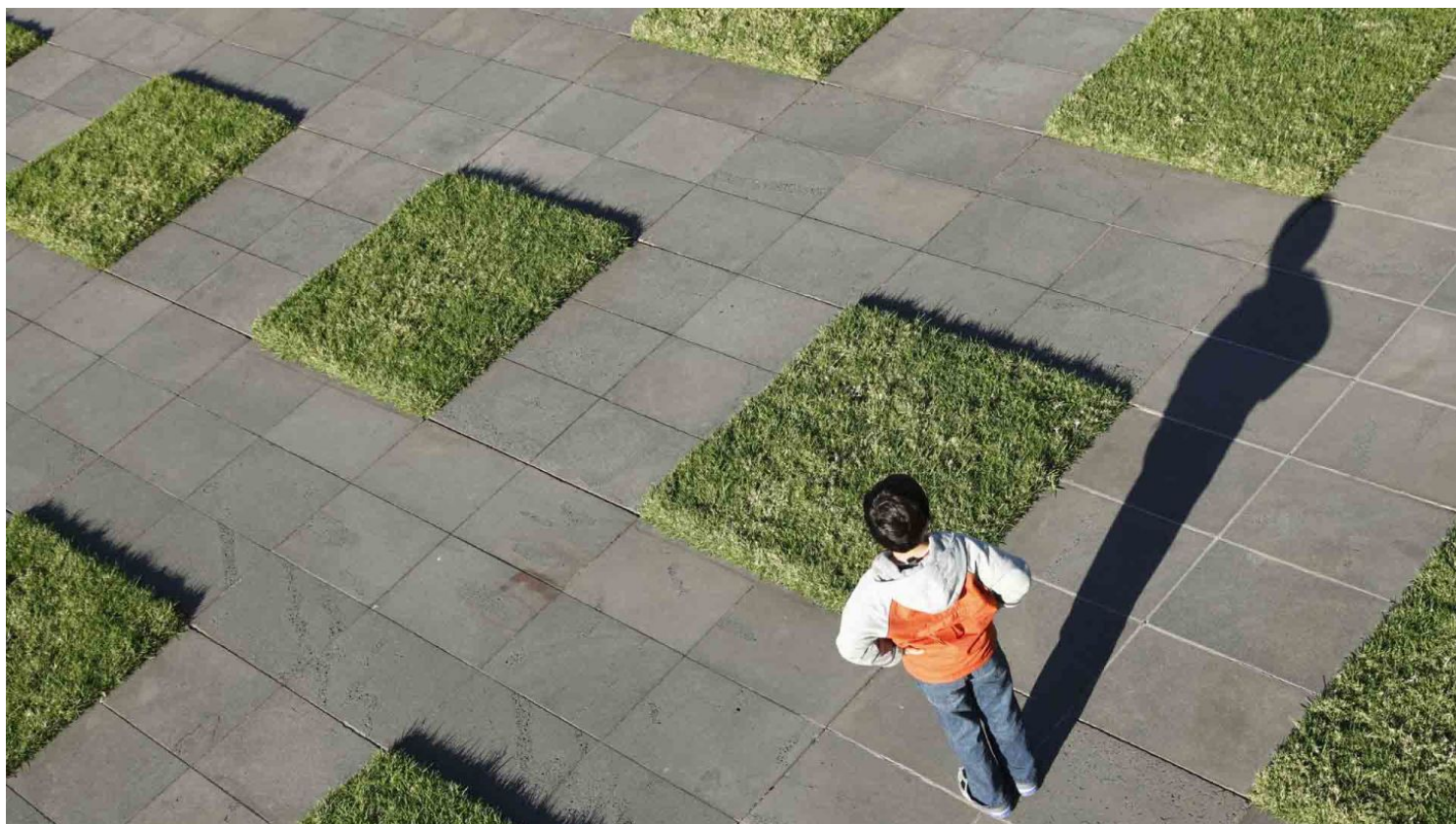


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Steps to Help Foster a Preschooler's Spatial Reasoning Skills

By [Deborah Farmer Kris](#)  Dec 16, 2015



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While boosting kids' math and verbal skills may draw more attention from parents and educators, spatial reasoning skills play an important -- sometimes overlooked -- role in academic and career success. And preschool, it turns out, is a key time to foster children's spatial cognition.

Spatial skills encompass far more than having a good sense of direction, according to Nora Newcombe, a Temple University professor who helps lead the [Spatial Intelligence and Learning Center](#). They include the ability to read maps, diagrams and charts; to correctly

identify, transform and manipulate shapes; to understand how objects relate to one another in space; and to maintain a stable mental representation of an object as it moves.

“We live in a spatial world,” said Newcombe. “The objects we handle are large or small, we move around certain distances, and we turn by certain angles. Thinking about how objects move and change, and how we move among and past objects -- all of this is spatial reasoning.”

By teaching spatial reasoning skills to young children through language and activities, caregivers can help prepare kids to develop those senses for developing other skillsets.

“There is growing evidence that strong spatial reasoning skills in preschool help support math learning in elementary school,” said Newcombe. “Beyond math, spatial thinking is important in and of itself for fostering interest in science, math and technology.”

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In fact, spatial skills “**strongly predict**” who will pursue STEM careers, and -- according to **one study** -- children’s spatial reasoning skills were more predictive of future creativity and innovation in STEM fields than math scores. But learning those skills is not widespread.

“We know spatial skills can be taught and grow with practice and we know that spatial skills predict whether or not kids pursue STEM careers,” said **Julie Dillemath**, a spatial cognition geographer and children's author. “But we don’t systematically teach these skills in schools and a lot of parents aren’t tuned in to this topic.”

That’s fixable, said Newcombe. “It’s very easy, and fun, to do spatial play with your preschoolers, and it will probably make a difference.”

How does one help?

Use Spatial Language

The way young children talk about space is a significant, early **predictor** of their future spatial cognition. According to a **University of Chicago study**, parents vary widely in the amount of spatial language they use with their children -- and this gap has consequences: Children who were exposed to more spatial language during their preschool years **outperformed** their peers on spatial tests years later. Spatial language includes references to shapes (triangle, square),

sizes (tall, wide), features of shapes (corner, edge) and orientation (above, below, near, between).

Parents and preschool teachers can address this language gap by using descriptive language to describe their environment. For example, research suggests that parents can amplify the benefits of **block** and **puzzle** play by using spontaneous **spatial language** with their children such as, “Can you find all the pieces with a flat edge?”

Dillemath recommends playing games such as “hidden treasure,” where the adult hides an object in a room and then give the child step-by-step spatial directions to find it, such as “Walk forward five steps. Turn to your left, towards the couch. Now reach your hand between the pillows.”

Engage in Simple Mapping Activities

Research suggests that children as young as **3 years old** can appreciate the relationship between a map and the physical world.

Dillemath, whose dissertation focused on how small-screen digital maps influence our navigation decisions, said that map reading is not an obsolete skill. “When you look at maps, you are building a mental map. Mental maps are really important because it gives you freedom to navigate where you want to go -- for example, how to take a shortcut, or where to go if your road is blocked.”

Parents can encourage kids to draw maps of familiar places -- such as their bedroom or a favorite playground. Dillemath said she likes to play “map hide and seek” with her preschooler. “First, we draw a map of the house,” she said. “Then I might hide a toy in the cabinet and point to the cabinet on the map.” This prompts the child to make the connection between the 2-D representation of the room and its 3-D counterpart.

Invest in Blocks and Puzzles

Parents who want a simple way to boost preschoolers’ spatial cognition should start with the toy box, said Newcombe. According to a **2015 study** that she co-authored, “children’s play with spatial toys correlates with spatial development.” Specifically, children who regularly play with blocks and jigsaw puzzles have more advanced block design scores than children who play with such toys less often. Her research also found that “females play less with spatial toys than do males, which arguably accounts for males’ spatial advantages.”

Newcombe shared a few rules of thumb for encouraging spatial play. First, procure blocks and puzzles and encourage girls as well as boys to play with them. Second, try to avoid toys that seem either too hard or too easy -- aim for the “stretch” zone. As children improve, give them something to do that is just a little bit harder.

Read Spatially Challenging Picture Books

Reading **spatially challenging picture books** is another way to engage children’s spatial thinking and expose them to spatial language. Look for books that include pictures from various angles or perspectives, that contain **maps** and abundant **spatial language**, or whose illustration require close attention to decipher their meaning -- such as **wordless books**. **According** to Newcombe, “Even though books only contain static pictures, they can help children understand spatial transformations, if adults read them with the children and stimulate their imagination.”

Dillemath said that adults often take spatial skills for granted because we use them all day long. “If you are packing a bag, loading the dishwasher, or playing sports, you pay attention to where things are located in relation to one another. We don’t really think about our spatial skills until we have to assemble a bookcase from IKEA.”

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But, she said, by taking a step back and consciously introducing more spatial play, spatial activities and spatial language into children’s lives, parents and teachers open doors for their future success.

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