

>> Okay, all right. Then, it's my pleasure to introduce Nancy Hennessey. She's an educational consultant, past president of the International Dyslexia Association and an experienced teacher and administrator. While in public schools, she provided leadership in the development of innovative programming for students with special needs, a statewide revision of special education code, and an award-winning professional development initiative. She has delivered keynote addresses, workshops and trainings to educators nationally and internationally. Nancy has co-authored Module 6 of *LETRS: Digging for Meaning: Teaching Text Comprehension*, the second edition, with Louisa Moats, and the chapter, *Word Learning and Vocabulary Instruction in Multisensory Teaching of Basic Skills*, third edition. She is a former national trailer for Language Essentials for Teachers of Reading and Spelling, which is LETRS, and currently serves as the director of Academic and Professional Practices for AIM Academy. Nancy is an honorary member of the Delta Kappa Gamma Society, is the 2011 recipient of IDA's Margaret Rawson Lifetime Achievement Award, and NCIDA's 2012 June Lyday Orton Award. So, join me in welcoming Nancy, please!

>> Well, welcome, everyone! I'm very pleased to be here with you. I do spend quite a bit of my life in Pennsylvania. I live in Kitty Hawk, North Carolina, on the outer banks. So, if any one of you has ever been to the outer banks, if you come across the bridge into Kitty Hawk, I can see you coming across that bridge, if I'm watching! I spend two weeks out of the month at AIM Academy, which is in Conshohocken, Pennsylvania. It's a private school for students with language-based learning disabilities, having spent many, many years in public school.

Everything that I have to say to you today about dyslexia comes from the wonderful experiences that I've had as an educator. But I will stand here and readily say to you, I do not know everything about dyslexia. I know a great deal, we know a great deal, but there's still much more to learn. So, I want you to know that as we have this conversation today, that this is an evolving field, the field of dyslexia. It's a very old field as well, and I'll share something with you shortly that may, in fact, be a bit of a surprise to you that back in the 1800s someone was talking about dyslexia.

As we have this conversation today, I'll pause periodically to ask you for questions. I'll engage you in some activities. What I'm hoping is, that you are able to make connections to what it is that I'm saying in terms of the students that either you work with in terms of diagnosis, or delivery of intervention, or intensive instruction, or perhaps as a leader, administrator, curriculum developer in your district. I assure you, each and every one of you in this room knows someone who has dyslexia, even if they haven't self-disclosed that to you, because when we begin to look at reading disability, when we have conversations about reading disability, dyslexia is the largest of all the reading disabilities. So, we'll try to fine-tune this for you, engage you in conversation and hopefully, elaborate on your neural networks, or your "mental model," as I like to say, because I'm into comprehension, your mental model of dyslexia.

So, I'm going to use a framework today to talk about dyslexia. I'm going to use a framework that was developed by Margaret Rawson, who, until the age of 102, right, was engaged in the education and diagnosis of those individuals who have dyslexia. In fact, she dedicated her life to the topic. And in the 1950s, she's really one of the pioneers, she really earned the title the "Grande Dame" of dyslexia. In the 1950s, at a meet of what was then the Orton Society, which then became the Orton Dyslexia Society --

and by the way, if you're wondering what's an Orton, I will answer that question -- which then became, as I said, the International Dyslexia Association. She said this: She said, when we think about dyslexia, we have to think about it from these perspectives. First of all, the understanding is scientific. And so, we're going to use the definition of dyslexia to probe exactly what that means. What has the science told us in terms of dyslexia? She also told us that the diagnosis is clinical. And so, yes, we will spend some time not only talking about definition, but we'll spend some time talking about diagnosis, and the importance of having a knowledge base to make that diagnosis, and why you might want a diagnosis; what does that lead to? She also talked about the treatment as educational. Hence, my willingness to be here with you, but not only a willingness, I'm really thrilled to be with educators to talk about this.

Louisa Moats, not too long ago, said, "Expert teaching is the answer." So, understanding the nature of dyslexia, understanding it from an assessment point of view is certainly critical. But even more critical is understanding it from an educational point of view. And last, but not least, the differences are personal. So, dyslexia is different in each individual. We can talk about the commonalities, but we also know there are differences, and we have to be aware of those. We also know it's a personal journey. So, while I am not dyslexic, I will share with you, I have dyslexia in my family. I had a brother with dyslexia, I have nephews with dyslexia. I have cousins with dyslexia. And believe me, the journey is personal. In fact, I probably would not have gotten involved in the field at all, if it were not for the experiences of my brother.

So, dyslexia is -- let me share a few resources with you, before we begin. I want you to know that the International Dyslexia Association, www.interdys.org, has many, many resources that have been developed by experts in the field, that are accessible either for free -- you have one of them in your handouts, the Dyslexia Basics Face Sheet, downloadable. There are several fact sheets that are downloadable. These happen to be -- well, one of them is a book that you can purchase, *Basic Facts About Dyslexia*, very low cost. The other one is a dyslexia handbook, downloadable, on this particular Website. There are also others out there, such as *Overcoming Dyslexia*. There's probably not a person in the room that doesn't know Sally and Ben Shaywitz' work if, in fact, you're interested in dyslexia. Nancy Mather's work, you know, Nancy Mather? One of the authors of the Woodcock-Johnson, *Essentials of Dyslexia Assessment and Intervention*. And then, of course, to Dehaene's work, *Reading in the Brain*. So, there's many, many things out there, but I wanted to at least share a few with you as resources that you may want to look into.

So, let's begin, then, our journey this afternoon, the understanding is scientific. And many, many of you, I think, I hope, are familiar with Hollis Scarborough's Reading Rope. I can't talk about dyslexia without first talking about reading proficiency, because dyslexia is, in fact, a condition that affects word reading, and subsequently can have effect on comprehension. So, we have to start with a basic understanding of, what has the science told us about how students learn how to read? What happens with the student who reads by magic? What happens to the student with good instruction who reads? What are the skills and processes that go into reading? In fact, all of us as informed educators, as we think about reading, whether we're thinking about it from the perspective of a Tier One, Tier Two, Tier Three student, have to have an understanding of this, because when we make good decisions about our core reading programs, our interventions, our intensive programs, when we look at our assessment data, we

have to be able to make good decisions about whether something's working or not. Or, where has something gone wrong for a student? The lower part of this reading rope is word recognition. And many of you have heard me speak before, I think, because I see a lot of LETRS ladies in the audience, right? You all know that I often say word recognition is the onramp for reading proficiency. If you cannot read the words, you're not going to be able to make meaning.

But reading the words is dependent upon a number of different skills and processes. And you see here the lower part of the rope, color-coded, by the way, which is what we do at AIM Academy, where I currently work, because we make connections to interventions and to our assessment through the use of color-coding. But what you see represented here are the skills or processes of phonological awareness, decoding and then sight recognition. Each of those contribute independently, and interdependently, to word recognition. If a student is not able to work with the sounds of their language, if they are not able to segment sound, blend sound, they are going to have difficulty with decoding. If you can't identify the sounds, you won't be able to map the letter or letters onto the sounds. You all should know that, if, in fact, you're using universal screening, whereby you look at what, initially? You look at letter naming and you look at phoneme segmentation fluency, for instance. There's a reason why you do that. They're predictors of whether or not a child is going to have difficulty.

So, we have decoding, understanding how the language works, the structure of the language. English is not crazy! Diana Hanbury King, another very good book! Once we understand the language, we're able to teach it to students in a structured way.

Sight recognition -- it's not enough just to be able to read the words, we have to be able to do this automatically, whether they're phonetically based or not. So, the lower strands of the rope have to be in place. Now, they're not sufficient for skilled reading which, by the way, is the outcome, here. And I don't know if you can read this, but skilled reading has everything to do with, what? Reading the words and making reading simultaneously. P.S., that's the definition of fluency; being able to read the words and make meaning, simultaneously. So, now, we need language comprehensive processes and skills in place, as well. And what do they look like? They function independently, we develop them independently, but they also function inter-dependently.

So, we talk about things like background knowledge, and vocabulary which, by the way, are related. And we talk about verbal reasoning, this ability to make inference, for instance. And we talk about a knowledge of text structure. And we talk about a literacy knowledge; well, the literacy knowledge actually is the text structure. So, we talk about these strands developing over time, as well. Notice that the rope comes together, and as it comes together, the strands of the rope become tightly woven, and the results, then, is skilled reading. Any one of the strands of the rope, whether it's lower order for word recognition, or if it's higher order, language comprehension -- any one of the strands frayed, then the student is jeopardy of not becoming a proficient reader. That's the science of reading. This is an analogy of what happens in terms of reading proficiency, based off of something called, "the simple view of reading." Word recognition times by language comprehension equals reading comprehension. Right.

So, we begin here. Now, let's see if we can experience this a little bit, to have a sense of what I've been talking about. Take a moment and read. Who would like to volunteer -- you're all fluent readers, so you should have gotten through that -- anyone in the group want to put their hand up and tell me exactly what this said?

>> [INAUDIBLE]

>> Well, I know I put it off the screen, because you should be able to remember it! But if I put it back up, even if I show it to you within a timed period of time that would be sufficient for automaticity, you still would struggle to read it. Now, I know what's happening out there. Some people are figuring out that, what, the vowels are missing! And you're beginning to slot in the vowels. And maybe context is facilitating the reading of this. By the way, context, a very poor strategy for word reading; it's what novice and poor readers do, they use the context, right? What do you have to know in order to be able to read this? Think back to that reading rope for a moment. You have to be familiar with the sounds, you have to know what letter or letters map onto the sounds, and you have to know the patterns that we use in English to represent those sounds. And then, in order to do this in a way so that you could make meaning, you have to be automatic. When you're not automatic, if you're barking at the print, you know -- ph-ph-or-or-ss--ck-or-or -- if you're barking at the print, what happens? You lose focus. You're not able to attend to what the meaning is.

Now, read it again to yourself, if, in fact, you read it at all the first time. What does it take to make meaning of this? Now, we all know with Abraham Lincoln, we have a sense of where it came from. What did you all bring forward? Your background knowledge, yeah! One of the strands of the reading rope, right? And along with that background knowledge comes, what? Your vocabulary and understanding of word. And then, you had to work your way through. There's two sentences here, right? And they're pretty lengthy. I can't believe I forgot to talk about that strand of the rope, the language structures, the syntactical structures. That's my favorite topic in terms of comprehension, sentence comprehension. You have to work your way through the sentence and figure out, who is it about? Or, what is it about? What's happening in the sentence? And it's complicated by the fact that there were embedded phrases, for instance, in these sentences.

So, a number of things have to happen in terms of the reading of the word. Not good to have the vowels missing. A lot of our kids never get those vowel sounds, right? And then if, in fact, we can read what's presented, we have to have all these other processes and skills in place, in order to make meaning of the text, right? So, skilled reading.

So, what goes wrong for many of our students? Well, things can go wrong in different areas, they can go wrong in different areas. Jack Fletcher, right, and his colleagues, in a recent book on learning disabilities began to parse out for us, and many of us knew this from studying models such as the four part processing mode, began to parse out for us different types of struggling readers, right, based on the research. And so, what did Jack Fletcher and his colleagues say to us? Well, there's a subgroup of kids who have difficulty with word recognition -- lower strands of the rope, right? Those are your classic dyslexic students. Classic dyslexic students. In fact, what they struggle with is the speech sounds of the

language, right? They also then struggle with mapping the letter or letters onto the speech sounds, because they don't have the foundation to do that. We have another subgroup of readers who struggle with fluency. They may, in fact, be able to read the words, but they bark at the print. C-C-C-A-A-A-T-T-T, cat! They finally get it. Those are the kids who are struggling with automaticity, with this ability to quickly retrieve, right, the letter or letter patterns that represent the sound, make connections with the sound and read the words in an appropriate way. Or, to read the words in connected text. Oftentimes dyslexic students will struggle with this, as well. And when they do, we talk about a double deficit.

A third subtype of reading difficulty, language comprehension. Students who can get through the word, they can read the words accurately and automatically, but they have no clue what they've read, or they can only report back to you what lies at the surface of the text, literal questions, okay? Now, when we begin to work with readers, and we continue to read the literature, what we find is, the largest number of struggling readers have problems with all three, right? They have problems with all three. We also find that word recognition piece emerges as the predominant problem within all three of these subtypes. So, we need to keep this in mind in terms of, this isn't an easy topic. This is complex, right? If, in fact, we're going to address students appropriately, the dyslexic student, we have to understand the science, and we have to understand where the student is having difficulty through the assessment, and then the response to intervention.

So, we have Jack and we have Sammy, and we have Alicia. And any time I do a talk like this, I want for you to be thinking about those students who are sitting in your classrooms or in your schools, or in your practices, and make connections to them. Be thinking about, where can you find the evidence for what it is they're experiencing difficulty with? So, against that backdrop, right, let's now talk specifically about dyslexia. And I've already given you a clue, haven't I? I've told you actually two, maybe more, things about dyslexia. I told you, all right, that I have relatives who have dyslexia. So, you should be able to respond to, is dyslexia familial? Yes. Will every member of a family have dyslexia? Not necessarily; it's a little more complex than that. Right? The second thing you should be able to respond to is, what does dyslexia primarily affect? Word recognition. In fact, in many of the definitions, you'll find single word decoding as a hallmark characteristic of the student with dyslexia. But let's go a little further.

So, you have in your handouts a Truth of Fib sheet. So, if you didn't download it, you need to go to the app, as Deb just said, all right, and it looks something like this. "Dyslexia is not a vision problem, truth or fib?" "Dyslexia is dimensional, truth or fib?" "Dyslexics range the range, truth or fib?" I'm just going to give you a minute to complete that, and then we'll come back to that as we progress through the talk, or perhaps at the end of the talk. So let's -- this is like an anticipation guide. What we're trying to do is help you make some connections. Okay. No sharing of answers, I didn't authorize cooperative learning, here! All right? This is an individual assessment of what you brought into the room with you; what was flying along on your neural networks. I tried not to make them too tricky. Take about 15 more seconds. All right, if you can just put that to the side, and we'll return to it.

So, the understanding is scientific. So, we've already had a discussion about the science. We've looked at what the science tells us about proficient reading, now let's look at what the science tells us about

dyslexia. We're going to travel back in time just a little bit with you, as I promised, all right? And when I travel back in time, all right, what I find is that two individuals -- there are more, but two individuals stand out in terms of recognizing that there was a problem in terms of word reading, for some individuals. In fact, one was a physician, a British physician, the other one, an ophthalmologist, right? And they recognized the problem in adolescent boys. Wow, that's a surprise! Okay? And one of the publications, all right, this happens to be, I think, the one that came directly from James Hinshelwood, all right, he called his publication, *Congenital Word Blindness*. He wasn't the first one to use that term, all right, but he wrote about it. Look what he said, though. "It is evident that it is a matter of the highest importance, to recognize as early as possible the true nature of this defect, when it was met within a child. It may prevent much waste of valuable time, and may save the child from suffering and cruel treatment. The sooner the true nature of the defect is recognized, the better are the chances of the child's improvement." Pretty smart guy in terms of early intervention and identification.

But look where we have to travel, all the way back to the late 1800s, and what are we doing now about this? Okay. Here's Pringle Morgan's quote, 1896, describing a young man he was working with: "He seems to have no power of preserving and storing up the visual impression produced by words. Hence, the words, though seen, have no significance for him. His visual memory for words is defective or absent, which is equivalent to saying he is what Kussmaul has termed, 'word blindness.' I may add the boy is bright, and of average intelligence in conversation." Pretty interesting! "The schoolmaster who has taught him for some years said that he would be the smartest lad in school, if the instruction were entirely oral."

Here's another little hint: One of the ways we can identify dyslexia is by looking at the differences between listening comprehension and reading comprehension. What gets in the way in terms of their making meaning? Is it the lower strands of the rope, or the upper strands of the rope? Well, this work, of course, was followed in the 1920s by Samuel T. Orton. So, in case you were wondering what an Orton is, all right, Orton was a neurologist. And surprise, surprise, he worked with adolescent boys as well, right, and began to see some of the very same things that Pringle Morgan and that Hinshelwood had seen. He called it something different, though. He called it strephosymbolia -- "twisted symbols." Now, Orton was right in many ways, but he wasn't totally right. He leaned more toward dyslexia being a visual problem, right, which, in fact, we now know, it is primarily a problem based on phonological processing, right?

But he was right about some things. He said these students that he was working with over time, they appear to have a constitutional issue; in other words, it was a part of them, right? He also said these students were capable. In other words, it wasn't intelligence that was interfering with, we can exclude that. He also said many of them had language delays, intonating, then, that it was a language-based problem. Okay.

By the way, the Orton Dyslexia Society was founded in name, you know, based on Orton's work. That work carried on, then, by June Lyday Orton, and individuals such as Margaret Rawson. So now, if you didn't know what an Orton was, or you had heard about Orton-Gillingham, all right, Orton worked with

an educator and advocate, Anna Gillingham, and they were responsible, then, for the educational treatment of individuals who had strephosymbolia, which we now call dyslexia.

Okay, so up to present-day, and I know some of you are thinking, “But that says 2002, that’s not exactly present day.” Well, I will tell you that if you go out and you take a look at the literature and you look at the very definitions of dyslexia, right, this definition stands the test of time, because the current definitions, including those put forward by NICHD, for instance, and others, contain the same type of language that we find in this definition. So, I’m going to use IDA’s research definition, which was created by a group of researchers, including the Shaywitzes, UKCATs, Susan Brady, Reid Lyon, who was then at NICHD, a number of individuals under the auspices of IDA, the International Dyslexia Association, was also, then, the definition used for research at NICHD, the National Institute of Child and Health Development. We will now have a conversation about this definition. I’m going to parse it and take it apart, as we continue to think about the science of reading.

And the first component we’re going to look at here is that dyslexia is a specific learning disability. In fact, some would say it is the best-defined of the subtypes of learning disabilities. Jack Fletcher actually said that in an article not too long ago, right? But it also is neurological in origin. So, let’s talk a little bit more about that. That connects with what Samuel Orton said about it being constitutional. In fact, over the last 20 years, centers around the country have studied the brains of individuals who learned how to read as if it were natural -- we know it’s not, right -- and individual who have difficulty. In fact, they have mapped the circuits, the pathways that activate in the brain when children are asked, or young adults, when they are asked to work with words. And by working with words, I’m talking about working with the sound-symbol relationships, the reading of words.

The left hemisphere of the brain is primarily responsible for language. There are areas within the left hemisphere of the brain that activate, right, when we do fMRIs, for instance, Functional Magnetic Resonance Imaging, of the brain, right, as the student reads. What we find in that left hemisphere is, we find an area that activates for speech sounds, we find an area toward the back of the brain that activates for the recognition of letter or letters, the symbols that we use to represent our sounds, and we find an area that connects the letters and the sounds. When the researchers look at the brains of normally-achieving readers, and then they look at the brains of individuals who are struggling with word recognition, dyslexics, they see differences in these brains. I am not a neurologist, right? I have a basic understanding of this, so I thought it might be helpful if we turn to someone who is an expert in this area at this moment, and hopefully my video clip is going to work for you. Dr. Kenneth Pugh is the director of the Haskins Lab, which is Connecticut. It is affiliated with the Yale University. It was the home for Isabel Lieberman, who is responsible for bringing to the educational community the idea that phonological awareness might be important. It houses researches across multiple disciplines, but they’re specifically interested in the language and learning disability. It also is affiliated with researchers around the world.

In a recent visit to AIM Academy, right, Ken Pugh spoke with one of our students about reading, and the reading brain. And the student asked him a very pointed question, which you’ll hear in a moment, about the dyslexic brain. And here’s his response.

>> Is there any difference that you guys know as of now that differentiates between how reading with dyslexic kids, or kids who have learning differences, are between children who are born or don't develop certain things, like decoding issues --

>>Mm-hmm?

>> -- or dyslexia? Is there any difference?

>> Yes. So, my work over, I guess, almost 20 years now, has really focused on these three questions; one is, how does the brain form circuits or connections that allow reading to be easy? How does it differ when reading is not easy, when children struggle with what we call specific reading disability, or dyslexia, depending on the terminology? And then this third question, of how does learning and intervention modify or change those brain differences? So, to kind of give a very short overview on what we've learned to those three questions, and it's a complicated subject, but what we've seen is that in order for reading to develop fluently, to become fluent, there are important pathways in the left hemisphere that connect visual areas, the areas that see the letters, and language systems along the left temporal and inferior frontal lobe, sort of where I'm pointing. And there are certain pathways that support very fast translation, which is, of course, what we want to do when we're reading; we want to be able to decode the words quickly. So, we've been able, through these neuro imaging techniques that I use, to map the brain and to see where those pathways are, how they develop, how they maintain connectivity, so a lot of sort of basic science.

To the second question, do children with reading disability look different? And the answer is yes. So, when we look at the brain of these bright children who happen to struggle with reading, we find that reading has a very different circuit. And children who are struggling tend not to develop these fast pathways in the left hemisphere. They tend to rely on alternate systems, including areas in the frontal lobe, which is where we do a lot of cognition and thinking and attention. So, those two questions, how does the brain develop circuits for skilled reading, and does it look different in dyslexia, have actually been very well-studied, and we know a lot about those differences. And interestingly, we see them not just in English, but in every country; every language we've studied. We do research in 12 languages around the world. And when we look at dyslexic and non-dyslexic brains, we see very similar differences...

>>So, there's more of this. If you're interested, AIM Academy, you can Google AIM Academy's Website, right? We have a series of something called, "Teachable Moments." Everyone that we bring into our school to speak to our staff, as well as to our professional development series, we record teachable moments in which either I or students interview. And this is a very interesting interview, and very relevant to our conversation. All right.

So, this happens to be a picture of myself and my colleagues at Ken's lab up in Haskins. And when we talk about imaging, this is actually a simulation mechanism for fMRIs. When you bring a child in to do an fMRI, you put them through these scanners, and what they do is, they do some practice sessions with them. So, that's what you're looking at, here. And what they're actually measuring is, the increase in hemoglobin and oxygen to various areas of the brain; that's what lights up when you take a look at

brains of individuals who are normally-achieving readers, versus the dyslexic. So, here is a scan, all right, in which you see readers on the left, normally-achieving readers, and dyslexic readers on the right. And you just heard Ken talk a bit about the fact that different areas activate in the dyslexic brain. In fact, what they do is, they over-activate, all right, that front area, which has everything to do with the speech sounds. And that's where the glitch really occurs. And they're not, then, able to reach out to that back area where you have the letter or letters being recognized, and then that area that brings the letter and sounds together. So, a neurological basis here, neurobiological basis for dyslexia. So, yes, we've been able to take a look at -- not we, but these neuroscientists have certainly been able to take a look at the neuropathways that are involved in dyslexia. So, imaging studies give us information. Good readers of all ages show strong activation in the back of the brain, less in the front. We become more reliable in the back of the brain for automaticity, all right? The dyslexic brain uses auxiliary systems that over-activation in the front, sometimes activation in the right hemisphere of the brain, all right, and that's the last bullet, here.

So, that first part of the definition is, dyslexia is neurological in nature. We can find a basis. I will tell you there are also studies that are not represented in these slides today that speak to the issue of genes. Dick Olson and Bruce Pennington has looked at genetic studies, twin studies, and identified genes that make individuals more susceptible to dyslexia. This is an evolving field. This is Ken Pugh's most recent work, right? This was released by the Yale Office of Public Affairs and Communications; you can see he has a long list of colleagues through Haskins that have worked with him on this. And what he has identified along with his colleagues is a chemical basis for dyslexia that reading-impaired young children have higher levels of metabolites, glutamate and choline in their brains, and these higher levels continue to be indicative of difficulties in developing typical reading, and then we have a connection here to language.

So, just a reminder, from time to time, you can glance at your truth and fib, and if something that I've said resonates, you can go back and check your answer. All right, let's take another part of the definition, all right, so I'm not representing the entire definition; I've just pulled a piece out for you now. So, we know it's neurological, right, it's biological. Okay. We also know that there's a core deficit. The majority of individuals who have dyslexia will have a core deficit in the phonological component of language. So, if you walked into the room and thought that reversals are a hallmark characteristic of dyslexia, right, you now know that's a fib, right? Because this is not a visual problem. I'm not saying that dyslexic children never reverse, but many children reverse, and they're not dyslexic. That I'm saying to you is, this is a phonological problem. And when you think about phonology, right, we go right back to the reading rope, and the strand that's most specifically identified here is the phonological awareness strand, right?

So, let's elaborate a little bit more on that. What does phonological processing mean? What does this area of the brain that activates, all right, in terms of speech sound, do? Well, it certainly works with the sounds within words. It works with our ability to identify how many syllables do we hear in a word? We're not looking at the word, we're just hearing it. What's the beginning sound or sounds, onset? What's everything from the vowel, on, rhyme? What are the phonemes? How many phonemes? Now, we're into phonemic awareness. How many sounds do we actually hear within words? Okay.

It also has something to do with phonological memory, and some of our dyslexic children will have difficulty with working memory, and they'll have difficulty remembering verbal information. It also has something to do with speech perception and production. You know, the little ones and the big ones who mispronounce words? You know, the typical one we hear is, "busghetti" instead of "spaghetti," right? But bear with me for a moment, and I'll tell you a quick story. And I know some of the folks in this room have heard it. My brother, dyslexic, right, when I asked him one time about taking my dad to a doctor, what the doctor's name was, right, he replied -- it was a woman doctor, by the way -- he replied, "Dr. Estrln." Oh, I'm sorry, he replied, "Dr. Estrogen." Dr. Estrogen. And I said to him, "That can't be possible, her name can't be Dr. Estrogen!" And he said, "Yes, it is!" And I said, "Go get her card, and spell it for me." And he said, "No, I won't," but I was his big sister, so he went and did it, right? And he came back, and spelled, "E-S-T-R-I-N." Her perceived incorrectly, and that's the way he laid it down. Phonological representation, accurate phonological representation of the word, the sounds within the word, is key to being able to read words correctly.

Marilyn Adams said to us, that discovery about phonemic awareness being so critical, that Isabel Lieberman actually came up with at Haskins, was the single most powerful advance in science and the pedagogy of reading in the century. Connie Jewell, in 1988, said, wow, this is a powerful predictor of reading achievement. Ninety percent of poor readers who lacked phonological and phonemic awareness in the first grade remained poor readers in the fourth grade, if you didn't intervene. Oh, and by the way, it's teachable. So, this little gal down here, I learned all my vowels, they're E-I-E-I-O, we can teach that little gal or guy, right, their vowel sounds.

One more piece of this puzzle: The phonological deficit can range in severity across individuals. Dyslexia needs to be thought about as being dimensional, and on a continuum. Mild, moderate, severe. The same is true here, with the phonological deficit, which is the core problem. And its impact can increase or decrease, depending on co-occurring risk factors; so does the child also have specific language impairment? Does the child have ADD? Or, has the child been taught appropriately? Those are all risk or protective factors. It's a major contributor, but I do not want you to think it is the only contributor, as we have a conversation about this, all right, dyslexia is an outcome of these multiple risk factors. That can include these other comorbid, or co-occurring conditions. Okay.

Let's go back to the definition. Okay. Dyslexia is a specific learning disability that is neurological in origin, okay? We've talked about that. It is characterized by difficulties with accurate and/or fluent word recognition, and by poor spelling and decoding abilities. So, we have one piece of information; we know it's neurological. We have another piece of information that says, difficulties with the phonology of the language disability to work with the sounds within languages presents as a difficulty. And now, we're saying, what's a manifestation? What's it characterized by, right? Well, it's characterized by these kids -- remember that subtype, right, one on the left and one on the right -- who have difficulty reading the words accurately, and/or automatically. So, I want you all thinking for a moment about students that you've seen in your classroom, in your schools, in your practice, once you're making the connection again, can you think about these little bunnies, or these big bunnies -- it doesn't matter whether they're in first grade or ninth grade -- who still struggle when you say to them, "How many sounds do you hear in this word?" How many sounds do you hear in the word, "chat?" And they have

no clue what you're talking about. Or, when you say to them, "What's the sound that you hear at the beginning of the word, 'chat?'" "What's the sound that you hear at the end of the word, 'chat?'" "What's the sound you hear in the middle of that word, 'chat?'" Now, blend these sounds together: CH-AH-T. And I did a little more sophisticated word for you, rather than "cat," right? I guess that many of you know those students' phonological issues. Right? And what, then, happens when we put the word "chat" in front of them? Can they read that word accurately and automatically, and/or, can they spell it? Have they learned the symbols, the letter or letters that represent the words?

So, if I come back to the reading rope, and I have to keep coming back, I need phonological awareness well-developed, which includes phoneme awareness. And I don't care if you're working with ninth graders; you may have to go back there and do this work. All right? I need decoding, the teaching of the patterns well-developed, right, and I need automaticity developed. A child has to develop the insight that spoken words can be pulled apart into phonemes, and that letters in a word represent these sounds.

True story: I tell stories over and over, so I'm sorry for the people who know this story, but here's a child -- you know, there are kids that you never can get out of your head? All right. I worked across the grades in public school. And I worked in every capacity, just about, that you can think of. But I happened to be working in New Jersey, I lived there for quite a long time, and I was a learning consultant. They do most of the diagnostic work in New Jersey, right? And I was in a first grade classroom, and I was observing instruction being delivered that was very structured, systematic, regular ed. And I was particularly interested in this one little guy, Ben. And I was interested in Ben, because he came out of kindergarten not knowing his letters, and not knowing his sounds. And so, we put him into -- this was well before RTII or MTSS -- we put him into what would now be considered an intervention group, right? And within a few weeks, he had letters, he had sounds. And I was sitting at his reading table the day that he began to read words and say, "Oh! I get it! Sounds make words!" It never occurred to him before that all that stuff that was being taught, because Ben was dyslexic. He had to be explicitly taught the system.

It's like this kid: Oh, let's begin. What sound does this letter make? And what does the little guy say? "Flip." He doesn't say, "A - Apple - Ah," he says, "Flip." Right? Because he doesn't have a clue that the sounds make words. So, what has to happen for these kids that are dyslexic, right, this hallmark characteristic, is they have to be automatic and accurate; not only in terms of sounds, but letter naming, letter-sound association, and then word reading. This is a critical piece of the reading puzzle for them. Here's the other thing to think about: Here's a model that some of you are very familiar with. This is Ehri's Phases of Word Reading, all right? And Linnea Ehri has provided for us is a way of thinking about how children develop in terms of word recognition.

And she tells us, very simply -- this is very simple, right, explanation for a very complex construct -- that when children first come to school, or perhaps in pre-K, right, the letters, all right, really are just symbols, right? So, they're not representative of anything for children. And, in fact, when you talk with them about what they write, all right, some children won't even say do you, "I drew my letters," that's what they're doing. And you can't read their writing, even though they'll read back to you something

that they think they wrote. And any word that they know, they've just put it into memory, but they don't have a sense of how the sounds go with the letters, to make that word. That's pre-alphabetic, right? So, pre-K K. So, what do we do? We work with them -- by the way, you know, we have to provide effective instruction to all children, you all know that, right?

So, we work with them, we provide them with that instruction, and we move them along to a place, we hope, by end of kindergarten or so, okay, where they know their letters, and they're beginning to be able to work with their sounds, right? And so, they know beginning sounds, ending sounds, and they keep working at that medial sound. And then, we move them along again, first grade, going into second grade, where, what are they able to do, right? Well, now, they've got phoneme grapheme correspondence at a basic level. They can read words, they can represent word in writing. It's phonetic, usually, but we can read it. They understand how to use their letters, they understand complete phoneme awareness. And then, we move them along, second grade into third grade, and guess what? They're independent readers. Okay.

What happens for the dyslexic kid that gets stuck along the way, here? The dyslexic kid, more often than not, right, gets stuck pre-alphabetic, partial alphabetic, sometimes full alphabetic, if you get them there, sometimes. They don't get to this consolidated alphabetic phase, where they're able to come to the page and automatically read words using what? No longer their knowledge of just sound-symbol, because we don't read words that we're unfamiliar with by sound-symbol. We've internalized that. We read by chunk. We read by syllable and morpheme, or by analogy. Okay? That's where the dyslexic kid doesn't get to, right?

So, sometimes, people will say to me, "How do I recognize this dyslexic kid?" And I want to say to you, in spite of effective instruction, in spite of the use of information assessment, using an RTII or an MTSS system, in spite of, they still continue to struggle. But the key here is that the instruction is effective; that it's based on the science of reading. Okay.

So, Ehri says to us about skilled reading -- so, now, think about the lower strands of the rope again, think about being automatic, here's what she says: "Most of the words in skilled reading are known by sight. We, as skilled readers, do not have to stop and sound out words; we don't even have to chunk words into syllables or morphemes if, in fact we know the words. And we know a lot of words. Sight reading is a fact-acting process. The term "sight" indicates sight of the word activates that word in memory, but what does it activate? It's activating multiple systems, that's what Ken Pugh was talking about. That's what's not happening for the dyslexic kid. It's activating pronunciation, the sounds within the words. Even accent has to do with your phonological processor. The spelling, the symbols, the letter or letters that are used, and the typical role in sentences and meaning, because we do -- we do -- as we read words bring forward the meaning of a word, facilitates the reading of a word. Okay.

The other point here in terms of the hallmark characteristic of kids with dyslexia that can't read the words, guess what? They can't spell them, either. So, I want you to be thinking about those kiddos that can learn their words for their spelling test -- maybe. All right? And then, when you go back, and you give them the test again, or if you ask them to use those words in their writing, they have about

fourteen different variations for that word. Why? Because they don't understand how the sounds work within the word; they haven't laid down the patterns. Those systems haven't activated and connected for them. So, [INAUDIBLE] most people think dyslexia is a reading disorder, but it is also a spelling and a writing problem. Why does she put "writing" in here? Do you know what it takes to write? Writing has lower order skills, too. The lower order skills for writing, okay, are spelling, handwriting and mechanics. If you can't spell the words, and your handwriting is not automatic, guess what? You're working memory is going to get bogged down trying to figure out how to put those words on paper. And all those good thoughts you might have, in terms of the higher order skills, you know, the things that we go through in terms of writing; the planning, the translating and so on, you're not getting there. Just like for reading, you don't get to the comprehension piece if you don't have the word recognition. Same thing is true for writing. Okay.

So, I had to give you an example, because it's really hard to talk about any of these things without bringing some kids into the room. And I'm so fortunate to be where I am right now in terms of the school I'm at, because I'm seeing these kids every day. Now, this doesn't happen to be a kid from that school, but believe me, I do a lot of writing sample analysis with the teachers, and this is typical of what I see. So, here's what a little guy, Will, wrote, right? By the way, Will had been in intensive instruction for about a year, but it wasn't delivered until he was in fifth grade, as dyslexic as they come: "I saw a red surfboard laying on the road. It looked like my friend, so I hid it in the bushes, just in case. When I went to the beach, I saw my friend, Spence, he had his board." So, when I look at this, I see a couple of things: One, I see that for the most part, his phonological issues have been addressed through the instruction that he's received, because I don't see a lot of phonological errors. I don't see him mistaking, all right, one sound for another, right? I see he's put all the sounds into these words, in one way or another, whether they're spelled correctly, all right? I do see one thing, though, that's a little bit of concern. "It looked like my friend." He left off the "S" for "friend's." When kids leave off those suffixes, right, that's a morphological error, and it connects back to the phonology. As kids get older, dyslexic kids, we want be looking for those morphological errors, because PA, phonological, or phonemic awareness, improves with reading, right? But the morphological issues remain. Okay.

What I do see here, though, is the spelling, don't I? So, what happened, here? All right? He's improving in terms of his reading, but he's still making errors in terms of what we would call the orthography of the language. He still needs more instruction in terms of the letter and letter patterns, and it will take more practice, because spelling is more difficult than reading. Okay.

So, I'm going to stop for a moment, and here's what I've talked about thus far. And I'm going to give you an opportunity to do a little sharing at your table. I've gone back to the science, I did the reading rope with you so you would have a sense of what happens in terms of attaining reading proficiency. I presented these subtypes to you, right, in terms of the different types of difficulties readers can have, connected back to the row. And then, I went to the definition of dyslexia. And the first thing we talked about was, it's neurological. The second thing we talked about is, the core deficit is phonological. And the third thing we've just talked about is, what do you see? What are the typical characteristics? It's difficulty reading words, and spelling words. I need for you to have a conversation with a partner at your table about something that I've said that resonated with you, something you didn't walk in here

perhaps knowing, or I elaborated on something that you knew, but now you know a little bit more about it. Go ahead. Have a conversation. We'll take about three minutes to do this.

All right, I'm going to take just a couple of minutes now to see if there are any questions on anything that I've said thus far. I'm going to talk about the differences being personal. I'm going to talk about the treatment being educational, right, in a few moments. But are there any questions on anything that I've said thus far? Yes? All the way in the back.

>> [INAUDIBLE]

>> Yeah.

>> [INAUDIBLE]

>> Oh, no, they absolutely can learn. So, the question is, when I was talking about the suffixes, you know, the morphological aspect, which connects not only -- it connects to meaning, and connects to grammar, really, yeah? Can they learn that? Everything I'm talking about here can be learned. How easily it can be learned is determined by a number of factors, right? It's determined by, first of all, when you intervene. It's determined by, where is that student falling on the continuum? It's determined by the nature of instruction that's provided, and the intensity, right? It's determined by the co-occurring conditions. Most of all, it's determined by whether or not you have informed educators making informed decisions. Okay? All right. Any other questions? That was a good one.

>> So, your definition says that the diagnosis is clinical, so the big elephant in the room is, who diagnoses dyslexia?

>> Yeah, and I'm getting there.

>> Okay.

>> Okay? I'm getting there. But I'm going to tell you -- here's a little hint, okay? So, here's my background. I was a regular education teacher, a special education teacher, and then a learning consultant, right? So, if you're familiar with New Jersey, you know that's a certification in New Jersey, and it's specific to diagnosis, right? I diagnosed dyslexia. I didn't have any problem doing that. I don't have any problem doing that now. But why was I able to do that? Because not only did I depend upon my certifications, I depended upon gaining a knowledge base in this particular area that allowed for me to understand what this is, right? If you ask me a question about autism, I'm going to be the first person to tell you, I can't answer anything in depth about autism. It's a specialty. There's a reason this is "special education." I'm not a generalist, right? If someone came and said, "Would you work in a school for students with behavioral problems and consult with us?" I would say, "No." If someone asked me to come and work in a school for dyslexia, my answer is, "Yes." It doesn't take a physician to diagnose dyslexia. It takes an informed clinician. Okay. That just rattled some cages in the room, I'm well aware of it! Okay, one more question? Yeah?

>> Hi. My issue is, how do you tell if it's developmental or if it's a true disability?

>> How do we know if it's developmental or a true disability? I'm going to take you back to one theoretical model, but we have several theoretical models that are based on research that we can depend on. We can look at Ehri's Phases of Word Reading, and we know what's appropriate for students to be able to do at different phases of acquisition of skilled reading. If I have a third grader who is still struggling with segmenting sounds within a word, who cannot read closed-syllable words, wow! I have a major problem! That is not developmental. And I could point out other characteristics for first graders, as well. So, again, the knowledge base makes the difference, right? Okay, I think that's it for questions, but thanks, they were good ones.

Let's keep going! Wow, you've got me energized here, guys! Love talking about this! Love talking about kids, and what we can do for kids. You know, that's the other reason I wanted to give you the writing sample. It's not about us. It's about these kids. Okay. So, the differences are personal. Now, I asked some of my friends to be willing to stand up, and in very loud teacher voices, to read descriptors. Now, they're not describing themselves, but they are representing the children who are dyslexic. So, anyone, stand up. Anyone who has a card.

>> Sometimes I say words wrong!

>> Sometimes I say words wrong!

>> My son needs help, lots of it!

>> I was a late talker.

>> Say it again.

>> I was a late talker.

>> I've had good ideas, but it takes way too long to put them on paper.

>> Who else?

>> I know my friends [INAUDIBLE].

>> I am dumb!

>> Anyone else?

>> English is hard enough. Why do I have to take a foreign language?

>> Okay.

>> It takes me forever to read my assignments!

>> Okay. All right. So these are just some of the characteristics that bubble to the top, when you work with and you talk with dyslexic individuals, right? And I will assure you that if you know adults who are dyslexic, some of what you just heard here, you probably associated with young children? This is what

we associate with adulthood, as well. It's a personal journey. It's -- the differences are personal. And it's often a painful journey. When we take a look at dyslexia, we say it's often unexpected in relation to other cognitive abilities, and that's what's so difficult. So many of these individuals have other capabilities that allow for them to shine, but oftentimes, that does not happen for them until they come into adulthood. Now, I'm not about to stand here and tell you every dyslexic is gifted. Not so. They range the range in terms of overall capability. But oftentimes, oftentimes, it appears that they have capabilities that are much more developed, right, than their reading. Keep in mind, reading is a cultural invention. People didn't always have to learn how to read, right:? It's fairly new in our society.

So, let's listen to the stories of some individuals as they come into adulthood, and they have found themselves. I hope you all know who Philip Schultz is. He's a Pulitzer Prize-winning poet. He's the founder of the Writer's Workshop. His most recent publication is a memoir called, "My Dyslexia." "Repeating third grade at a new school after having been asked to leave my old one for hitting kids who made fun of my perceived stupidity, I was placed in the dummy class. There were three of us, separated from our classmates, at a table in the corner of the room. One day, the teacher, who seldom spoke to us, since it was understood that most of what she taught was beyond the reach of our intelligence, placed books in our hands, and whispered that we should sit there quietly, pretending to read. The principal was coming."

Three other, or two other, examples: Jack Horner, a well-known paleontologist: "We think outside the box, precisely because we have never been in one." This ability to think creatively, or outside the box, has been documented in several books, one of them being, *In the Mind's Eye*, right, an interesting book to read. But again, I make a connection with students. We have two students at AIM Academy, who were recently featured in a TEDx talk. I don't know if there's anyone in the room who's ever done a TEDx talk, but I haven't. But these two students did. And what did they speak to? They spoke to the business that they founded, because they've had an opportunity at this particular school to participate in a class that develops entrepreneurship, creativity and outside-of-the-box thinking. They spoke to how their learning difference, dyslexia, they have turned that into an advantage. And in fact, their business is called, "Opportunity Rising," it's a clothing business. At the recent IDA conference in San Diego where Cameron Herold, you know, "I Got Junk?" -- he's dyslexic, by the way -- was honored with a pinnacle award for his achievements and for his willingness to say, "I've had this issue, but look what I've achieved," to inspire young people. These two young students, who did the TEDx talk, were invited to introduce Cameron Herold. "We think outside the box precisely because we've never been in one."

How about David Yurman? I bet some of you have some David Yurman jewelry, and if you don't, you'd like to have David Yurman jewelry! Or, you may have some knock-offs, I do, all right? "I was ADD and dyslexic, but I wasn't diagnosed with ADD until '75. I would daydream and find my language in drawing in lines. I learned how to weld, and I had these little objects around. I put loops on them, and I sold them in the cafeteria." By the way, he got in trouble for doing that.

The personal stories, I think we have to put a face to dyslexia, and the personal stories are amazing. And I share them with you, not so much from the perspective of every dyslexic is gifted, but that they have capability, and we have to address the reading and the languages, but also look beyond that, and see in

what ways can we foster the talents that they've had? You all know Patricia Polacco, right? I think you probably all know that both she and Henry Winkler are dyslexic, yes? And if you've read this book, *Thank You, Mr. Falker*, in your classroom, all right, you know that she's not talking about an imaginary character, she's talking about herself, right? "Now, almost every day after school, she met with Mr. Falker and Miss Plessi, her reading teacher. They did a lot of things she didn't even understand. At first, she made circles in the sand, and then big sponge circles on the blackboard, going from left to right, right to left." Letter formation. "Another day, the flicked letters on a screen, and Trisha shouted them out loud." Letter recognition. "Still, other days, she worked with wooden blocks and built words. Letters, letters, letters, words, words, words, always sounding them out. And that felt good. But though she read words, she hadn't read a whole sentence, and deep down, she still felt dumb. And then, one spring day, it had been three or four months since they had started, he put a book in front of her. She'd never seen it before. He picked a paragraph in the middle of a page, and pointed at it. Almost as if it were magic, or as if the light poured into her brain, the words and sentences started to take shape on the page as they never had before." A teacher making a difference for an author of well-known children's books.

So, we can talk about it being neurological, we can talk about phonological deficit. We can talk about it being manifested by word reading and spelling difficulties. We can talk about it being personal, unexpected, in comparison to -- but we also can talk about that sometimes the dyslexic student will have difficulties with the upper strands of the rope. They will have difficulty with language comprehension, and so, this part of the definition says, "Secondary consequences may include problems in reading comprehension, and reduced reading experience that can impede the growth of vocabulary and background knowledge."

Now, earlier today, I said to you, one way that you can look at dyslexia is to look at the difference between reading and listening comprehension, because the typical dyslexic child, who perhaps doesn't have this co-occurring problem with language itself, right, will not struggle with comprehension. But how do you learn all your words and gather up all your background knowledge, once you've reached third, fourth, fifth grade? You'll learn it through reading books. If you haven't learned how to read by then, if you haven't reached that consolidated alphabetic phase that Ehri describes, if you haven't had access to text, whether it's through Learning Ally or the teacher is reading, guess what has not been developing? Those strands of the rope, the vocabulary, the background knowledge, even the ability to work with more complex syntax, which we learn through our interaction with books. So, we can have secondary problems with comprehension. Okay?

Attention to code is capacity-draining. Remember I said something about the onramp? It results in the inability to attend to meaning that results in less exposure to text. Believe me, if you struggle with reading, you're not picking up a book to read, you know, when you have a few extra moments. It's not your favorite thing to do. Right? That less practice results in diminished capability in the areas of vocabulary, syntactic structures and declarative knowledge, that overall influences verbal intelligence. Here's another reason for early intervention, right? In grades K through two, our focus, for the most part, is on the development of word reading skill. Yes, we have students engaged in reading. But the books that they're reading are not necessarily rich in terms of vocabulary and background knowledge.

Our read-alouds do that for them. Once kids are in second grade, mid-second grade and up, they're able, we hope, to read independently. And now, their source of those strands of the rope, the language comprehension, becomes their own engagement with books; if they haven't learned how to read by then, then they're not going to have that engagement. And yes, we do need to provide Learning Ally and so on, but we have to teach them how to read.

Okay, the diagnosis is clinical. So, you're all familiar with this, right? You're all familiar with different types of assessment. So, I'm going to talk a little bit about, how do we get to this? How do we, kind of, the "elephant in the room," as was said earlier? And you're all familiar with a multi-tiered support system, or RTII. So, when we look at assessment, right, early on with children, we identify those kids who are at risk. And that includes the dyslexic kiddos, right? So, we put in place screening. And when we identify those kids who are within these strategic or intense ranges, we provide intervention. But boy, we'd better understand the science of reading, to provide the appropriate intervention. It's not enough to just know that they're having difficulty with phonemic segmentation fluency, right? Or, that they're having difficulty with letter-sound recognition; the intervention has to be tailored to meet what the need is for them to progress, or progress. And we progress-monitor. And when kids do not respond, right, when they do not respond to instruction, then we begin to think about doing something more diagnostic.

So, when we think about the student who is struggling, when we think about the student who potentially is a dyslexic student -- well, no potentially, if you're dyslexic, you are. But -- your whole lifetime, by the way, okay? It doesn't go away, right? But what do we then do? We engage in diagnostic assessment.

So, what does that look like? What does that look like? Well, first of all, all right, it needs to be informed by clinical judgment -- that was the question you asked. So, whoever is doing the assessment and making a determination whether or not the child has a reading problem, it is not sufficient to simply say they have a learning disability and it's in the area of reading. You'd better be specific about what area of reading. If you're not, your intensive instruction will not be tailored to what the need of the student is. This is why the diagnosis is important. It's important not only to get kids service, but a particular type of service, instruction that meets their needs. And it's predicated on the fact that up until then, they, along with all of their peers, have received instruction that aligns with the science of reading, okay?

Here's the other thing: No single test is designed to diagnose dyslexia. I wish I had a penny for every time someone said to me, "What's the test for dyslexia?" There is no test for dyslexia! I'm sorry, it's not one test! Just think about how complex that reading rope discussion was. How complex Ehri's phases could be. How the definition itself is complex. Now, are there individual assessment tools that should be part of what we do, in terms of determining whether or not a student is dyslexic? Yes! And in a moment, we're going to look at those areas that we should be assessing. You already know them, based on my conversation so far, about dyslexia, okay?

So, what are you going to look for? And I was going to have you generate this, it's a long list. But I'm just going to put it up here, and have a discussion about it. What are you going to look for, in terms of this diagnosis, or in terms of thinking through what assessment tools to look for? Now, think back to everything I've said thus far today. I probably would want to see whether or not the child has sufficient oral language skills. Now, you will have indicators whether or not they do; so, not every dyslexic child will need a full language evaluation. But, boy, I never diagnosed a dyslexic kid without having one, I'll just tell you that. You're going to have to look at how well they do on phonological and phonemic awareness tasks. Well, you already have screening instruments that tell you that. You probably have some informal diagnostics. When you do RTII well, you use informal diagnostics. You use surveys in addition to your screeners.

So, you probably have some of that. But now, now I need to use more standardized assessments; I need to use reliable, valid, standardized assessments. I've got to look at naming letters. All right, I already have some information about that, but I probably want some more. I need information about sound-symbol relationships. What's decoding look like? Can they read single words? Early on, I said to you, dyslexia is about single word reading, for the most part, okay? Can they read single words accurately and automatically? Can they read new or nonsense words? Kids can store words in memory. Not every word in the language, but they can store words in memory. Nonsense words allow for us to see whether or not they can apply what they know about the language. Can they read a passage fluently? Can they spell words consistently? What's their writing look like? And what about this reading versus listening comprehension? And by the way, I want a family history. Because scratch the surface -- scratch the surface, and you're going to find dyslexia. It might not be both parents. Probably one. And if not, a parent or grandparent. Maybe a brother and a sister, a cousin. Scratch the surface. It's familial. It's genetic, right? I want to know what the instruction looked like up until now. Because back in that definition somewhere, unexpected in relation to cognitive abilities -- and I didn't get into the cognitive processing thing, but it also said classroom instruction. So, has the instruction, the core instruction and the intervention up until now been appropriate? I need to exclude those, right? I need to know the nature of intervention.

So, here's a great little book. This costs about 14 bucks, all right, this is IDA. And it's basic facts about the assessment of dyslexia, and it's Susan Lowell, well known for her work in the area of assessment; Becky Felton and Pamela Hook. And here's what they talk about. I can't talk about all of these things in detail here, I mean, we'd be here until 6:30, 7:00, maybe 8:00, and none of you want to be here that late, and neither do I. But again, you can see that this is referencing back to some of those things that I've just talked about, all right? Oral language. Because often times, what we find are language issues, all right, present in the dyslexic child. It's a language-based learning disability. You have to look at phonological and orthographic processing. Phonological processing is going to tap into, it's going to tap into how well do they work with sounds? The majority of students who have difficulty with acquiring word reading, the majority of dyslexics, will do poorly on phonological processing tests. There are a few that won't. But then, they're more often than not going to do poorly on RAN, Rapid Automatic Naming. Or on orthographic processing. That was that second circle, that fluency piece. You have to know about word recognition, spelling, decoding and comprehension.

Okay. So, if you want to know more about the assessment, get the book. Okay. So, here's just a few examples, because people like examples of what I'm talking about, right? So, assessment: Phonological and orthographic processing. Well, you start with AIMSweb, your screener, and your progress monitoring tools, right, because they tap into these things. And then you go to things like the CTOPP, all right, Comprehensive Test of Phonological Processing, these are examples. I'm not saying you have to use these, they're examples. You go to the RAN/RAS, Rapid Automatic Naming. You go to the test of orthographic competency. That gives you some information about what's going on here, and do I see the evidence of the "core deficit" -- I hate that word, "deficit" -- the "core deficit" that dyslexic kids manifest. And then, I need some information on alphabetic principle; can they connect, you know, sound-symbol. I need some information on word recognition, spelling and composition. You recognize these. I go to AIMSweb first, right, my screen and my progress monitoring, and then I go to things like the Woodcock-Johnson, or I go to the WIST, or I go to the Gray. There's lots of things out there. If you want a really good book, if you're a diagnostician on reading assessment, all right, Melissa Farrell, who is speaking here tomorrow, right, has published a phenomenal book on reading assessment. If you're not going to her sessions tomorrow, and this is your area, you should be going to her sessions. It's absolutely phenomenal. And everything I said about the reading rope, all right, and about Ehri's phases, and this language base, all right, that's where she's coming from in terms of reading assessment. Okay. All right.

So, I'll just say this, before I go to the treatment as educational. Someone asked the elephant in the room question, and here's how I'll respond: Again, it does not take a physician to diagnose dyslexia. In fact, most physicians don't have the background knowledge that I provided to you. What physicians can do is, they can look for the characteristics and make recommendations for intensive diagnostic work. It takes an individual who has been trained in assessment, and when I described myself, I was trained in assessment. In most states, it's a psychologist and a speech and language pathologist, right? An individual trained in assessment, but who also has gone the next step in terms of an in-depth knowledge of the particular type of learning disability, we're talking about. Okay.

So, the treatment is educational. Well, here's Louisa Moats. This is an old quote, so some of you might think, "Oh, that's an old quote." It doesn't matter, it's still true. Teachers cannot rely on their implicit understanding alone to teach reading. Explicit teaching requires explicit understanding. Most of us were not trained to teach reading based on the science. I'm sorry if I just, you know, upset someone with that statement, but it's a reality. It's not just my personal belief. Right? And most of us were not trained to work with dyslexic children. We need an explicit understanding of how language works, the structure of language, in order to teach dyslexic children.

Here's proof positive: Scientific studies of reading, Piasta, Connor, and so on, 2009. Teachers' knowledge of literacy concepts, classroom practices and student reading growth. A key element of teacher quality is the specialized knowledge teachers utilize when teaching. Again, I'm going to say to you, and it's not my quote, it's Louisa Moats', "Programs don't teach, teachers do." I love good programs! I love structured literacy programs. I love some programs that maybe aren't under the umbrella of structured literacy. But no one program can meet the needs of every kid, including the dyslexic kid. You need teachers who have a knowledge base to make these informed decisions. That's

the reason the International Dyslexia Association, a few years back, all right, created the Knowledge and Practice Standards. You can take a look at these. These outline the knowledge that all teachers of reading should have, but particularly those who work with the average student. These standards are being used to review university program. One of the universities recognized in the State of Pennsylvania is St. Joseph's, in Philadelphia, for a curriculum that aligns with these standards. These standards are being used to take a look at structured language, or multi-sensory structured language programs, right, that align with these standards. These standards in the future will be used to review private schools for LD students. And maybe, at some point, we'll get to public schools. I don't know if I'll live long enough, but that's the hope! All right.

So, what did these standards outline for us? Well, here's just an example: So, everyone sitting in this room, if you work with students who have reading disability, particularly in the area of word recognition, you should be able to know and identify the phases in typical progression. I went over them with you today. Ehri's. But not only going over them, knowing how they manifest in terms of both reading and writing for students. You should be able to identify, pronounce, classify and compare the consonant and vowel phonemes of English. If you're going to teach kids the phonology of the language, you need to know the phonology of the language. If your students represent either in their speaking, or in their reading, or in their writing -- if they misrepresent sound, you need to have a way to address that with them. And if you don't understand the features of sounds, you're not able to do that. Do you need to be a speech and language pathologist? No. But they're a good ally.

You need to understand the role of graphemes. So, some of you may be sitting here and saying, what's a grapheme? It's a letter or letters that represents a sound. You need to know the historical influence on English spelling patterns. So, what pops right into my head, and I know there's people in the room it's popping into their head, too, is, I'm seeing a triangle. Anglo Saxon, basic everyday words. Latin. A little bit more sophisticated based on roots, prefixes and suffixes. Greek, sophisticated as well, all right, and very specific to certain disciplines. Specific spellings that come into play with Greek. The way that we represent our language has been determined by what influenced the development of our language. When your kiddo says to you, "How come the 'Ch' is spelled with a C-H?" You should have a ready answer for that. It's a Greek spelling, right? "How come 'Ph' is spelled with P-H?" You should have a ready answer for that. It's a Greek spelling. You should also know that that's not the first spelling you're going to teach them for those sounds, and that there's a logical progression. You also should understand the common orthographic rules and patterns in English.

So, if I said to you, take a look at these words -- we're running a little low on time, so I won't necessarily do all of these -- but take a look at these words, all right? When we think about how we represent words in English, we represent them based on sound-letter patterns, that's what phoneme grapheme is. We represent them by certain patterns that occur in the English language. We represent them by the position of the sound. We represent them by pedigree. Anglo Saxon, Latin, Greek. We represent them by meaning.

So, here's an example: Why the heck in the word "love" do we have an "E" at the end? It's not making the "O" long. That's not about constant and "E" pattern. It doesn't say, "Oh." It's because words in the

English language -- this is a pattern -- do not end in "V." That "E" is like a placeholder. If I said to you "foil," why didn't I spell it F-O-Y-L -- you might say, oh, that would look weird. And you're right, it would look weird. But I'd say to you it's because the "Oi" sound in the middle of a word is spelled with O-I. That's position. If I said do you, why do I have a C-K in "slack," versus just a C or a K, I hope you would say it's directly after the short vowel. That's position. Psychic, that's pedigree, guys, that's Greek. And heal-health. Hmm, E-A, it says, "ee." Health. I still have E-A, but now it says, "eh" -- how come? Well, I preserved the meaning. I preserved the root. So, English is not crazy, right? Our knowledge base makes a difference. These are the kinds of things we need to teach kids who are dyslexic. They don't get this at all! And you know what? You've internalized, even though you're saying, "I didn't know that!" I mean, you've internalized how words look. They can't do that. They need to be directly taught about this stuff. And those of us, those of us in the field who have been doing this for a while, can tell you over and over and over again that kiddos will say to us, "How come nobody ever told me this?" They get mad! And I don't blame them! How come we didn't unlock this mystery for them? Words are not that big of a mystery, when we understand the structure of language.

Now, why do we need to know that? Why do we need to know what's effective, right? I'm going to give you a few principles in a moment. Because there's stuff that happens out there for dyslexia and other types of conditions that kiddos or adults have that shouldn't happen. We don't do anything, unless we have quantitative evidence that it works. Not anecdotal, not qualitative, quantitative. So, again, I'm going -- sorry if I'm bursting anybody's bubble here. Here's an issue of perspectives, right, published by IDA, the entire issue is on controversial therapies for dyslexia. I have to tell you that vision therapy, movement-based therapies, are controversial therapies. The use of eye tracking, Irlen lenses -- I know I got myself in trouble now, okay -- a number of these things are not based in science. The evidence is anecdotal. We have a responsibility, right, as educators to know what's effective. We have a responsibility to inform our parents as to what's effective. Now, it's up to the parents to do no harm, so parents sometimes will pursue other things that I wouldn't recommend, right? My responsibility is to tell them what we should be doing. The American Ophthal -- I can't even say it -- Optometry and Ophthalmological Society have a position statement on vision, and I put down there on the bottom, do you see, "The Eyes Don't Have It?" If you go to the IDA Website, www.interdys.org, and you look at the 2015 conference program, all right, there was a symposium on "The Eyes Don't Have It," controversial therapies, and all the handouts are there. So, if you don't believe me, and you need more information on this, that is a great, great resource in addition to this article, or publication. Okay.

So, what should the instruction look like? Well, it needs to be structured literacy. It needs to address these linguistic concepts, how the language works. How do sounds work? How letters work. Right? How do these patterns work that we put together to represent words? And what about those words that we call "irregular?" There aren't that many irregular words, right, in the English language, once we understand the structure of language. So, we need to understand the language, the linguistic concepts. We need to be systematic. Why do we teach kids closed syllables first? Closed syllables have short vowels. Closed syllables appear in the majority of English words, over 50% of the syllables in English words. That's why we teach them first. We go from what's regular to irregular. So, we have a system for the way that we teach. We teach explicit. This is not about embedded phonics. It's not about

embedded decoding. I do, we do, you do. We teach cumulatively. We spiral and review everything it is that we teach. I'm going to teach you closed syllables, now I'll teach you open, now I'll teach you another type. And every time I present you with words, I'm reviewing the type that I presented before, as well as the new one. We're multi-sensory. We see it, we say it, we hear it. We move, use our fingers, manipulatives, as we work with sounds, letters and then the reading of words. And boy, we'd better be intensive.

So, if we wait until kids are in third or fourth grade, it's going to take us, what, Joe Torgesen told us? Four times as long. How many minutes a day is that? Those of you who work in middle and high school, you know what I'm talking about. I worked in a high school setting. That's the last public school setting I worked in. And we had structured literacy programs in place for our high school kids who came to us not being able to read. And they worked for them, and they left us being able to read, but not as well as if someone had intervened early on. They weren't as fluent, or as accurate. They were accurate, they weren't as fluent or automatic as their peers. But they were more accurate and more fluent than they were when they first came to us. It's important for us to keep in mind.

And then, this isn't like open my phonics book, and I talk about phonics. No, I have to apply this to purposeful reading and writing. I have to provide lots and lots and lots of practice with what it is that I'm teaching. So, having students both read connective text, write their thoughts, using what it is that they've learned. In terms of a progression, right, you saw this a few moments ago, and what is it that teachers need to know? If you talk about a phonological progression, right, a phonological progress includes this: That kids need to be able to identify the words that they hear in sentences. There's a little controversy about that. So, best to start with syllables. So, when we work with phonological and phonemic awareness, right, we first have kids work with the syllables. How many parts do you hear in this word? How many parts do you hear in the word, "teacher?" How many parts do you hear in the word, "child?" How many parts do you hear in the word, "classroom?" How many parts do you hear in the word, "chair?" Right? And then we go to onset rhyme. And I already defined that for you, the beginning or beginning sounds, and everything from the vowel, on. In the word "chat," which I used, it's a little sophisticated, "Ch" is the onset, "At" is the rhyme. And then we go to phonemes. Think about the word "chat." How many phonemes in "chat?" Everybody think about it for a minute. "Ch, ah, t." Three phonemes. Okay? That's the phonological progression.

So, we need to know that if that's where we're intervening, right? But we also know this: That dyslexia creates this breakdown in the acquisition and application of alphabetic knowledge, okay? So, we have to think about the phonics progression. So, we start with phoneme grapheme correspondence, alphabetic principal, "A, Apple, Ah," "B, Buh," right? "E, Ed, Eh." Okay? And then we move to phonemes and sound patterns. And so, now, how do I spell "A?" Well, I can spell it with just an "A", but I can also spell it with an A, consonant, E. And I can spell it with an A-I. And I can spell it with an A-Y. But I have to be logical about how I introduce that. This is systematic. So, I need a scope and sequence that aligns with the regularity of the language.

And then I want to teach these inflectional morphemes. And everyone in this room, if you're working with a student who has a reading problem, you need to know what those are. So, it's happening, or it's

already happened -- E-D. It's happening now, I-N-G. More than one - "S." Inflectional morphemes. Anglo Saxon layer of the language -- really basic. All right? And then we have to work with syllable spellings, so we work with syllable types. We have conversations. What do I see? What do I say? You know, a syllable type unlocks for you what to say. What's the sound in an open syllable? It's long. Labor. La-bur. La, L-A, ends the syllable, it's long, okay? What's the sound in a vowel team syllable? What do I see? What do I say? Well, I know what I saw in the open syllable; I saw a single vowel at the end of a syllable, so I know it's long. What do I see in the word, "team?" Oh, I see two vowels together! What do I see? What do I say? Long? Short? Or different? It's long in this case, E-A. But you know what? It could be short. Head. H-E-A-D. Okay.

We also have to be thinking about derivational morphemes. And now we move from the Anglo Saxon layer of the language into the Latin. Now, we start talking. This is advanced phonics. Sometimes we think we're done with phonics in second grade, right? Well, if you're working with dyslexic kids, you're not. They're not going to understand the advanced phonics. They're not going to understand the prefixes, the suffixes and the roots, unless you work with them on those. And boy, you get a bonus from doing that, because they call carry meaning!

So, here's a little task for you. I know we're almost at the end. What letter or letters represent the long sound of A? Everybody thinking. Okay, I gave you a hint. Well, here's a mnemonic to help you out. Vacation came on a rainy day, so eight reindeer would not obey. Now, remember I said a few moments ago that we're very systematic and we're cumulative? You move from what's regular in the language to irregular? So, when I look at vacation, what do I see, what do I say, how do I spell it? The "A" is at the end of a syllable. It's an open syllable, so I spell it with just an "A." That's what I want to teach first. Came. Oh, I've got a vowel, consonant, "E." That's what I'm going to teach next. Rainy. Oh! Beginning or middle of a word, often followed by "N" or "L." That's what I'm going to teach next. A-Y. Oh, end of a word. And it's not going to be the open syllable necessarily, although it sounds like one. I'll teach that next. Everything after the slash mark is irregular, right? And I don't mean, like, those read words that you can't figure out at all. I mean, I can figure this out. I can tell you E-I-G-H is a vowel team. It's an Anglo Saxon vowel team, right? But I want to group words with E-I-G-H, E-I and E-Y for my kids, and teach them in a group. I'll teach them the sound-symbol correspondence, but I'll teach the words that have those spellings, because it's much less frequent. Okay.

All right. So, what is it you're able to do as a teacher, if, in fact, you have a knowledge base? If, in fact, you follow these principles of instruction? Remember the treatment's educational? You can change brain patterns in your students. And this has been used many times, but it's sort of the quintessential representation of what can happen, all right, when you take a look at remediated versus unremediated readers, and how you can begin to see activation in areas of the brain that you didn't see previously. So, remember we said the left hemisphere, early on, is really responsible for word recognition, and that you have to have the speech sound, the grapheme or the letter, and then that connection area working? And that the dyslexic student tends to over-activate, and they tend to look different, then? And sometimes they use areas in the right hemisphere. Well, what we see is, we see differences in those activation patterns, when, in fact, right, we begin to compare and look at remediation.

So, we're coming to the end, here. I'm going to come back to Hollis-Scarborough's reading rope for a moment, right, and say to you, as you think about the dyslexic reader, your first focus needs to be the development of word recognition. If, in fact, they have co-occurring language problems, or they've been denied access to print, you're also going to have to attend to language comprehension. Now, we attend to that, anyway, so don't misunderstand what I'm saying, right? But your primary focus will be the word recognition area.

So, here's the definition. Take a moment and read it to yourself. And see if it makes sense to you now. All right? Take your truth or fib, okay? Here goes. Reading is cultural invention. Everybody? You can hitchhike on each other's responses, here. Truth! Dyslexia is dimensional. A person can be a little or severely dyslexic, and everything in between.

>> True!

>> Remember I said something about mild, moderate, severe, a continuum. It can co-exist with other disorders?

>> True.

>> And I mentioned language and ADD, specifically. Dyslexic students typically have problems reading words accurately and automatically. Come on, guys, I know you got this one.

>> True.

>> All right, phew! Okay. Vision therapy is an effective approach to treating dyslexia.

>> False.

>> Fib.

>> Fib, or false. I know that was probably hard for some of you to say, I'm sorry! Dyslexia has a neurobiological base?

>> True!

>> There's an age limit on when remediation is still affective.

>> False.

>> All right, I didn't directly address that. There is no age limit. There is no age limit, here. It takes longer, it takes more intensity the older the student, the later you've waited. But there is no age limit. Everyone deserves -- there's a right to read in this country, isn't it? I think it's a right! Everyone deserves to be able to read, okay. And we can work with older students. Working with the speech sounds of our language is often difficult for the dyslexic?

>> True.

>> Truth. All right. Dyslexia affects only those with above-average IQs.

>> False.

>> That's a fib. They range the range, okay? With appropriate teaching methods, students with dyslexia can learn successfully?

>> True.

>> You bet! Approximately -- I don't think I gave you a percentage, it was on the bottom of one of the slides. Ten to twenty percent of the population exhibits some symptoms of dyslexia. This is true, but I will give you this caveat that the percentage numbers differ, dependent upon the source. They're generally in the same range. The most recent ones that I've seen are five to fifteen percent, and I think that's coming out of NICHD. Okay. Reversals are a symptom of dyslexia.

>> False.

>> That's false, okay? And in fact, there's a recent article on reversals that says it has everything to do with symmetry. Kids tend to reverse letters that are oriented to the left more than letters oriented to the right. So, think on that one for a little bit. All right? The diagnosis of dyslexia can only be done by a physician?

>> False.

>> Dyslexia is a lifelong condition and runs in families.

>> True.

>> After fourth grade, it takes four times as long to remediate reading difficulties.

>> True.

>> Wow! Okay! Expert teaching is the answer, guys, so it's up to you, all right? That was our truth or fib. And the very last thing, this is what we talked about, and I'm hoping you're walking away with an understanding of it. Thank you, Margaret Rawson. Understanding is scientific, the diagnosis is clinical, the treatment is educational, the differences are personal.

Thank you very much! If you have additional questions, this is my email.