

## **Web-Based Radio Show**

### **Series on Learning Differences, Learning Challenges, and Learning Strengths:**


#### ***Visual-Spatial Processing Part I***

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Good morning. This is Dr. Greenspan on our web-based radio show. Welcome and thank you joining us today. Today our topic is continuing in our series on learning challenges, learning strengths, and learning differences. As you recall, we've been using our tree metaphor, where the tree trunk is our basic thinking and social capacities; our branches are the different academic skills; and our root system is the different processing capacities that children bring to nourish both the tree trunk and the branches. We've covered the tree trunk and we've covered some of the roots, but we haven't yet covered one of the more important parts of the root system. We've covered auditory processing and language and motor planning and sequencing, and we've talked a little bit about sensory modulation and how to help children overcome over or under reactivity, but we haven't yet talked about visual-spatial processing – how we make sense of what we see and how what we use what we see to learn and to think and, among other things, to solve problems and get around in the world.

Visual-spatial processing is less familiar to most parents and also many colleagues. We sometimes think about perceptual motor activities or visual motor activities, like looking and reaching games or throwing and catching games, but visual-spatial processing and visual-spatial thinking is actually much more complicated. In today's segment we'll draw heavily on the work of my dear colleague, Harry Wachs, who worked with Jean Piaget in the middle of the 20<sup>th</sup> century. He and his colleague, Hans Furth, are the pioneers around the world in extending Piaget's theory to visual-spatial thinking and their book, *Thinking Goes to School*, is a very good resource. Soon we'll have on our ICDL website ([www.icdl.com](http://www.icdl.com)) a new book by Harry, updating all his exercises from *Thinking Goes to School* in a more complete format, so we can look forward to that in a few months. Also, in addition to using Harry's work in our ICDL




DMIC, our Diagnostic Manual for Young Children, we have a very thorough section where Serena Weider, my longtime colleague, worked with Harry, as well as myself – but it was mostly Serena and Harry working together – to conceptualize visual-spatial thinking within the DIR model and that’s an excellent section, too, that we’ll draw heavily on today.

Now, what I’m going to try to do today is present visual-spatial processing and thinking in a way that’s easy to remember and that will hopefully make sense visually, as well as verbally. To do that we’ll follow our functional emotional developmental capacities, going from regulation and interest in the world; engagement; two-way intentional communication; problem-solving; using ideas creatively and logically; connecting ideas together; and getting into higher levels of thinking, such as gray area thinking, comparative thinking, and reflective thinking. We’ll use those stages to organize how we approach the visual-spatial world.


Now, visual-spatial thinking and processing is really about our relationship to our environment because while we take in our environment through sound and touch and smell and many of the senses, we also use vision a great deal. We use it to understand how our own body works, to look at our hands and feet, and to understand how our body works in relationship to others and in relationship to our physical environment, as well as to make sense of our physical environment. For example, how does a little baby know that that series of shapes that we later call a “nose” and a “mouth” and “ears” and “eyes” equals a face? Well, that’s a pattern. Do babies know that at birth? Is that something they learn? What do they actually see? Would somebody from another planet have the gift of sight or do different animals see things differently? Do they see a person as a whole pattern or just as a series of separate little entities? It’s a little bit like if you look at an Impressionist painting. Some people may see a pattern there; other people may see just a series of colors and shapes; other people may just see a mish-mosh of colors. So if you look at a Rembrandt or a painting that is clearly something familiar to you, you tend to see a pattern, but what do you see when it’s something that’s modern art? Again, different people will see different things in it. So, what’s important to realize is that we put a lot into our visual-spatial world in terms of construction. We actually build a visual-spatial world! We actually learn how to make sense of our world.

When we’re born we have the gift of sight and we only really perceive the most fundamental patterns. We do perceive certain kinds of shapes and newborn babies can




discriminate very, very basic patterns so the brain seems to be pre-wired for that – or at least the human brain. My guess is that certain animals are far more gifted at birth with what they perceive because they have to be to survive in the jungle. But human beings then develop the capacity to make sense of their world. So we're going to go on a journey to see how that's best developed, particularly in children where there may be challenges. To do that let's start at the beginning with looking at regulation and interest in the world – the first stages – and how that would translate into the visual-spatial world. What "interest in the world" means is taking in sights and sounds, so the kinds of exercises we want to do to strengthen that ability is to notice the world. It begins with a newborn baby simply looking at Mommy's face, but for older children who are already a little bit verbal or somewhat verbal we strengthen that ability by encouraging them to around and take in everything they see and noticing details and subtlety. So it could be facilitated by a nature walk and asking the child to describe everything he can see – the colors and shapes of the flowers that he sees, the trees, the streets, the cars. It can be a game when you're on a trip and you see how many different cars you can identify or houses or trees and things along the way. You can have a game among many children – Who can describe more of what you see? So, simply noticing is important. Again, with a newborn, we also like to see the baby turn towards Mommy's sound and find her face, so it means combining what we see with the other senses. So, with a child who has trouble, simply moving to the left and right as you talk to him where he has to kind of follow you to see where the voice is coming from. With the child who is very self-absorbed and doesn't tend to coordinate sight with sound and with his own movement, it may mean our old friend "affect" or emotion – finding something the child's very interested in. Usually, even with children with autistic spectrum disorders who are very self-absorbed at the more severe end of the continuum, if we have their favorite cookie or their favorite object they like to perseverate on, they will reach for it and we move to the left and say, "Here it is! Here it is!" and they hear our voice to the left and will often turn to the left to look for it. So we can get combining sight and sound with a little bit of movement.

Then we want to facilitate the other senses, too – touching that object, smelling the object, and – if it's a food – tasting the object. So we're always looking to increase the range of things we see. In other words, notice all the details. We want to do that in the real world as much as possible, but we can use pictures in books. There are a lot of great books like where you have to find something that's embedded in a picture with many, many details, but here the goal would be not just to find the hidden object, but



also to describe all the other things in the picture. But in the real world it's far more interesting – going on nature walks and, if it's not too scary, going on a bus or on the subway or when you go on a car ride, or just walking to the grocery store. All these things can be exciting adventures in the visual world if we look simply look, listen, smell, touch and gain as much multi-sensory experience as possible. It's also very important for children who get overloaded by sights and sounds to do this in a modulated way so they feel calm and soothed, so do it at doses or levels the child can tolerate. If the child is sensitive to sounds, you want sounds in the nice, calm range for that child – not high-pitched or too low-pitched, which may overwhelm the child. Similarly, bright lights or sunlight can overwhelm many children or bright reds will be too loud for them. For others, they need the loud colors – they're under reactive and so the soft blues and grays won't work, but the bright reds or yellows will work, so you have to also see what attracts your child's attention – what doesn't overload him, but also what doesn't underwhelm him – and draw him into using his vision and doing it in a calm, regulated way. So this is really the first stage. Reuven Feuerstein, another pioneer in using visual-spatial thinking, who also built on Piaget's work, has lots of games with dots where he has children see the details in the dots and identify patterns, which also can facilitate this capacity.


The second stage that we always talk about is engagement and the beginning of two-way communication. Now in the engagement phase we focus on the emotional involvement with the primary caregiver. Here, when it comes to our visual-spatial world, we want to focus on investing what we see with emotional meaning. So here, for example, we don't just want to notice the red ball, we want to notice the red ball invested with a lot of emotion. So the red ball will be on Mommy's head or if it's a cookie, and if Mommy is brave enough, she may put it in her mouth and little Junior will have to take it from her mouth to eat it and they'll be sharing the cookie together. What does that do? That connects what you see with an object you're already interested in, like a cookie, with the Mommy. So it facilitates the engagement and the relationship and the emotional depth and pleasure and intimacy with using vision to begin relating not just to the physical, inanimate world, but the animate world, too. So here we want to combine the physical world and the animate world using vision as a bridge to make that link. There are lots of games where the person – Mommy or Daddy or a sibling or the therapist – uses himself as the object of visual fascination. Since you're alive and you're moving, start off simple by just putting the cookie in the mouth or the perseverative, fascinating red ball on your head or some other object of desire in your



pocket, but show a little bit of it sticking out so the child is relating to you and the object at the same time and then gradually make it more complicated and become a moving object because people move around. So you can move to the left or right and up and down and you can be a horsy the child wants to ride on, but a horsy that keeps moving away a little bit. Make it challenging so the child has to come after you; be a horsy with a cookie in his mouth so the child comes to get the cookie and then gets a horsy ride. So all these things create, again, a visual link to you and the object that you've already gotten the child interested in as we talked about increasing the child's visual awareness of his world. Also, this begins helping the child track a little bit. In order for the child to find the cookie in your mouth he has to be searching and as you're moving the child has to follow you from left to right, up and down, behind the chair and so forth and so on.


Then we progress to the third stage, where we have real two-way communication and two-way intentionality, and the fourth stage, which we call "shared social problem solving." We'll talk about those together, but to begin with we'll start with just the intentionality. Now we want to focus on the child's awareness of his visual world, awareness of his body in space, and awareness in space that has other objects in it. Here's where, as a child gets to be more mobile, we want to first focus on all those motor skills we talked about when we talked about motor planning and sequencing. Remember we talked about the Evolution Game, from squiggling to crawling, all the way up to walking and running and throwing and catching and so forth and so on, so reread the section on motor planning and sequencing and all those exercises are very important to do to strengthen two-way, intentional communication and shared social problem solving because you use your motor system to, in a sense, carry out visual problem-solving. If the child has severe motor problems, motor tasks can be simpler. In other words, just turning and looking or using tongue movements, but there will still be some movement that indicates for the child and for others their visual awareness of something going on in their environment.

Let's take a simpler case first, where the child may have motor planning challenges, but not huge challenges so he can move. Here we go through those motor exercises, but now always attaching some visual goal to it. So you're squiggling on the floor or crawling on the floor to catch Mommy or to get that cookie or to find the red ball that's in Daddy's hand and that he's showing you flirtatiously. So the key now for two-way communication is we help the child become aware of his body in space, his body in relationship to other objects, as well as other objects that are also moving. So




he's not just aware of the visual world, but he's aware of the interaction between him and other things and people, so we have a moving child and a moving Mommy and a moving Daddy. Now the child is tracking, he's moving, he's anticipating, he's judging distance and he's gaining a sense of how much space he has to cover to get to Mommy or Daddy when they're across the room with that little cookie that he wants. He's getting the sense of how long it takes to get there without even knowing the concept of seconds and minutes in time. So space and time, eventually to be measured in concepts such as distance and seconds or minutes, are now forming experientially for the child, before he has labels for it or mathematical formulas to describe it, all because you're moving in relationship to the child and he's moving in relationship to us.

We want to do this in a constantly expanding way with different colors and with different shapes that we interest him in as part of our body. Here, we can play games where we hide things, first making it real easy where he sees it sticking out of our pocket or out of our hand and we show it, hide it, show it, hide it, show it, hide it, and eventually we hide it and he has to remember that he saw it and figure out that we had it so it must be somewhere on us, so he has to figure out that it was behind us or we're sitting on it and he'll have to come and push us off. We make it more complicated by hiding something on us and he's sees that we've hidden it but he doesn't know quite where it is and then we run away from him like a moving doggy or moving horsy and hide behind a chair so he's got a double task – he's got to chase us, find us, and then find the cookie hidden somewhere on our person. So now he's pursuing, he's covering his own body in relationship to our body, he's getting experiences of space and time, and he's also learning to use vision in a highly flexible way, tracking our movements and so forth and so on, meaning that he's following from left to right and up and down, looking behind things and next to other things and here we get real visual-spatial problem solving beginning. As we're doing that and we're doing our motor exercises, remember we're also helping the child to integrate his sense of left and right sides of the body, so we're doing motor challenges that require using the left hand and right hand together and using the left and right feet together, maybe climbing, running, jumping, as well as complicated crawling. It may involve throwing and catching games. One of the best ways to work on visual tracking, which will be necessary for reading, which requires moving one's eyes across the page, or playing computer games, is throwing and catching games, so we can entice the child into first just rolling the ball back and forth and then to his left and to his right. We can then hold something and say, "It's high" or "It's low" and, as the child is reaching for, "It next to this" or "It's behind



that.” Way before the child understands the words he’s getting this experience, so he understands it’s on top of Daddy, it’s below Daddy, it’s behind Daddy, or it’s in front of Daddy. We can be giving the child clues where he doesn’t understand the words right away but he sees the object that he wants in different relationship to Daddy as it’s moving. So he’s tracking and getting a sense of the different dimensions of space that will later become more meaningful to him when he has verbal clues for it. So now we’re into more complex problem solving with more complex search games.

There’s no end to the kinds of activities or games one can come up with in order to facilitate this ability. The important thing is to have fun, but keep the child invested in you, and keep the child invested in seeing all the details in his environment, taking in the whole room or scanning all of what he sees outside. So it’s always asking, “What more do you see?” or “What about that?” or “What about this?” and then making it more complicated by playing these games that involve searching and finding and movement, on your part as well as the child’s part. And we want to facilitate the child’s motor and visual-spatial skills at the same time, so we’re always keeping in mind what motor planning and sequencing we have. Balance and coordination are important here, too, re-emphasizing the motor planning because the balance and coordination allows you to get a sense of your own body in space, it allows you to move fluidly in relationship to other moving objects. So when you’re throwing or catching or dancing with another person you’re in a balanced and coordinated way in relationship to other people using both motor and visual-spatial processing skills. Here, too, we want to combine this high-level problem solving vision with sound and with touch and with smells and with textures and taste. So when we do our visual-spatial problem solving we want to make it as multi-sensory as possible. For example, if we are searching for that cookie in Daddy’s mouth and he’s running away and being a doggy who’s hiding, when we finally catch Daddy and we’ve done a lot of visual tracking and movement in relationship to Daddy’s body in space and we have a sense of how long it took us to get there, then we want to have physical contact and note what that cookie feels like and what it tastes like and what it smells like. So we’re always combining and having multi-sensory experiences. Daddy can be giving clues with sounds going, “Beep beep beep! I’m here, I’m here!” if the child is having a hard time finding him when he’s hiding behind a certain chair or in a closet. Then the child is using sound to orient sight and eventually will use his other senses, too. We can play games where the child has to identify objects he saw with his eyes closed using touch and smell and maybe taste and then describe what it looks like. Here we’re constructing the visual image from the other senses, again facilitating the




interaction among the senses and, although we're not using vision directly, we're actually strengthening the visual-spatial problem solving because we're using that as our framework. The child is actually constructing the image from the other senses.

With children who have visual impairments and don't have the gift of sight but have the gift of their other senses, we try to construct a visual-spatial world from sound and touch and the child's own movement. So the verbal child can describe what something would look like by touch and by examination and by smell and taste and movement. He can figure out where things are in a room based on where the sounds are coming from, for example, as well as by walking over and touching those objects. Judging by his own movement where the sound is coming from the child gets a visual-spatial roadmap of an area just as a sighted child would, and that's very important for visual-spatial thinking and problem solving.


Similarly, a child who has a hearing impairment may not be able to combine sound with vision effectively but can use all the other senses with vision, so we want to get as much of a multi-sensory picture of the world as possible and vision is a very important component of that. During this stage of problem solving we also get into what we call a "functional understanding" of the world, where patterns become more important. They're important from the beginning, but they become especially important during this stage, as is understanding the physical world in terms of a pattern that we'll call the function of the physical world, the function of objects. Let's take something concrete and simple like a toy telephone. Well, again, that's not something that's red or blue or brown or black and has a certain shape and you put it to your ear – those are all elements of it and later you'll come to call it a "telephone." But even a 16-month old child will imitate Mommy or Daddy and put it to his ear and his mouth and he copies Mommy and Daddy talking on it, so they understand the function of it is to somehow go "blah blah blah blah" to communicate.

So, here we want to have objects in a child's visual world that have functions – a comb, a hairbrush, a toy telephone, a truck, a car, the beginning of doll play – hugging the dolly. These are all objects of function and here the child can see that these little elements that they see constitute a pattern. The pattern is a dolly or eventually what's labeled a telephone, but the child sees the pattern way before they can label the pattern with a word or they'll have a few words for some patterns, like "chair" maybe or "juice" but not for others, but they're noticing these patterns and they're noticing the function of the objects. Here when we play games we want to play games where we



introduce imitation and we actually use objects functionally. We can combine math, for example, with a search game where the child has his own toy grooming set, let's say, because grooming is a very popular interest to kids, with a comb or a brush and Daddy encourages the child to do the same. So, Daddy may comb his hair and the child has some stuff in front of him and sees if he can find the comb by playing copycat with Daddy. To encourage that, Daddy may start off eating a pretend cookie or a real cookie and he has a cookie and some spinach in front of him and sees if the child can figure out which is the cookie, which means identifying a pattern and using that object in a functional manner, i.e., eating the cookie. So there are lots of ways to encourage the child who just doesn't want to play copycat by taking a high motivational item. So now we want to search for things – in a sense, relate to things according to their function as well as their colors or shapes or textures or just general fascination. Kids kind of gravitate toward this naturally if there's been a lot of interaction and a lot of back-and-forth problem solving and they being relating to the world more and more functionally and more and more in terms of patterns. Their central nervous system is geared toward developing this ability if we challenge them through lots of interaction of the kind that I'm describing.


Now if all these exercises have gone well and we have a child who is looking and listening, touching and smelling, and noticing his world, seeing patterns and tracking well and using his motor system to explore his visual world, we also want to help the child now describe his world. We want to get into the next level of using ideas and we want to use ideas in relationship to the visual-spatial world and combine ideas together in different ways for symbolic visual-spatial problem solving and understand visual-spatial relationships in a new way now that we can use symbols. This elevates the child to a whole new level of problem solving. But this builds on the foundations we've been describing. It's very important to have these foundations and be strengthening them, and even as we work symbolically with the child, we're always strengthening the basic foundations, as well. One of the first things we do symbolically is simply help the child label and describe with words what they're already doing and understanding. So with typical development, children basically experience their world, experience what they see, experience their own bodies in terms of their hands, their feet, their legs and their other parts. They see themselves in the mirror. They experience themselves in relationship to physical objects and moving human objects, they're forming a sense of patterns, and once they see patterns they can see differences between one pattern and



another, so they're getting all these experiences – they're getting experiences with things that are behind, next to, on top of, below, things that are far away or close.


All these have to do with lots of interaction with the physical world and the human world by combining that physical world and the human world together in a moving, dynamic dance. So if you only remember one thing about the basics, just have lots of interaction and lots of fun where you, as the caregiver or therapist, and the child are interacting and having fun together and using vision quite a bit by rolling the ball back and forth or finding Mommy or Daddy. If you do that and you're simply having fun together and using vision, as well as sound and touch and smell all together, you're cooking. You don't have to remember all the details of what I've just said; all you have to remember is have fun together and use all the senses together and go through a lot of movement together while relating to one another. In other words, don't just be in your own world. If you're doing that, the child is using his left side and right side, he's covering distance, he's getting a sense of how long it takes to get somewhere, he's combining experiences with the senses and he's noticing more and more what's going on in his world and all kinds of good things are happening. On the other hand, if the child is overwhelmed because he's in a noisy environment that's overloading his nervous system or he's underwhelmed because he's either under reactive or everyone is just too quiet at home and there's not enough interaction going on, then this whole area of development is not occurring. So if we had to boil it down to a few key words I would say the first is "have fun," "look," and "move" all together. Everyone should be doing it in a calm, regulated way.

Then we get to the world of symbols where the child begins using ideas and can use descriptors – just giving words to some of the patterns the child is already seeing. So we talked about the cookie or the telephone or the juice. Begin with the words that are visually meaningful to the child, that have the most emotional meaning and affect – so a favorite toy, or favorite food, or Mommy or Daddy. Mommy and Daddy always get discouraged when the child doesn't say "Mommy" or "Daddy," and they say "juice" first or talk about a character on TV. Well, then you have to examine how much time you're spending with the child, how much Floortime you're doing. If you're doing a lot of that, don't worry about it. Your child may have a harder time with those sounds or may take you for granted, which is fine because you're there to be taken for granted. But if you're not spending enough time with your child, let that be a sign to spend more time with him. So help the child with the words or labels by using them. You don't have to teach




him and say, “I’m Mommy” or “I’m Daddy,” or “Say ‘Daddy’” or “Say ‘Mommy’” – you refer to each other and Daddy says, “Oh, Mommy has the cookie! Momma has it!” and then Mommy has a big smile and says, “I’ve got it! Come find me!” The child begins getting the idea and says, “Mommy, Mommy, cookie. Want cookie!” and will use it on his own. Let the child discover by hearing you use the word “Mommy” rather than trying to directly teach him. That’s the way it ordinarily occurs and how it should occur, even with children with severe language problems or autistic spectrum disorders. Let the child discover how to use the label.

Now we want to use these labels and words for the visual-spatial world. So we go back to the beginning – just noticing the world. Now we’ve got our nature walks and we’re not only going to take the walk and notice everything, we’re going to identify what we see – the flowers and the plants – and we’re going to touch and smell them and describe what we see. We’re going to describe the busses and the trains and the cars and the foods and the colors and the shapes of things. Mommy may say, “Will you give me the small one or the big one or the round one” as the child is Mommy’s little helper in the supermarket. As you were playing those same games that we played before where Daddy’s got the cookie in his mouth and he’s a doggy and running away, Daddy can now provide auditory clues such as, “I’m in the closet” or “I’m in a place where the coats are,” and the child can figure out where Daddy is. Now we’re expanding language to be used to support visual-spatial problem solving, but also giving the child symbolic labels for how his physical world is organized. Daddy can now say, “Oh! Here’s the cookie – it’s on top of me, it’s behind me, it’s next to me, it’s below me, it’s to my left, it’s to my right,” and then we can play a “Where Is It?” game, where to get the cookie the child has to describe where it is. “Daddy, it’s on your head, it’s on top, it’s to your left, it’s to your right, it’s behind, it’s next to, it’s under.” Now the child is getting all sense of spatial dimensions and labeling them by simply going back and doing the games we were doing before, but now with a verbal discussion as we’re doing it. So now the child is not only fine-tuning his sense of space and the dimensions of space and taking in the details of life, but he’s now symbolizing all these dimensions. In other words, he’s giving words to them, and now he has ideas and he literally can form pictures in his mind of what “above,” “beyond,” “below” look like and give them a label. Before that he could probably create the picture in his mind to some degree, but didn’t quite have a label for it, like “above” or “below,” “next to,” and so forth and so on. So this becomes very, very, very important.



When we're doing these games we continue, obviously, always moving interactively with the child. As we're doing this, the child is also learning about higher-level concepts. As we move on, the child can also use ideas creatively during pretend play, in addition to during reality, where the dolly can go high or low or fast or slow or next to, or behind or above or below something else; or if he's building a little house, where are the rooms and where's the bathroom and where's the kitchen? All these things can be incorporated into the pretend world, too, and they should be as you do interactive pretend play with the child. Then we go one step further and we begin challenging the child, particularly as he's connecting ideas together and getting closer to that three- to five-year age range when he's beginning to answer "why" questions, like, "Why do you like to go outside?" "Because I want to play," Now we can begin helping the child understand relationships of objects in space. For example, we have the concept of conservation and that if you have three blocks, whether you have them stacked up like a tower, one on top of each other, or laid out side by side, it's the same three blocks.


So we can begin playing games that facilitate these kinds of tasks. We can also begin playing games that facilitate the child's classifying things more effectively. So, these can occur together. For example, let's say we have games where we help the child form larger patterns that are now symbolized, which is for clarification just another form of pattern recognition but now in a symbolic form because we give it a label. We can play a game where the child has to get all the same colors and all the same shapes. We might have a contest that's the equivalent of a card game but with physical blocks or different shapes and we each get a turn and we see who gets all the same colors first or all the same shapes first, and then we can make the game more complicated by seeing who can get all the same colors and shapes of one kind; in other words, who gets all the blue squares first, and then we can make it functional. Who gets all the shapes he needs to build a house first? Who gets all the shapes he needs to build something else the child is interested in, like a chair, first? So we can have little contests which combine objects in physical space by color, shape, and by function and making it a little competitive or making a game out of it just makes it more fun, starting with simple, one-dimensional kinds of things and then going to multi-dimensional kinds of things. We can do "same difference" games by then having a game where we see who gets all the different blocks first without repeating any color or any shape and each one has to take a turn to see who is the first one to have all differences, i.e., one of every kind that's in the pile. So this is a challenging game where the child has to know not to take the same



color or shape a second time. These are great games for establishing higher-level symbolic pattern recognition and I'm sure you can think of others along these same lines.

Similarly, for extending this then we want to help the child understand patterns at a higher level, which we call the conservation tasks, so that three blocks looking like a train are the same as three blocks looking like a tower. The same goes for five blocks. When we have a piece of clay we can make it long and skinny or make it round and roll-y, and it's the same piece of clay. The best way to do it is to actually play with these objects with the child and to let the child experiment with his physical world and see that physical objects and physical space and weight and quantity and shape can all be transformed. So in a sense the snake is diff from the roly-poly ball, but it's the same weight and the same amount of clay. So first we experiment and we might ask the child to actually experiment – roll the piece of clay into a little ball and then make it into a snake, so we'll start off with two pieces of clay that are exactly the same and are square, initially, and he makes one into a ball and one into a snake and then ask him, "Which has more?" or one which he likes better and if we do it in terms of something he's invested in, like something he likes to eat that he has to squish up into two different shapes, such as a food you can make different shapes out of, he'll be invested in getting the one with more. And you can go back and experiment until he realizes that they're the same. The same thing with a liquid he likes – it could be a juice and he can have a little straw and he can pour it into a long, thin glass or a short fat glass and you can ask which one he wants and experiment and see if he can eventually grasp that they're the same.

So the key here is realizing that things that are long and thin are the same as things that are short and fat and that things laying on their side are the same as things in a tower, or that liquids in one container may be same as the liquid in another container, even though they look differently. They're realizing that looks can be deceiving, in essence, and you have to take a multi-dimensional approach, so what we're emphasizing here is that patterns can be in multiple dimensions and the best approach is actually to have the child experiment and then let the child come to the conclusion himself. This will take place over a long period of time as the child gains these concepts, typically at a young age, but for some children who are older and who haven't yet mastered you can go back and do the same experiments until they get it and let the child figure it out. If they're a highly verbal child but lacking in visual-spatial capacities,



ask them, “Well, what do you make of the fact that you started off with the two things that were the same and now you’re telling me there’s more of one than the other? Are you a magician? How did you do that?” Then the child can go back and experiment again – and pour the liquid back into the tall, thin container or the short, fat container or put the blocks that look like a train up and make it look like a tower. Now as you do that and get the sense of quantity and the various dimensions of space, the child can now begin also developing some of the formal systems, like what we call “one-to-one correspondence,” so the child understands that “one” or “two” or “three” equals those three blocks that are piling up. So now we’re getting into regular academic activities. They also can begin understanding that the shapes they’re looking at make letters – A’s, B’s, and C’s – and that they have little circles and little lines or double circles and a line for a B, and that these have sounds that go with them, so they begin conceptualizing this and that these sounds can be blended together to make words. The phonemic awareness approach is very good here for combining what you see with what you hear and the Lindamood Bell approach to reading is one example of an excellent approach that builds on phonemic awareness – their LIPS program and their V/V program also builds on using vision to understand and to picture what you read once you can sound out words. So here we now can begin getting into some of the more formal academic activities, but we’ve built a very strong visual-spatial foundation.

We’re going to stop for today in just a second. Next time we’re going to continue with our visual-spatial world and talk about the higher level visual-spatial thinking – how we get more into connecting ideas together visually-spatially, how we get into multi-causal thinking and comparative thinking and gray area thinking and reflective thinking off an internal standard, all from a visual-spatial perspective. So next time it’ll be Visual-Spatial Processing and Thinking II – the higher levels of visual-spatial processing and thinking – and that will be the title for next time. We won’t be meeting next week because we’re having our conference this weekend and we’ll have some post-conference activities on Thursday, but in two weeks we’ll resume the show and we’ll do Visual and Spatial Thinking, Part II. So we’ll see you in two weeks and for those archiving this, look for the next segment in two weeks. Thank you.