

## **Web-Based Radio Show**

### **Neuroscience Research and its Relationships in the DIR®/Floortime Model**


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Good morning. This is Dr. Greenspan welcoming you to our Web-Based Radio Show. My colleague, Serena Wieder, will be joining us in a few minutes too.

We have a very interesting focus for today's show. What we're going to talk about, basically, is early preventively oriented intervention for children at risk for autistic spectrum disorders. The principles that we'll talk about, really have relevance for children at any age because often we're trying to intervene with children while they are developing problems, before the problems become very, very chronic. This is true even for older children because development is a continuing process. We are always developing either more and more healthy patterns, or we're developing more and more problem patterns. So whether it's an 8-year-old or an 8-month-old, or 4-month-old, we want to be working on that developmental pathway, heading it towards health rather than towards problematic functioning. There is a body of recent research from our colleagues doing basic research in neuroscience with brain imaging studies and working on animal models, to understand better and better how the brain works. What's very interesting is that this body of work really supports our developmental approach to helping infants and young children on the pathways towards autistic spectrum disorders.


To begin with, let me review our developmental model and how it will help us understand the emerging findings from our neuroscience colleagues, which in turn, will help us further support our developmental model. As you know, we call our model the DIR Model for Developmental, Individual-difference, Relationship-based model. We focus on the emotional and intellectual levels of development, the individual differences in the way the infant or child processes and takes in sensations including sounds, sights, and movements, and the relationships that enable that child to master regulation, engagement, two-way emotional signaling, shared social problem solving, and the creative and logical use of ideas - the relationships that enable the child to master the fundamentals of relating, communicating, and thinking.



Now we have recent neuroscience research that helps us understand the best ways to use the DIR Model for infants and young children, and in turn, helps us understand this research. Let me review the research for you.

The research shows, in overall, that in individuals with autistic spectrum disorders, there tends to be an under-connectivity between the different pathways that connect up the different parts of the human nervous system or the brain. In other words, when each part of the brain is developing, like the part that has to do with balance and coordination, the part that controls motor actions, and the part that controls language – these can be localized in different centers of the brain. But, what is also critical, is that there be connections between these different parts of the central nervous system; that the language parts connect to the parts that have to do with taking in sights, that connects with the parts that have to do with movements, that connect with the parts that have to do with balance and coordination. Think of it as an orchestra having to play together, or a ballet having all the dancers having to work together, or think of it as a basketball team where everyone has to play in harmony with one another rather than each player playing just one-on-one. What they are finding, is in children or adults with autistic spectrum disorders at older ages, there is evidence from brain imaging and other studies, other cognitive neuroscience studies, that the connections between the different parts of the nervous system or the different parts of the mind are not formed as well as they should be formed. This seems to be the more prominent feature than challenges in each area separately.

Let me present these findings more systematically. Research by Martha Herbert, building on the work of Margaret Bauman, who had demonstrated years ago differences in a number of areas of the brain in individuals with autistic spectrum disorders who are older. This was done on autopsy. She shows that around 9 months of age, the white matter in the central nervous system grows abnormally, especially in the frontal lobes in the cerebellum and the association areas. The association areas are the areas where learning is occurring actively. These are all parts of the nervous system, or the brain, where processing and ordering information at higher and higher levels tend to occur. In addition, she found that the nonverbal areas in the right hemisphere tended to show lots of excessive white matter. The white matter, by the way, is the pathways that tend to try to connect different parts of the brain. But at the same time, the pathways connecting the left and right sides of the brain are not as well developed as would be expected. So, what she is seeing, is kind of an overgrowth, but it's a little like a garden that is growing a little bit without direction. The garden is flowering, but the flowers are going all off in different directions and you're not getting an organized pattern.



Research by Eric Courchesne, demonstrated that individuals with autistic spectrum disorders tended to have smaller head circumferences at birth, and then had rapid growth. The pattern continues with some spurts and slow periods until around age five, but by mid-adolescence, individuals with ASD tended to have smaller head circumferences. This isn't true for every child or individual, but it is true for a large number. Typically developing adolescents catch up, while those with the autistic spectrum disorders tend to now, not grow as fast and so they equalized with each other.

Ruth Carpenter demonstrated that the frontal lobes tended to have the largest size increase. At the same time, however, the functioning of the neuronal networks in the frontal lobes were less well developed. In other words, the connections between different neuronal pathways – the networks that create larger organizations – they were less well developed.


Marcel Juss found that individuals with autistic spectrum disorders, again as a group, not each one, tended to use parts of the brain that process shapes through member letters of the alphabet. That is, a sensory region was dealing with conceptual challenges. He also suggested, based on this and related work, that one of the central characteristics of individuals with autistic spectrum disorders was difficulty in different parts of the brain connecting with each other. He found that local networks tended to be over connected. In other words, like one part of the garden where there's a high density of flowers, but the long range networks tended to be under connected. In other words, different parts of the garden weren't connect to each other.

Serena is joining us now, but I'm going to just finish this and then Serena is going to come on and join us in just a second.

Philip Teitelbaum, when looking at videotapes of infants later diagnosed with autistic spectrum disorders, found they had difficulty in orchestrating basic motor planning sequences involving rolling over, sitting up, crawling, and walking – not every infant, but a large percentage.

Carlos Pardo Villaminzer had a very important finding, that there was some inflammation in areas of the brain, where others had reported excess white matter or these connective pathways where there were these overgrowths. He also found a cell, called microglia, that is associated with inflammation in the spinal fluid of some children with autistic spectrum disorders.

All these findings taken together suggests some very important general impressions. They suggest that, again, the core issue may be that the pathways that connect the different parts of the central nervous system are not working as well as they




should because of developmental problems. In other words, they are not forming a cohesive unit. However, at present, there is no cohesive theory to explain these diverse findings, including the excessive white matter or the irregular patterns of head growth.

The question is, using these findings and using what we know about development of autistic spectrum patterns in children, we can reinforce some of the notions that we have been talking about. As you recall, we have talked in past shows, according to our DIR Model, one of the problems early in development is that emotions or affects, which normally guide what we say and what we do, aren't connecting according to our affect **diathesis** hypothesis – our own developmental model – aren't connecting to the motor system or the sensory system or later the verbal system, as they should. In this instance, certainly with the research showing lack of connectivity between the different parts of the central nervous system and the different parts of the mind.

So what we are saying is that the most important of these connectivity problems is between emotion or affect; pleasure, etc., which tells you what you want to do and the parts of the brain that have to carry out the actions. Let's just take two examples. A one month old baby who mommy is walking to the left and making funny sounds and funny faces, and one baby hears the pleasurable sounds of mommy's voice and turns to the pleasure to see what is cooking and looks and listens and gives a big smile or begins to try to smile by one month. By three or four months he's giving a big smile to mommy who is off to the left. But another child, let's say, may hear the sounds, but can't connect it to pleasure, or may experience pleasure, but can't connect it to a motor pattern to look where the pleasure is coming from, because these parts of the nervous system aren't connecting.

Now let's go up to a 14 or 15 month old who wants a toy up on the shelf. That's the desire; that's the emotion; that's the wish; that's the affect. But, they can't connect that to a motor plan like taking dad by the hand, walking to the toy area, pointing, and getting dad to pick him up to get the toy. So here we see how this problem with connectivity plays out in our DIR Model with problems in mastering each of the functional emotional milestones. At the first stage, it's regulation and interest in the world. At the second stage, if you can't connect your emotion to your behavior, it's hard to show your pleasure and engage with others because you can't reach out and hug, smile, or get into back-and-forth reciprocal vocalizations. By the third or fourth stage, it's hard to carry out complex purposeful actions. If words then do come in, it's hard to give the words meaning. You might just script the words. That's why, in our DIR Model, we tend to focus on following the child's emotions, following the child's lead, harnessing their affect, in other words we enter the child's world, we then use that to pull the child into a shared world, then we start back-and-forth emotional signaling. We always go




after the child's emotion, we create heightened states of affect, and what we are trying to do, basically, is where even the main pathways are blocked, we are trying to create side pathways through heightened affect. What we've observed in almost all of our children, is that this seems to work, but to varying degrees. With one subgroup of children it seems to work very well, and they become interactive and creative thinkers and good problem solvers, and we've followed some of these children now until they are teenagers. Their progress continues. Others make much slower progress because they have greater neurological challenges. But, what is important here is that the connections do get made. They do become more engaged, more interactive, and as language comes in, it is used purposefully and meaningfully. But language isn't developed quite as readily or the motor skills don't develop quite as readily. Whatever is developed can be used meaningfully.

We are obviously working to try to develop better strategies for the children who make slower progress, but we feel that the latest neuroscience research supports what we have been trying to do in terms of harnessing affect and emotion. In turn, this gives also an explanation for why this problem may get worse as children get older, if you don't work on the affect. In other words, if you use approaches that just focus on one part of the nervous system at a time, like scripting or memory-based learning, then you might be actually improving that particular part of the nervous system, but leaving the bigger problem alone, i.e., the connectivity problem. But, when you work off the child's emotions, following the child's lead and challenge the child to master each of their milestones, you are challenging the child to do two things at once: form more connections using emotion as the orchestra leader for the mind, and also you are practicing each component part because when you help the child take daddy by the hand to find a toy, you are able to strengthen the motor system as well as the connections with affects and emotions.

Now we are going to have Serena join us. Serena?

SW: Yes, good morning everyone.

SG: Good morning. Serena, I thought you might want to comment on how we can utilize this approach, our DIR Model reinforced now by these latest neuroscience findings showing under-connectivity and showing overgrowth in certain areas, but without the patterns we want to see, without these long pathways connected to different parts of the mind together and the brain together. How can we use that to help both very young babies as well as older children in a preventively-oriented way, even before the problems become severe? I thought you might want to give some thoughts about how to work with 2-month-olds, 4-month-olds, 8-month-olds, and 12-month-olds, as you see




some of these challenges emerging through the difficulty in negotiating some of these early functional emotional milestones.

SW: It certainly has been exciting hearing some of these findings because we have always approached children from the point of view of how they really do function. As you were talking, I was thinking of how something that we call “play” or in our own system we call “Floortime” is not always clear in terms of how it really does require all those interconnections, because to play you have to look and move and use your voice and capture the attention of the child, and realizing that so much happens, even when you’re bending over a two month old and now they have this lovely capacity to follow you. You get them to coo and how you sustain with them.

Even with a two-month-old, the simple things which we all love to do which is look at the baby and say he’s so cute, can really turn into a much longer dance which helps the infant to expand their capacity to attend and have that nice shared attention. Very simple things that we always do very naturally, often we don’t do long enough and the opportunity to strengthen the connections and on keeping him going. What we call play is actually the most powerful tool that we have to bring all the things together. So whether you’re just looking and having the baby follow and turning your head and using your voice, you will find that the baby will actually pick up those lovely signals and begin to process that information and figure out, “Hey, this is very nice.”

As the child gets a little older, they have more motor capacities and they are able to then, even reach out. They are able to put their hand on your hand. So the one thing that we have noticed that really makes a difference, which is such a simple principle, which is when you, so to speak, “play with the baby” just keep it flowing and see if you can use all your own senses in engaging that child. Through the looking, through the movement, you have the baby in your arms and you are slowly rocking them or going from side-to-side, you’re looking to see if they follow you, always using your voice to entice the child, do the looking, listening and the moving at the same time. The so-called playing really is something that gets this practice in. So whether you’re aware or, hopefully don’t find necessarily a challenge, or if you do find a challenge, we have found that very often we’re not offering that child the same full range of multi-sensory experience to respond back with and to really encourage and stimulate them within this interactive relationship.


When you were giving that example of how does a child let you know when they want something up on the shelf, I think of how often we say that maybe the child isn’t motivated or maybe the child isn’t interested. When the child is motivated, we can see a huge difference in how much they can organize and how long they can sustain that



interaction. We have to become the vehicle that helps that motivation get expressed and get that motivation going where we become the baby's toy. So in the early years, I think especially in the first year of life or the first 18 months of life, if you think of yourself as the main toy, and we're always busy getting toys, but if you think of yourself as being the toy, you could offer this multi-sensory, rich experience and make it pleasurable for your baby, you're already beginning to help that baby make the connection and sustain them. It's that joint pleasure in the emerging developmental capacities that really helps your child so much – discovering the music or jack-in-the-box popping up – you could be doing the same thing with a baby as they pull off a kerchief that is on your head. Or if you bend behind the chair and you look up again. Try to think of picking up that gleam and those little responses that the baby gives that shows interest, trying to figure out where they can execute – how will they let you know that this is fun or pleasurable – and different babies can do it in different ways. Each system is as good as any other system until all of them can come together more.

Ok, now you're coming in. So let's go back to really of what is the vehicle for us to capture that pleasure, that emotion, and how we do the affect cuing that harnesses the baby's sensory and motor capacities to become a player with you. How we get it to the point where we are actually sharing and cuing and getting the child to experience that interaction in this pleasurable way.

When we have children with challenges, often it takes awhile to recognize that the child is not able. For example, they might hear you, but they don't necessarily process what you're saying. So what is so critical is if you might naturally gesture. You might naturally use a lot of facial expressions. You might naturally put the music into your voice so that they begin to take in some of the cues and messages, even if they don't understand the words. They are reading it through these other gestures, through these other sounds, through the other movements. What we look for, even when you don't know exactly how the baby is taking it in, you can usually tell if the baby is taking it in. Then you can experiment in different ways to harness that baby's attention and affect and make it pleasurable. You can recognize if you are moving too fast or too slow by looking at whether the baby gets over excited or if the baby begins to shut down and feel overwhelmed. This just takes a lot of practice, seeing what works. What works? When we work with parents, we are always asking, "Well, what do you enjoy?" and "What is fun to do?" If you were a parent, discover what your child enjoys. It might be swinging in a blanket. Or it might be dancing to the music. Or it might be some kind of cause and effect toy that you can take turns popping up and down. Often, this is underestimated and not thought of as, "Hey, my child is learning and this is the avenue that we could keep going and have fun with!" in contrast to what you might see your child avoiding.




Avoidance is usually not an issue of motivation. Avoidance often is related to the child in some ways knowing that this is something that is hard to do and something that they will move away from when they don't know what the next step should be, or something that they don't comprehend because they aren't seeing what they hear. Some children will respond anyway by offering you something that they do know. If they are already verbal, they'll say something, but it won't have anything to do with what you just asked them. If they are more visual, they might pick up another toy and start playing with that, and not necessarily continue what was started. The key thing really is finding where your child's strengths are, using those systems to strengthen the interaction, and meanwhile bring in the other systems as part of it so that there is more comprehension of what you are doing.

When you get to the older children, if the child begins to show that toys can be a language for them, that they begin to explore and experiment and try things. Just yesterday, it was so interesting to see. There was this little child under two who was trying to go down a toy slide. Then they tried to sit on a little chair. When they saw a horse they tried to ride it. Your reaction might be, "Oh, no, don't do that. That's just a toy or it's too small." I always say, "Wait, wait, let's see what your child is going to do." They're looking up to see if you are watching them. Let's see if you can help them do what they want to do, in which case, help them get on this little toy slide. Encourage them that they are going to go down and wheee! Children will continue this effort because it is something that is really meaningful to them. Why do they do it? In their mind, this is a slide and it's something that they know, something that they enjoy, and when they bring it to a little pretend toy, it's this wonderful transition they are making into the symbolic world. We never want to interrupt that because we can see the pleasure. They are recognizing something they really enjoy, that they are motivated to do, that they work hard to figure out which hand and which foot goes where, just because the pleasure of coming down is so great and we want to be part of that.

So the sources of how a child enjoys things and how they express it will vary a great deal. A child who can orchestrate that sequence of actions is already moving into the symbolic realm. Other children may just enjoy the direct pleasure of sensory motor play. The roughhousing, the horsey rides, the tickles. Every child has the capacity to enjoy their experience and we want to make sure we are part of it. That's the best place to start because if you build from the emotion of pleasure and if you build from the success, the child will work harder to do the things that really are not so easy. We reach the different systems that work well, plug in the interaction and the pleasure, and then we can begin to expand into the areas that are more challenging.

SG: Serena, thank you. Let me add something in, and then ask you to be thinking about examples of activities, just like the one you gave with the parent becoming the



jack-in-the-box for the baby by putting something over their head and then popping out. Think of examples for each age and while you are doing that, I'm just going to mention a few general principles, then we'll see if we can walk through the different ages for the 2-month-old, 4-month-old, 6- and 8-month-old and right up the ladder. Ok?

SW: Ok.

SG: In the meantime, let me suggest a few general principles. What Serena was saying and what we were saying earlier about what our DIR Floortime Model stands for, which is so now supported, and also gives further explanation to the new neuroscience findings about connectivity, is the following:

1. You've got to harness the child or the baby's affect or emotion, particularly pleasurable emotion because the affect or the emotion are the pathways that help connect the different parts of the mind and the brain together. They are the orchestra leader.
2. You want the experiences to involve as many parts of the nervous system at the same time as possible. You want to involve sound, sight, movement, balance, coordination, left and right sides of the body – all together at the same time. Those are the experiences that help the child use everything together, and we know that the brain develops in response to how we use it.

We know the old axiom that they say for those of us who are getting on in years, “use it or lose it.” But the same thing applies for both typically developing babies and babies with challenges – use it or lose it. One of the biggest concerns is the secondary loss of functioning because something is hard to do. We – the environment - mommies, daddies, clinicians, therapists, and educators, we don't challenge the children enough to use all the parts of the nervous system in an orchestrated way. So then you may have a primary challenge that makes it hard for the child to do it, if it is biologically based, but then if we don't set up the right environment, the child's problems may get more severe because they are not using and practicing it. So, even if they have some capacities that could be developed, as we have seen is often the case, we're not creating an optimal setting to do it. That's why rehabilitation works so well. When we know adults who have an accident or an injury, the rehabilitation is so critical. We're always so amazed that individuals with even severe injuries who learn to do things that we didn't think they could do, and we as physicians are always pleasantly surprised when a patient who has been in a car accident, for example, is able to walk when it was thought they wouldn't be able to master that. That doesn't mean that every challenge can be overcome by sheer practice and effort. You need the potential or the plasticity in the biology. That's true for lots of individuals and you need the environment to challenge the rehabilitation program that really works optimally, and the key is you don't know what the nervous system is




capable of until you create the optimal program. You can't often tell in advance - that's what we have found.

So the principle is the affect harnesses the motives and the interests, but also affect and emotion is an orchestra leader. It helps the different parts of the nervous system and the mind work together. And, we want to harness as many of those parts as we can in every activity. You want to use sight, sound, movement, balance and coordination, and left/right integration in every activity that we can. So a perfect activity for a 1-month-old baby is simply listening, looking, and turning to mommy. There we get the pleasurable affect, we get the sight, we get the response to sound, we may even get some synchronous movement patterns along with the looking, we're not getting a lot of balance and coordination yet, but we may get the left and right hands moving and waving together in excitement. We may be beginning to get some left/right coordination and some collaboration between the different sides of the body, and that becomes a perfect activity – a simple looking and listening game.

For a 15-month-old, as we were talking about, going on a treasure hunt, but you having to take daddy to find the favorite toy. That involves affect, again, motivation, it involves movement, it involves sequencing and planning to the frontal lobes, it involves sight – you have to search for that hidden toy, it involves sounds because daddy might be giving you clues – “here,” “over there,” he might be pointing, involving interpreting visual perceptions, and so forth and so on.

Now if you have to go through an obstacle course to get to the hidden toy, it may involve some balance and coordination. If you have to catch a little Nerf ball that is being rolled at you with both hands, it may involve coordinating the left and right sides of your body at the same time, all while you are pursuing your goal of getting the hidden treasure, which might be the cookie or it might be the special toy. So here is where we are following our principles: harnessing positive affect in a relationship that is warm and trusting and pleasurable, and that is important to emphasize that that relationship has to be there, and then using all your senses and your motor system, under the guidance of your emotions including your balance and coordination and left and right sides of your body, using all of that together. That becomes a marvelous exercise and workout. With older children, we may have them walking on balance beams, standing on one leg with their eyes closed, all part of the game where they are seeking the hidden treasure. So this becomes a wonderful way of exercising the nervous system and trying to help the different parts relate to one another. In other words, what you are always working on is getting that “connectivity” cooking, and even before we saw these latest neuroscience research findings supporting this model, we were advocating these same principles because clinically we saw that children's biggest problems were getting the whole mental



team, all the parts of the nervous system or the mind, working together. So, the clinical observations were supporting what neuroscience has confirmed. In turn, it gives more meaning to the neuroscience findings, which only, I think, give us more energy in our quest for finding better and better ways to help the different parts of the nervous system work together. Now obviously, ultimately you would hope to find the reasons; the biological reasons why it is hard to develop the connections in the first place; what it is about the central nervous system in certain children. Is it something that happens in response to environmental challenges? Is it genetic challenges? It is probably a combination of both – some physical environmental challenges, maybe prenatally or early in life, coupled with some genetic susceptibility, as is true for most complex medical disorders – there are both factors playing a role. But, while we are searching for that reason, which would obviously make life easier, it is very important for us to develop the potential, or what we call “redefining the potential for each child.” For children, even if we were to find a biological tool now that could change this process for a two or three year old child, we would still need to do the same program because we would still have to help that nervous system form those connections and bridges. So, we would still have to focus on affect, multi-sensory experience, balance, coordination, etc., to help that nervous system. Again, it would just be easier if we had some biological help. But, for many of the children, we are finding that we can make better than expected progress – better than we ever imagined. And other children, even the children who show the slower progress, it can be the right kind of progress – meaningful, social relationships and interactions.

Now Serena, I hope I have given you enough time to think about some games and exercises for each stage and age. So let’s start with our two month old.

SW: I think you pretty much pointed out, at two, when the baby’s strengths are really looking and listening and giving these synchronous movements. What really counts is the way you use your tone of voice and the affect, and your facial expressions. As you move, think of what your child is capable of doing at two months. They can also move their heads, they can also look at you. We can begin to do a very early version of peek-a-boo games. They are not yet going to be able to use their bodies to reach out and pull you in as they already are able to do at 4 months, where they can be supported in a sitting position. Between the two and four month period, what we really are looking for is waiting to see how the baby responds to your being silly, making faces, they might touch your nose and you might go “boo!” and you might make some other silly little sounds. But, take into account what the baby can actually act on. You know they can listen and watch, you’re beginning to see if they can move, and give them small little steps where they can reciprocate and signal you to do some more of it. You can see this in the anticipation. You can see it in their looking. Don’t underestimate how much that

baby is capable of really communicating to you, and they might even be able to do some early imitation and some rhythmic kind of cooing and responding back in this kind of pseudo conversation you can begin to have, with the simpler sounds.

SG: Ok, Serena, now how about our 4-6 month old?

SW: When we move up, then we are beginning to see the child actually being able to reach out. They might be able to have a little tug-o-war. They may be able to take something you hand them and you can take it back. You could possibly shake a slinky together. Or, you could have simple rattles that they shake and then you shake – it's really important to have multiples of toys available, because then you can both do it and set up a rhythmic pattern, or you can exchange different little things that they can already hold. There are many, many musical toys that have this big effect that they can already manipulate. So, those are always kind of fun to do. Once this child discovers, between 4-6 months, the magic that they can make happen because shaking some bells or rattles makes these wonderful sounds. Or, it might make you make silly faces or sing a little song. We are now going to expect that baby to use more of their own motor capacity to respond back. They might move forward with their bodies, even if they are not yet crawling, or they might roll over towards you. You'll get on one side, and then get on the other side and they'll go left, right, and try to find where you are. This is the beginning of what all children love, what later becomes hide-and-go-seek game, or the treasure hunt kind of game.

SG: Let's take the 8-10 month old, Serena.

SW: I think here babies are beginning to not only expand on these earlier games because those keep going. What they begin to do now is they can also start doing more with their hands. So, you have the babies picking things up. You can have pop-up boxes or shape sorters. I like toys that have a big effect, not the electronic ones so much, but something where the child themselves can do a big action to make something happen. We begin to interact around a toy, and even by 10 months you will see the baby actually begin to have some very early symbolic things. It used to be that feeding a baby was a very early thing. Now I find they will actually pretend to talk on the telephone. They see the magic of this phone that goes everywhere they go, and can ring at any time and interrupt everything at any moment.

SG: Serena, I need to interrupt here. Before we get to the symbolic and the pretending, as you pointed out, may be giving it's first glimpses, what about helping the baby learn to become a continuous flow, back-and-forth interactor, and using all their senses and their motor capacities under the guidance of affect, with just more complex

social interactions? I think we need to give the family some ideas and exercises for that as a foundation for the symbolic that is to come.

SW: I think that is already happening, you know, by 8 or 10 months, where we can really expand and keep going. The child is finally on their own steam – whether they are crawling or crawling rapidly or beginning to move and cruise and discover and realize they are more of actor. We can expand into longer sequences and more problem solving kinds of interactions.

SG: What kind of concrete games would you suggest here?

SW: Well, I think I would now go into the baby really being able to uncover something, and “Oh, what did you find?” We might be able to see them pulling over a string and getting something at the other end of it.


SG: Serena, how would a mommy and daddy become the, as you pointed out earlier, become the play partner or the play object with that string or...

SW: Well, I think it's because you bring your own animation to it. So, when you say something surprising, or you act kind of silly and you get a bunch of giggles going and it's going back-and-forth and you're saying, “Oh, boo, boo, boo, boo” and the baby is saying, “Dada, boo boo,” you're just beginning to get that really nice flow, using that child's ability to babble, using it in service of getting Mommy or Daddy to say something more, using it in the service of expanding it as long as you can, not changing the topic, keeping it going for as long as possible, shifting or adding some movement side-to-side. You can create all the magic that your child is about to discover in those new toys they are going to be able to use now.

SG: So right now, you're saying, for example, just to bring this home in relation to the other comments you made, now instead of the mommy taking the little blankie off her head and popping up and getting a big smile from her 3 or 4 month old, now for the 10 month old, mommy might put the blanket over her head as she is lying on the floor and the baby may crawl over and come and take the blankie off himself and mommy may give him a big smile or a funny sound and they may begin babbling at each other.

SW: Right

SG: Or, there may be a string that the baby pulls that gets the blanket off mommy or gets mommy to make funny sounds, so every time the baby pulls one string, mommy makes one sound, and another string the mommy makes another sound. So mommy becomes the best animated toy the baby can ever wish for.




SW: Right. And babies can do a lot of signaling at this point. If you stop, you'll see the baby might tug on you. Or they may twist and show you what direction they want to go in. You're doing a horsey ride and the horsey collapses, and you'll see the baby trying to pull you up. If you are kind of running and you stop, you'll see them banging against your body. So you are beginning to see a lot of the gestural communication from their body to your body, way before words, and that is the essence of the early communication.

SG: Exactly. And this is what we want to emphasize during this period, is longer and longer, what we call continuous flow of back-and-forth sequences involving emotional signaling which includes vocalization and motor gestures and problem solving like pulling the blankie off mommy's head or pulling the string, and it can involve toys. But, you become part of the toy. You become part of the action. The rattle gets hidden in your shirt and the baby crawls on you and tries to find it. There's all kinds of games where you are the object of the baby's affection and the object of longer and longer sequences of interactions. Now what is happening is you're not only getting motor, sight, sound, and movement all orchestrated by affect, the more complicated the action like pulling and crawling, the more you're getting balance and coordination. The more the baby really has to use both hands to pull something off your face, the more you're getting the left and the right sides of the body working together. The more the baby has to find something, the more you're getting visual spatial problem solving into the equation as well as vocalizations. So now, even by 10 months, we can really get much more complex sequencing, which means the frontal lobes are getting more involved. Then, as Serena says, you may begin sowing the seeds for some of the cortical levels getting involved with some early signs of symbolism, or what will later become symbolism.

SW: The other thing that you're getting involved now, is not just pleasure, but the other emotions. We all know that the 10 month old can protest. The 10 month old can throw something down when it's not what they want. The 10 month old can convey, already, what they like and what they don't like. That's really wonderful because it's the first time where also for them starting expanding the emotional range with these deliberate communications – "I like this" or "I don't like that."


SG: Exactly. So what Serena is pointing out, for a range of emotions, not just pleasure, and you're looking for gradations in emotions – annoyance, curiosity, surprise, delight – the babies are becoming able now to show subtlety of emotions and not go from 0-80 miles an hour so quickly. So, they can not just show extreme glee or extreme anger, but the babies can show...

SW: They begin really giving their opinions.



SG: But the baby can show a range of subtle emotions. Now let's take one more example before we conclude for today. Let's go up to our 18 month old who is working on more complex problem solving, longer sequencing involving more complex problem solving like treasure hunts and searches, and where we are getting the beginning of more symbolic play and more complex social imitation leading to symbolic play. Then, if you can think of a concrete example for that age child, Serena.

SW: I do think that by 18 months, we already see children beginning to play in the sense of using toys in more novel ways and using toys based on their real-life experience. So yes, they kind of have begun to deal with more of the structure of the toy, whether it is pushing the pop-up box and figuring out where to put a puzzle piece, where they are using the properties of the toy. At 18 months, very much they are relying on that, and we do it with them. We become players as well. As we begin to see a toy that is a miniature version of real life, you have created the opportunities for them to start pretending, what we call "pretend play." In the pretend play, which is very much based on real life experience, you want to be one of the other players with them in using those objects. So maybe, you'll see a baby picking up a pretend baby bottle, and the first thing that you'll usually see them try to do is drink it themselves. You might offer them the doll and they might feed the doll, but even more so you might say, "Do you want a drink?" The symbolic world begins to open as the children begin to use the symbols and representations of what they know through experience in this kind of deliberate way, and they experiment a lot. That's why they eat pretend food, even though they know it's not real. So at this point, one of the really nice things to do is to create an environment where these kinds of toys are available and your child will do some kind of nice mix. They might put you to bed because you are tired, or they may lay down and you may bring them the blanket. You'll find yourself beginning those early symbolic reenactments of experiences they know. Bring them things you know they enjoy. If you bring a little plastic tub of water, and you can be sure the child will, at minimum, play with it because they like playing with water whether they are splashing or throwing in things. At the other level, they might actually pretend to give the little doll or the little animal a bath. Here again, we bring in this multi-sensory kind of experience where they can at least organize and orchestrate something that they do for themselves in this pretend fashion, and they know it from real life because you are doing it with them in real life and you continue to do it with them in the play. So being a player in these little dramas the child is starting is crucial. You just don't want to comment on it, you want to provide the language and you also want to play. And, the baby can wash you or the toddler, in this case, could shift it and you both could give the doll a shampoo, or whatever the object is of the child's choice. In this case, whether it is a person or an animal or a truck, it doesn't really matter so much. They already have an idea.



SG: Serena, we need to begin to close off, so I just wanted to alert you.


SW: Ok.

SG: Did you finish your example?

SW: I think that the critical things of the 18 month level – I just wanted to heighten again, we are going to see a lot of individual variation in how the children can express what they enjoy. There is going to be a very big range at 18 months between the pre-symbolic and the symbolic capacities.

SG: Right, so what we are trying to do here, is basically work on the problem solving and the continuous flow of back-and-forth interaction using all of the senses and more complicated motor planning and motor challenges. And, at the same time, begin through imitation and through the realistic use of some toys, the beginning of pretend play or the symbolic kinds of play that we'll emphasize at later stages.

Just in conclusion, let me emphasize that we have been talking about this in terms of 4 months or 10 months or 18 months. What we are talking about is what typically happens in terms of functional emotional developmental capacities. Many children with special needs, including autistic spectrum disorders, may be working on 12 month old level capacities, or 18 month old level capacities, when they are 3 or 4 or 5 or even 8 years of age. The key in the DIR Model, is we can't skip the foundations. So, we figure out where the baby is. If we are doing this preventatively with a new baby who we think may be at risk, or just to help a baby not at risk simply master their emotional milestones more fully, so it's a win-win situation, if a baby is at risk, by doing these kinds of exercises more, we've reduced the risk. If the baby is not at risk, we strengthen that baby's fundamental capacities. So either case, it's very, very helpful. That's one important component of preventative intervention. They have to be the kinds of activities that are helpful for all children – those with challenges and those without challenges, because if we have special activities that only help children with challenges, and they are too rotanized or focus too much on memory alone and only focus on one part of the central nervous system, we may be creating a problem where none existed. Maybe a child who we thought was at risk is not at risk and actually we are creating a problem. Even for the child who is at risk, we may be not solving the complete problem. We may be solving a piece of it by strengthening the language or vocalizations, but not strengthening the connectivity to the different parts of the nervous system, again undermining the opportunity for a better solution. But whatever the age of the child, whether we are doing this preventatively or whether we are doing this with a 4 or 5 year old, or even an 8 or 9 year old, or even as we have had recently, a 40 year old or 45 year olds, we have to go back to where the individual is. What are they working on in terms



of these functional capacities? We work up the ladder gradually from one to another. Obviously, you find a game or an activity that will be pleasurable to that person, given their special interests. We were using examples that are typically of interest to babies, but even 4 and 5 year olds will like these same games if they are meeting the challenges of the 18 month old level or the 12 month old level.

When you work on the pathway, building the foundations, as we were talking about, you tend to get the kind of progress that is meaningful. If you go after splinter skills or just memory-based skills, you may get the illusion of progress, but you are not having the fundamentals. You are not having a child who is relating warmly, who is getting all part of his nervous system working together, who is learning to truly form symbols that are meaningful, as opposed to memorized scripts. So these examples that Serena was giving are vital for any age. What we have tried to highlight today is that the latest neuroscience research reinforces what we are trying to do clinically, and our clinical exercises may help provide additional insights into these latest neuroscience findings.

So thank you for joining us today. Next week we hope you'll join us. We are going to focus on some general principles for families of children with special needs, but also for all families. Kind of, principles to live by that help children develop and help families cope well with their challenges. So next week it will be, "Principles for all of us to live by to help overcome challenges." Thank you for joining us and we'll hopefully see you next week. Again, we welcome your calling in. Thank you, bye bye.

SW: Bye bye everyone.

SG: Thank you, Serena.