

Web-Based Radio Show

Visual Spatial Processing


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Good morning and thank you for joining us today. Today we will continue talking about visual spatial processing and about our new manual, which was developed by Harry Wachs, a pioneer in visual spatial thinking, along with some help from Serena Wieder and myself.

Last time we talked about why visual-spatial processing was so important – that it's the way in which the infant or child comprehends what he sees. You have to make sense of what you see just like you have to make sense of what you hear and just like there's a language for what we hear – making sounds into words, giving words meanings, and these meanings coalesce into larger concepts – similarly, what we see is not necessarily discrete colors or shapes, but a human face or a car and, obviously, our bodies in relationship to other moving people. We can even catch or throw a ball, and move as we do it, so we can move in space and anticipate where objects are moving in space. We don't realize how much we are using our spatial thinking every single day and in math and science we're often using spatial images. When we think of time or quantity, we're often thinking of the space it will occupy. We are all familiar with Einstein's work – not in terms of understanding it, but in terms of his pioneering work that helped us understand how time and space are all connected – and, apparently, as a young child he was using his pretend play for taking voyages into spatial imagery as opposed to just chitchatting between his dolls.

Last time we talked about how the child goes from appreciating first his own body and movements, then his own body and movements in relationship to an outer environment, then his own body and movements in relationship to a moving environment – so there are two moving objects in space; and then being able to comprehend patterns; and then being able to put into formal ideas things in space, like different architectural designs; and then being able to see lots of relationships between these different spatial images. So we can have a house that has rooms that are all connected, or we can build the tower one way and then construct a mirror image of that tower. Then there are higher levels of thinking where we get into more complex spatial relationships.




Now what I want to do today is show how this sequence of events in spatial understanding of the world parallels and both supports and derives from our functional emotional developmental capacities. As you know, we have six basic capacities and three more advanced capacities, and I'm going to walk you through each one and show you how there's a parallel in the development of spatial processing or visual-spatial processing and thinking that both supports the stage and also is supported by the stage because the stage is supported by all the parts of the brain and mind working together – language and spatial and motor and sensory – all together. This is important because if a child has a challenge in the visual-spatial area, strengthening that can help him master the fundamental building blocks of social, emotional, and functional development, that is, these developmental stages, and vice versa: If a child has a problem in visual-spatial processing, strengthening the overall building blocks in the other areas and in the other ways can also help the visual-spatial capacity. So we can come at it from both angles. I'm going to illustrate that as we walk through the stages.

Now the first stage, as you know, is regulation and interest in the world – a baby or child learning to be calm and regulated and take an interest in the outside world. Well, this corresponds to the child's becoming aware of the movements of his own body, with his arms and legs moving, and aware that there is an external environment outside him – there are images and shapes of interest, whether it's colors or a moving mouth, as it will later be described, but initially the baby doesn't know the word for it or the child can't use that word.


Stage two we call engagement, where the child – between two and four months, typically, but it could be an older child with special needs – learns to emotionally engage with the world – take pleasure and delight when he sees the big smiles of the caregivers. This corresponds to the baby being able to appreciate the outside world as a moving world, as an animated world, not just a moving ball, but moving people and beginning to discriminate different moving objects in relationship to themselves. So you see a baby looking to the left and the right and smiling as he captures Mommy's glance. That's stage two. So now we have the ability to discriminate different spatial images – the human from the non-human, the red ball from the mommy's big smile – and to be able to relate to a moving object in space – a moving ball or a moving mommy's face.

Then we go into stage three, which is two-way communication, where we see back-and-forth babbling and vocalizing and hand gesturing. Here we have a nonverbal conversation going on where Mommy holds out a rattle, baby grabs it and holds it up, Mommy opens up her hand and baby drops the rattle into her hand, then Mommy puts it



on her head and baby reaches for it, and so forth and so on. Again, this is for the older child, too. Now we have the third level of visual-spatial thinking and processing where we have two moving objects relating to each other: a moving child and moving objects in the external world, whether rattles or toys or moving faces or just people gesturing back-and-forth to each other. Being able to do this in a continuing way – that we call a “continuous flow” – characterizes the full mastery of stage three, which corresponds to the mastery of two moving objects related to each other in space. It’s a big accomplishment.


Then at stage four we have shared social problem solving where the 14- or 15-month old is taking Mommy by the hand, walking to the refrigerator, and pointing to the food that he wants. Now, from a spatial point of view, the child is seeing pattern recognition – he’s now seeing the world in terms of patterns. He can picture something, literally, in his mind, in terms of a pattern – not necessarily a series of ideas, but where the juice is – so he can take you by the hand and walk with you and then get a number of gestures going back-and-forth as you’re coordinating actions to get to that juice. Or he could want to get a toy from up on a shelf so the child is gesturing for Daddy to pick him up and when he finally does, the child gives him a big smile and a hug and he reaches for the toy he wants. As he’s doing that, he’s appreciating the spatial world in terms of its patterns. Daddy gets recognized by his hat and his briefcase and by the time he comes home from work and by the kind of play he does with the child, and all that becomes consolidated into an image of “Daddy,” but that’s a spatial and visual image of all the different things that Daddy does that the child can see and remember, and his own interactions with Daddy – what he does in space, how he runs up and gives him a hug and a kiss or sits in his lap – all that is now a pattern. So now we have two patterns, both moving in space relating to each other, and an appreciation of the world in terms of patterns, and that’s occurring spatially as well as vocally as well as motorically. So, again, here we see a nice correspondence between visual-spatial processing and the general stages of development. So a child who has trouble tracking, for example, or following an object moving or hasn’t mastered fully the notion of his movements in space vis-à-vis someone else’s movements in space or another moving object in space – he can’t coordinate the two and will have trouble appreciating these interactive patterns. So now we have patterns that are interactive based on two moving objects in space and the relationships between them – that’s a big accomplishment but it requires that the prior accomplishments have been mastered. Remember, it’s not just appreciating Daddy’s pattern and appreciating your own pattern; it’s appreciating the movement between the two of you in a spatial sense – in other words, how we move both in terms of the patterns each of you get involved in, because now the sum is larger than the individual parts. In



other words, picture Fred Astaire and Ginger Rogers dancing – the pattern of the dance together is different from what each one is doing individually. So the whole is now made up of the two parts and there's an appreciation of that in the spatial realm.

Then we get to the next stage of using ideas. Here we're constructing spatial images. Again, we can build a house or build a tower or build a corral with horses in the corral as part of normal pretend play, but with a strong spatial dimension. Now we have patterns that are elevated from just acting out the pattern – going up and hugging Daddy and giving him a big kiss – to actually picturing the pattern in your mind. So before Daddy comes home you can picture Daddy coming home, running up and giving him a big kiss, and you can play that with the dolls so that the baby doll is giving the father doll a big kiss and sitting in his lap, which shows that there's an idea percolating and the idea will have, again, a sequence of actions in space, as well as possibly having a verbal dialog, like “Daddy, I love you,” or “Daddy you're a bad daddy for coming home late,” or whatever. So the spatial dimension is quite important and the more creative it is and the more innovative it is and the broader the range of themes or emotions that are captured in these dramas that have a spatial component, the richer the child's dramas will be. So there's a difference between a child who's developed a great action movie in space versus the child who just has two sedentary characters sitting in chairs, chitchatting with each other, and hopefully the child can do both.

Then we get into the next stage, the fifth stage, which is connecting ideas together logically so the child is answering all the “w” questions and even “why” questions, such as, “Why do you want to go outside?” “Because I want to play.” Now the child can also figure out how to connect visual images and spatial configurations together logically. So the rooms in the house are all interconnected through stairs or through corridors and the upstairs and the downstairs and we have the bedrooms upstairs and there's a place downstairs and there's a garden outside, and it all kind of makes sense and hangs together logically in a spatial sense, not just that there's a dialog or verbal exchange that makes sense. Now the child's making sense spatially as well as verbally, so the child can do more: The child can see relationships and the child can now do one-to-one correspondence and see that one block equals the number “1” – again, that's the relationship between one idea and another idea, something where you see a single object in space and then a word where you put in the word “one” or even better the child can connect the symbol – the number “1” – a visual image – with the actual one block or match up the number “4” with four blocks lying in a row, making a little train. So now we have two spatial images – we have the number “4” that the child recognizes and connects to four blocks: one, two, three, four. So here we're seeing the logical connection




between different spatial images, just like the child connects words and answers why he wants to go outside. So that's an underpinning for math and for much of science and, we think, for understanding the world.

Then we progress up the ladder to multi-causal thinking, where we give many reasons for something; gray-area thinking, where we see all the shades of gray; and, finally, reflective thinking, at ages 7, 8, and 9. Here, too, we see the corresponding visual-spatial thinking. I won't go through these in detail, but I'll give just a few examples. We can see multiple relationships, we can see that four blocks in terms of numbers is equal to four ping pong balls, which is equal to the number "4" written down and we can see what happens, also, when we take two blocks and add two more, and then add two more, so we're seeing multiple logical relationships. Or we can begin doing some multiplication – we have three people and each get two blocks. This gets us into gray-area thinking where we see relative values, so the child can line up the blocks from the biggest to the smallest or from the fattest to the skinniest. The child can now see the differences between five blocks and three blocks and two blocks and one block and he can see them in a relative sense, in other words he doesn't just know there are differences because they have a different label or because there's a different word or he match them up with a different visual image when he sees the actual block, but the child actually understands the degree to which five is bigger than two and bigger than three; that 10 vs. two is a bigger difference than five vs. three, for example, and he can show you with his hands. So he can take a number and show it – you can have five minus two and you say, "What's left?" And he can tell you, "Three!" He can also show you how big that three looks compared to ten minus one, which will look even bigger. So the child can really understand addition and subtraction in a relative sense, the same way he can understand being very angry or a little angry or hardly angry at all, or being very happy or extremely happy.

Then, finally, we have reflective thinking, where the child can judge himself and has a stable sense of himself and can picture himself in the past, present, and future and maybe learn to do things like probability, such as evaluating the likelihood of going to this school or that school, or of having this friend or that friend, or what will happen if he does this or that. There's also some spatial reasoning when it comes to projecting himself in time or space in different locations. Hypothetical, probabilistic reasoning is very spatially oriented because it does involve how we see ourselves in the future, which is a time-space dimension.


We're not going into too much detail about the more advanced stages, but what I wanted to convey today was how each of the stages of functional emotional development



has a corresponding stage in visual-spatial processing and thinking and how the two support each other. So, just to give a concrete example, if a child is weak on tracking and seeing, he's going to have a hard time following Mommy's face as she's taking the bottle and putting it to the left and enticing him to find it in her hand. The child may lose where she is and therefore lose that purposeful two-way communication with her because he's not tracking well and he's also not seeing what she's holding up if she's not hiding it. Similarly, if we help strengthen that ability, we can help strengthen the two-way communication. Also, however, if we make the child a better two-way communicator by using a lot of extra vocalization and high affect, so that the child's really interested in Mommy, he's going to strain to look to the left and the right and he's going to work much harder to track, so even if the child has a tracking weakness he's going to be so motivated by Mommy's high affect that he's going to search all around until he spots her and his tracking is going to improve. This is just like teaching people to play tennis or ice skate when they're really motivated and want to do it and they keep working at it until they finally get it. The nervous system is very plastic and in its early development so something that isn't developing properly does benefit from extra practice and motivation. So they support each other, and it's not just with tracking. With pattern recognition, at stage four also, a daddy who plays with a child for a while and he comes home every night and entices the child to interact, that child is going to master that pattern; but it depends on what Daddy does in space and how he moves across the room and whether the child goes to a daddy who's only home once in a while or who's punitive and doesn't entice and engage with him.

So, each supports the other. The better visual-spatial thinker you are, the easier it is to master the stages, but the better you master the stages, the more you'll be able to use those new intellectual and social skills and emotional interests to practice your visual-spatial processing and to master that, as well.

Now for each of the exercises in the manual, we use this principle to an enormous degree, so that's why we want to practice these exercises in the context of these functional emotional stages of development. So we want to be mobilizing all six stages as much as possible with each exercise we do. If we're doing a motor exercise, like walking turtles or the wheelbarrow walk, we want to be engaging with the child, interacting with the child vocally and motorically while we're holding their feet for the wheelbarrow walk. We want the child to be verbal, creating a fantasy game that we're dinosaurs with a mommy dinosaur holding the baby dinosaur's legs, etc. Really, the fantasy game should be whatever the child enjoys. Then, to work with reflective and logical thinking, we have the child talk about that exercise, was it fun



or not fun, did he like it, and how much did he like it – more than the other one or less than the other one? How did he do it that time compared to how he did it the other times? So here we get into gray-area thinking and reflective thinking with a child who's very verbal and already very abstract, even as we're practicing a simple motor exercise. So for each of these we utilize as many of the first six stages and as many of the next three stages as we can while doing the exercise. Some exercises will lend themselves more easily to this; others, with more difficulty. You're not going to be using all basic six stages or the advanced stages for every exercise, but we get as much "cooking" as we can while doing the visual-spatial task.

So that's what we wanted to cover for today. Thank you for joining us and we'll hope to speak to you again next week.