of the things that I was struck by in your book was when you talked about the scans of people reading different languages, and the fact that Chinese readers who have a system I guess closer to –

MW: Sumerians.

GC: Yes. And then English, for example, which is an alphabet system, that we use different parts of our brain, and then the Japanese who have basically both systems use both parts. Do you have any scans of – I mean if someone's reading something like – would Hebrew be more like an alphabet or like a hybrid?

MW: Hebrew is really very interesting. And one of my finest students is teaching now in the University of Haifa and really working on some of this with Hebrew. And what's interesting about Hebrew is that with children, they are learning it with the vowel indicated through little points—it's a pointed system—and then by about fourth or fifth grade those leave the writing system and they use what is a system that doesn't have vowels.

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And the essence of what the brain is doing has a lot more emphasis on a linguistic term called the morpheme, which is a unit of meaning. And that morpheme is much more important in reading in Hebrew than the morpheme in English is. Morphemes are more important in English than I think the educational system here understands, but they're very important in Hebrew. And that's a good example of just one basic difference between writing systems that is used by the brain and will show up in different scans.

Now, you used Japanese as an example. I just returned from Japan and I was speaking to 2000 educators and physicians about dyslexia because they haven't understood the phenomenon until more recently in Japan. It had been thought there was no dyslexia. And it just of course was never true, but they didn't recognize it in the same way. And they have one heck of a feat for their children to achieve, because they are learning really three systems; it's not just two.

There is Kana and Kanji. Kanji is like Chinese, and it was derived from the Chinese system, so you're using a lot of visual imagery and a lot of motoric learning of those characters. But the other system has two different what are called syllabaries: a set of symbols that are depicting the syllables of your language. So, I'll just make this up: bah beh bee bah bo buh, let's just say. There would be a character for each of those syllables. And then they have another one that's for use with foreign words, names, etc. So, when you're reading at a high school level you're using three systems. Now, that's a heck of a brain. I tell them that. I said, 'Oh, I admire your brains so much.' And it really is such a feat.

GC: Is Russian – I don't really know the alphabet that the Eastern Europeans use, but it doesn't seem like when it gets translated into our alphabet there are any vowels.

MW: Well, I don't know Russian. I wish my friend Elena Grigorenko was here this second. She would tell me more. I'd better not say anything about Russian.

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I know a little bit about Hebrew, I certainly know a lot more about the various European writing systems and their regularity and their irregularity, and how that translates, and literally what different parts are used more in the brain.

But the end of the story really, if we want to just go right to the chase, is that every writing system has certain requirements and some of those requirements are very different from each other; which all goes to show you that there is no one circuit in the brain for reading. We literally rearrange our brain according to that writing system. And that's an amazing thing.

GC: And that's the bottom line.

MW: That's the bottom line.

GC: Reading is not hard-wired.

MW: It's not hard-wired, which means that it's hard for our children. And you were one of those it seems, Ginger, and I was too, who felt like it was just a seemingly natural act. And it wasn't. We used seven years, or six years of all the stuff that went into our development and we put it to good use. And it may have seemed natural, but it wasn't. It was a beautiful little miracle.

[music]

GC: Let's move on to what happens at the individual person level when we learn how to read. Do you want to talk a little bit about what happens in our brain as we learn how to read?

MW: Sure. Now, as you emphasized in your podcast—and for those people who are listening and they have not read it, I really thoroughly recommend they listen to you, Ginger. It was such a beautiful—and I want to use this word carefully—

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deliberative rendering of the book. And I so appreciated the care that you used in describing it.

The message that I wanted to give in these three chapters is that reading is a long beautiful process that has many parts and can be arrested in different phases of its development. We can become these extraordinarily superficial readers—what I call the Socratic nightmare—where we literally just skim along on the surface and we don't go deeper. And that's one of my big worries with the species; that we'll become great decoders of information and not great probers.

But the end of the reading development is this very probative, very inferential, analogical thinker—the expert reading brain. And the stuff that goes into it is life-long. It begins literally on the lap of the beloved who is first reading to us, and we're catching by hook and by crook all kinds of information from that loved one's voice when they say, 'In the great green room there was a telephone and a red balloon,' etc, etc.

And it's all about in the very beginning, understanding that something wonderful, beautiful, affectively happy is happening when that person opens the book. And the first part of reading is really about language and the perception of language, and the affect. So, you have language and affect coming together. And one hopes the ideal lap is giving both of those to the child.

And then very quickly, by the time they're one and two, they begin to pick up some of the nuances of reading: that there are lines with these squiggly things on them, that there are pictures, and that you turn the page. And if you're reading in Hebrew you go one direction, if you're reading in English you go another direction. And you're learning all these little accoutrements of the reading act.

But much more importantly, you're learning about words, and you're learning about what words mean and how they're used. And the more you are read to the

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more your language allows you to understand more, both in oral and in written language. And it prepares you to think in a different way. And I use a phrase used by other reading scholars; 'the language of story,' 'the language of book,' is a different kind of use of language. And it's a beautiful one. It's full of metaphor and simile, even for our little ones. Words are used in different ways.

If you think about what a child is like as they're listening to the storyteller begin, 'Once long ago in a valley…' and you're already ready for the schema of story. Now, when I say that—the schema—I don't even need to use a word from psychology; you have a set, you're waiting for a kind of story. You're prepared. You know what's going to happen. You're using prediction. You're using a set towards listening in a new way, in a different way. And that is a platform for later on understanding many other aspects that you yourself will read.

So, those first five years are just full of the stuff of story which gives us so much information about grammar, how words can be used, about vocabulary, about thinking and feeling. I think, Ginger, you know this, so it feels a little strange to be telling you this, but I love Frog and Toad. I love them, because they really teach about how people can feel towards their friends and what it feels like when you're sick and your friend Toad brings you soup.

There are ways that reading encourages perspective-taking social affective development. So, when I talk about reading as not natural, it's the stuff of many things that are natural but that don't necessarily come together in so beautiful and systematic a way as in our young stories and our young books that are read to children. And that is the platform that we want for every child. But it is not the platform that every child comes to school with.

And therein lies the second big story: the child who doesn't come with all this stuff that goes into reading, and that that child is seriously behind before they even begin. And here we can go in different directions in our conversation. My

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friend and colleague, Louisa Moats, talks about word poverty, and I have so many colleagues who are doing work in this area. But the bottom line there is that our children by and large from more middle class privileged environments are coming to school having heard millions more words.

Not that they hear a million different words, but they hear that vocabulary over and over and over again: in stories at suppertime, in the ways they are interacting with their parents and caretakers. They hear millions more words. That means their brain is literally processing language at a different level with a different level of sophistication. And we who are determined to educate all our children to reach their potential have to be so serious about what those differences are at the kindergarten door.

GC: And then trying to provide special training, or whatever you want to call it, for the children that come in at that different level, without stigmatizing them.

MW: That's right. And this is the most wonderful thing about kindergarten: there need be no stigmatization ever. It's a fabulous time, and the fluidity of different children's learning can be just the most beautiful environment for different groups. And I'm not talking canaries and robins and crows. I'm talking about fluid dynamic groupings that change with, you know, we're learning this, we're learning that, and really have a sense that we're all learning different things.

One of the worrisome things, that has been a subject of different NPR interviews and recently a *Boston Globe* essay in October by Neil Swiney, is what is happening with parents who are trying to teach their children to read even before kindergarten—like at three and four—and they're having their kids tutored. It is very much a cautionary tale from my standpoint. I am really trying very hard not to confuse people. On the one hand I'm saying there's this chasm of difference,

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but that does not translate into saying that therefore a three-year-old should be being trained or drilled on flash cards. I'm not saying that.

I'm saying that their enrichment of language, and understanding of rhyme, and the beauty of little sounds—which translates technically into phoneme awareness; being aware of those little units of sounds inside words—all of that is important. But I am not suggesting that most parents go out and spend money on tutoring at three and four years old. Some of the kids will really be failures when they should never have been even asked to do some of these things. Others will read very quickly. But we don't need to do that. What we need to do is to provide a beautifully enriched language environment where letters may be common occurrences, but not forced too early. The brain really isn't ready.

GC: Right. It's kind of like trying to force a kid to be potty trained before they're ready.

MW: Yes. It doesn't work. And it really can cause, for some children—not all, of course—but for some children it's a real emotional burden. And why in the world do three-year-olds have to bear what is really the anxiety of parents about getting their kids into college?

GC: I don't have kids so I come to it from a kind of distant perspective. It all just looks like craziness from my perspective.

MW: Well, it is a certain craziness, because I'm really worried that on the backs of three-year-olds are being visited the anxieties of parents who want their children to get into the "best colleges." I mean they're beginning at three; and instead of just realizing that what is important is what they are really already giving. And that doesn't mean that all parents are doing that. But I'm concerned that many of our children will be forced into doing things that are really pedagogically and physiologically premature and unnecessary.

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So, that's one worry. And then the other worry is the converse: meanwhile our children who are in environments that are far less privileged are getting even farther behind. And it's not that I'm worried about making the chasm even larger, though that is a worry; I'm worried that we aren't putting our emphasis where we should. There should be enriched language environments where there are plenty of literacy materials all over the place for everybody—just everybody. Daycare centers everywhere. It just should be a natural part, but it shouldn't be forced. Language is what prepares a child to read.

GC: So, your advice for parents is that if you want your kid to be a fluent reader language is what they need; lots of exposure to language.

MW: Exposure to language. Exposure to literacy materials. Read to your child. Have all these things around. Make them part of the life of that family. Nothing is better in the very beginning than the simple act of reading and speaking to your child. That does not take money; it just takes your time and love.

[music]

GC: And then there's the issue of bilingualism. I think that one of the points you made that's very important is that the sooner the child learns the second language is better. It's not something to be avoided. I think it used to be a myth that you only had a certain amount of brain for your language. And that's just not true.

MW: Not at all. Not at all. It's much, much easier for children if they are learning that language of their culture from one parent and the language of their environment from the other; if that could happen. It's very hard, but let's say the parents are coming from Guatemala, it would be wonderful if the mother—whoever the caretaker is in the home—would speak one language and the father

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would speak the other, so that the child is learning one system and not having to go back and forth.

The real message here, though, is to begin that second language as soon as you can. Give it as much emphasis as you can, if possible through one parent. And regardless of language read and speak to your children, as much as possible, either language. Because the concepts of a language are what—I used the word 'platform' earlier—are the platform. They are the linguistic cognitive platform for learning. And if you are learning in a second language and you don't have that concept in the second language, if you have it in the first we already know it's easier.

But if you don't have that concept in either the second or the first, you are really in a much more difficult position in terms of learning to read. So, we need richness of language as much as we possibly can give our children. And if the parents are really only speaking one language in the home, read in that language. Just read, read, read in that language. That child is going to learn those concepts and then they'll learn their second language and that second language will use the words, the concepts, the meanings from the first language to build from. So, all of these are important principles.

GC: I have to share a story with you. A couple of years ago I went on a trip to Scotland. And we were in the airport in Atlanta waiting for our flight and we met a couple where the man was from the United States and the mother was from, I think it was Sweden. And he had been living in Sweden for about eight years. And he had a little girl who was about three years old, and they had just spent two weeks in the United States. And he was telling me that she was just now getting to where she could actually communicate in English. But he had been doing just what you said. He had been speaking to her in English and his wife had been speaking to her in Swedish. And the funny part comes when he tells me this story about Pippi Longstocking. You remember Pippi Longstocking?

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MW: Yes, definitely.

GC: He said one night he was giving his little girl a bath and he was fooling around with her and he was doing the voice of Pippi Longstocking. And she said, 'No, Daddy. Pippi Longstocking doesn't speak English.'

MW: At three years of age! They know so much.

GC: It might have been four; but anyway.

MW: They know so much. And that's a wonderful and charming example. They are immersed in these worlds around them and we aren't always aware of what they know. So, it is very, very special to give them as much as we can from whatever linguistic culture that we're from.

GC: Before we move on to the issue of the problems in learning how to read, was there anything else you wanted to say about the normal reading process?

MW: Because many of our listeners here will be adults I would say that the more that you realize you bring to text, the richer your reading will actually be. And I'd like people to be aware of that. And I use Joseph Epstein's quote, "If you look at the biography of any person you'll realize that we are what we read." And I'm so concerned that we are losing a little bit of the edge of our expert reading brain in the service of efficiency. We're spending so much time doing email and the kind of digital print that we are I think forgetting the esthetic beauty and contribution of real critical leisure reading.

There was once a book that I read in a philosophy class called, *Leisure: The Basis of Culture*, by Joseph Pieper. It was written fifty or more years ago. And he made this wonderful point that leisure is an important part of the pursuit of virtue, because when we have the time to think deliberatively about virtuous action, about good and evil, about beauty, about truth, about these qualities that I

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think are becoming less salient in our culture, we will be the less. So, I look at reading in the expert reading brain as ever more important than it was.

And I don't think we read the same anymore. I don't think we read as a country, as a society. I don't think we read poetry in the way we did only 20 years ago. I don't think we memorize poetry. I don't think we read difficult prose. We want everything to be fast. And I was asked yesterday about the Kindle reader. I'm not opposed to anything on the computer but I am concerned that we will have a set towards efficiency rather than to deliberation and contemplation and reflection in our reading. I don't want us to lose that. And so, the expert reading brain as we have developed it to this point is such a beautiful and miraculous entity it would be a tragedy if we lost it in the service of having "more time." I ask, more time for what?

GC: I wish I had more time for it. Well, Maryanne, we really have gone longer than I though we were going to go today, but before we stop I really do want to give you a chance to tell us a little bit about what you've learned from studying children that have difficulty learning how to read. What would you say is the most important principle in approaching reading challenges?

MW: Well, I'd say there are three things I'd want everybody to know. The first is if you realize how complex the reading process is you have a very simple realization that it can actually go wrong in different ways. So, there can in fact be different forms of problems in reading—if you want to call it subtypes, in dyslexia that's a technical term. But reading is a very complicated act that can have very complicated and different ways of breaking down or having troubles. So, that's one thing.

Far more important to me is an understanding that dyslexia is not a sign that a child is not as smart or as intelligent as another child who can learn to read well. With dyslexia, all that we are amassing in our studies is indicating that that brain

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is very, very smart, and in some instances even gifted, but it is organized differently. As I said, there are different ways of having reading failure. Not every child with dyslexia has an extraordinary right hemisphere, but many do.

And what I mean by that, I'm using right hemisphere as a metaphor. The right hemisphere is one way of thinking of all the gifts that we have in terms of spatial skills, in terms of big pattern recognition—art, architecture, all these sorts of talents in the human species that we use to look at our universe in a particular way—the big picture. We're looking at how things are constructed, how they're configured. Well, many children and adults with dyslexia are quite talented, if not gifted in some instances, in art, in architecture, in computer science.

If they're in medicine, Ginger, they're often in radiology. In astronomy you see people talking about how amazing some astronomers with a history of dyslexia are at recognizing patterns that others aren't noticing. If you look in business, there was a recent report that 35% of entrepreneurs in small businesses have a history of dyslexia. If you look at CEOs in Silicon Valley; if you look at, I think it must have been *Forbes* magazine just a couple years ago, how many CEOs have dyslexia. Well, it's not a coincidence.

This second principle, the dyslexic brain can't be categorized in one way but often you will see a differently organized brain that is not efficient for written language but is often proficient in the big patterns in thinking differently. There's no coincidence that all these CEOs who literally think differently have a history of dyslexia. So, the second principle is be sure to recognize the potential of those children and do not ever think they are less intelligent. If anything they may be more intelligent than you are. But we have to give them that best shot.

And the third principle is that it's not about how the child can't learn to read, it's about how we haven't found the right way of teaching that child. So, the third principle is all about trying to find the match with the child's strengths and trying

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to really be very explicit about teaching that child how to acquire the parts of reading in a way that will maximize their sense of their own success and systematically give them more and more exposure time to some of the basic parts of reading.

Explicit instruction is so important. One of the saddest stories in American education from the standpoint of teaching children with dyslexia is that many children failed because of the methods they were being taught with—through no fault of the teacher; they weren't trained to do this, it wasn't their fault. But it was assumed that the child would induce the sound-symbol correspondence, would induce the principle of the alphabet, and they weren't inducing anything. They needed explicit instruction.

So, there were a lot failures. You know I don't like to label methods here. It's not about making anyone feel bad. But whole language methods for children with dyslexia were by and large really the most inappropriate way of teaching them. So, some children actually failed because the teachers didn't know how to teach them. And I don't blame teachers. It's not about blame, it's about learning how to teach children with dyslexia in better ways.

And our lab has been, as you know, working for 10 years on a particular curriculum that's called RAVO, but I could care less it's not published. It's not about the RAVO program, it's about having principles within this program that can be used by instructors, and tutors, and teachers anywhere. What's most important that the child needs; that's what I want people to think about. Every child can learn to read. It is not the case that children with very severe dyslexia can't learn to read—they can. They will not have as easy a time, it's true.

There are no "cures." And unfortunately there are a lot of people out there who are selling products or methods and saying they can "cure" dyslexia. It's not the case. You don't cure a different organization of the brain; you find ways and

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strategies of helping that brain learn to read in a different way. It's not about cure, it's about teaching different ways. Not everyone, of course, will agree with me. And that's all well and good. But my best advice for parents is to find some people who have used research methods that have a history of good research behind them. Don't buy products that don't have a research basis. It's very, very important. There are so many bad things out there, Ginger. It's terrible.

GC: Is there anybody out there that's doing any kind of clearing house?

MW: Yes, there are different efforts with some different degree of success. My colleague Barbara Forman at the Florida State University Research Center has a clearing house that she's working on. It's not a clearing house exactly, but they're working at making sure that the programs that they are recommending have an evidence base. There are different groups across the country that do that. The What Works Clearinghouse under the auspices of the Department of Education is trying to do that, with varying degrees of success. You know this isn't a simple kind of a process. I wish it were. I wish it were.

GC: I will get with you to get at least some basic links to help people get started.

MW: Yes. I'll certainly do that for you.

GC: Well, we're just about out of time, but there was one thing that I know that you're very—as you have alluded to—concerned about: the move to getting all of our information off of the Internet rather than doing reading sort of the old fashioned way. And I was hoping we would have more time to talk about that, which we aren't going to. But as I was preparing for your interview it got me to thinking that critical thinking is an issue, and that maybe that's a separate skill besides reading. Because, like say someone reads *The National Enquirer* as their source of information. You know? That's not really going to be any better than skimming off of YouTube.

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MW: Right. That's absolutely the case. So, you're alluding to the complexity of what I'm really asking. Let me just say a couple of things that are important. My worry isn't so much about presentation, though I am worried about text presentation in different formats and think that some are better in developmental periods than others. My real worry is the kind of set towards knowledge, understanding, ultimately wisdom.

But let's not go into wisdom, let's just go into a set towards true knowledge, rather than, let's say, superficial knowledge; which can be either skimming *The Enquirer,* or YouTube, or whatever. I want a set towards deep, critical, probative thinking that I believe is encouraged best at this moment, in my knowledge, by the kind of reading that I see us doing in print in the early years. I'm not talking about later years. I think you and I, Ginger, can learn a great deal in any format you throw at us because we have an already formed critical, expert, inferential, analogical reading brain. We already have it. We use it, whatever format. Do I personally feel more comfortable, like I'm really spending a more deliberative act of reading in certain formats like books? Yes, I do. But that's not really the question.

The question is formation. Can we have a child who is a truly critical thinker on digital text? Yes, we can. But I believe it will take much more than what we are doing now to really form that. I think that it is better—and this is something that I need more evidence for; I am stepping outside my own evidence base—but my worry is that all the skills that we bring into the last milliseconds of the reading process that are really all about comprehension, I believe those are going to be more and more short-circuited by a format that encourages immediacy, efficiency, and moving on, and on, and on, and on, and on.

So, my worry is that the young child, who hasn't formed that set towards comprehension and critical analysis and inference, will become more of an efficient superficial decoder of information—massive information. They'll have

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skills I never had, which are wonderful skills. But they will have lost some of the critical skills that I've developed. I find that an unnecessary and ultimately untenable equation that doesn't need to be there. I'm being redundant, I'm sorry. You don't need a binary situation here. It's not binary, it's developmental.

So, what I most want us as a society to do is to be deliberative and reflective about what we don't want to lose in that expert reading brain for our young children. They're going to be immersed in the digital-driven culture. They already are. But in the beginnings of the teaching of reading let us spend enormous effort and time ensuring that that brain is going to learn how to think when it reads. And until I am convinced otherwise I don't want that child to be immersed totally in digital presentation. It encourages immediacy and the illusion that they know it all—because that's our Googled universe—before they know anything well.

I don't want us to lose the preciousness of our probative generative reading brain. That's the Proustian principle. Proust said that at the heart of reading the reader leaves the wisdom of the author behind to begin to discover their own truths. That's the generative principle. Proust said it better, by the way, as always. That's the generative principle I do not want us to lose. And it's my worry that, again, the efficiency will trump the generativity.

GC: Are you seeing that in the kids that you work with? Because I have a very small sample of my nieces and nephews, and they're on the Internet but they're all readers too.

MW: I see so many different children, Ginger, and some are just like we were, and they're fabulous and they are bimodal, if you will; they're biliterate. And I think that is fabulous. And my hope is that there will be this great expert reading brain using various modalities. But I've just come back from Korea and Japan where I see children who are addicted to digital media. I see the report from the

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National Endowment of the Arts where reading comprehension scores and skills in our 12th graders are decreasing. I see a decline of reading all around me.

So, I see a real range of things happening for good and for ill. But if I do not use my small efforts, my own knowledge base to say to the world, 'Stop and think about what you might lose before you lose it,' then I won't have done what I think I was on the earth for. So, my mission, if you will, is to be something of a gadfly for the reading brain.

GC: Because you love reading you are the perfect person for the job.

MW: I certainly do.

GC: And I can't imagine someone who didn't love reading being able to do what you're doing.

MW: Well, you know it's probably no coincidence that my first two degrees were in English Literature, and only then did neuroscience come into the picture. But neuroscience was my way of actually making sure that everyone could appreciate written language in the way that I was so lucky to be able to do. So, I want to give my good fortune to others.

GC: I appreciate your coming on the show. I know that you've got to sign off. Maybe we can talk again sometime.

MW: Well, Ginger, it was a true pleasure. And I want to thank you from my own area for doing what you're doing. It's a great service and I'm sure your readers—your readers; you can hear me—your listeners are as appreciative as I am. So, good luck in your work.

GC: Bye.

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MW: Thank you. Bye.

[music]

GC: Well, I really enjoyed talking with Maryanne, as you can tell since we went so long. And just before I sign off I need to remind you that you will find Show Notes, including links for more information, at brainsciencepodcast.com. You can subscribe to the *Brain Science Podcast* on iTunes or at the website. And I hope that you will send me feedback, either on the forum, brainscienceforum.com or send me email at docartemis@gmail.com.

I want to take just a moment to tell you that I have posted a new episode of my other podcast *Books and Ideas*. Episode 16 is an interview of Dr. Steven Novella. Dr. Novella is a neurologist at Yale, but he is also one of the hosts of the popular podcast *Skeptics Guide to the Universe*. You can find *Books and Ideas* in iTunes or at the website booksandideas.com.

Lastly I want to thank everyone that has contributed to supporting the podcast. Your contributions and subscriptions are very much appreciated.

For those of you who have been wondering when I was going to do another book discussion, the next episode is going to be a discussion of Christine Kenneally's book, *The First Word: The Search for the Origins of Language*. This is going to be a discussion of a book about the attempts to trace the evolution of human language. And two episodes from now I'm going to be having an interview of the author of the book *Rhythms of the Brain*, György Buzsáki. If you have an idea about a topic you'd like to hear covered on the *Brain Science Podcast,* please post it on the Discussion Forum at brainscienceforum.com.

Thanks for listening. I look forward to talking to you again soon.

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