Spatial skills higher among those who played with construction-based toys and video games in childhood: study

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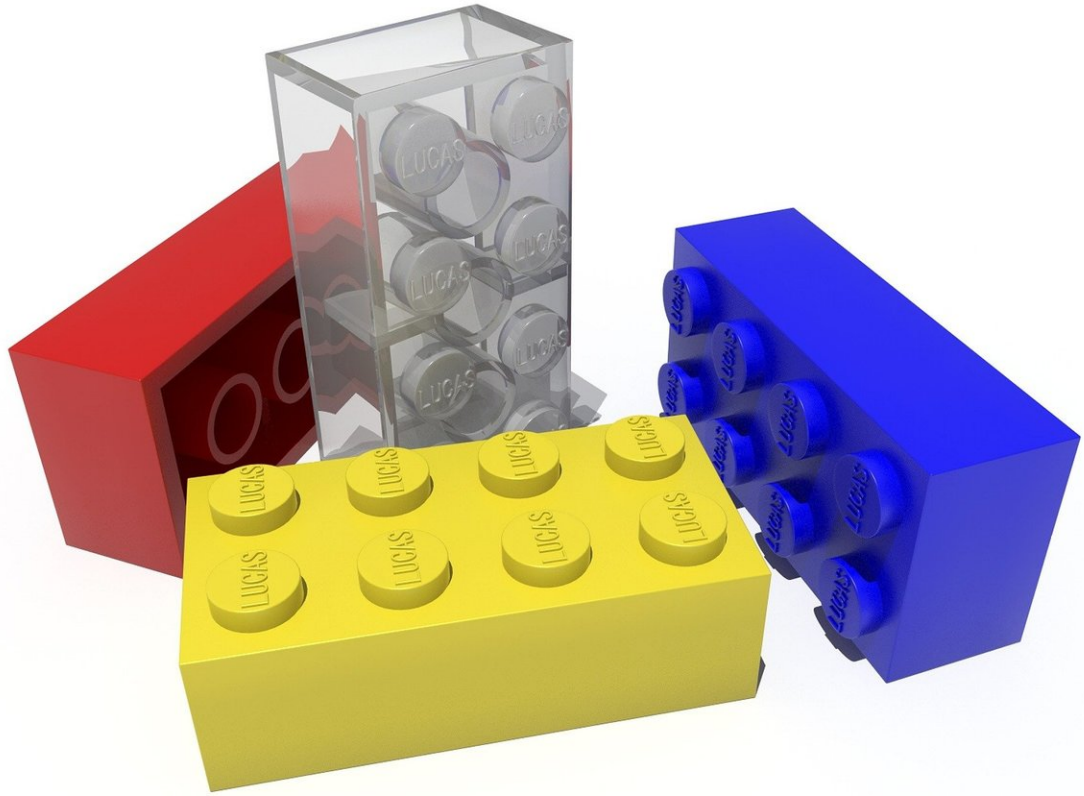

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Childhood play experiences strongly shape a person's spatial skills, according to a new CIRES-led study—those skills can be critical to success in fields like science and engineering. Young adults who played with construction-based toys such as Legos, or with certain types of video games outperformed other peers in tests of spatial reasoning—like the skill needed to mentally rotate objects. And most notably, the new research found that gender differences in spatial skills disappear when the researchers considered the impact of childhood play.

"The human brain is malleable and trainable," said Anne Gold, lead author and director of CIRES Education & Outreach. "By providing spatial training to K-12 children, and providing spatially demanding toys before schooling starts, we can give them the opportunity to develop skills important in fields like science, technology, engineering and math."

The team, who published their work today in *Geosphere*, surveyed hundreds of undergraduate students and found a huge spread in their spatial skills—students scored between 6 and 75 percent correct responses on a written, spatial-knowledge test. This poses a problem: It's difficult to teach a college-level class with so much variability in skill level. Gold and her colleagues sought to explain this contrast because most geologists need strong spatial skills to be successful.

"All of these students completed a K-12 education. If spatial skills were taught in grade school, we wouldn't see this significant spread of skills across the university classroom," said Gold. "Something must be happening earlier in childhood or outside of school that makes some kids better spatial thinkers."

She and colleagues from the University of Colorado Boulder and Carleton College in Minnesota gave written tests to 345 university undergraduates enrolled in geology courses at CU Boulder. Students

tackled multiple-choice questions that required them to mentally rotate obscure shapes, for example, or visualize an object's cross section.

The researchers dissected the influence of several factors on spatial skills scores, including: college major, childhood play patterns, standardized test scores, number of science courses taken, and gender. They found that childhood play patterns made a huge difference:

Spatial skill scores were significantly higher among students who engaged with construction-based toys, and certain video games.

Other studies have shown the influence of childhood play on spatial skills, but Gold's team is the first to show howthe gender difference well described in the literature is mediated through childhood play.

Overall, male students performed better than female students on the test, but the young women and men who played with construction-based toys and video games performed equally well. In other words, when researchers controlled for the impact of childhood play patterns, gender differences disappeared.

The new research highlights the need for more access to spatial training and experiences for girls and women—or for anyone who desires success in a STEM career. In addition to providing spatially engaging toys to young children, Gold also suggests offering spatial trainings in grade school or even adulthood. She has preliminary evidence that people can improve their skills with spatial training, whether they lacked spatial skills in the first place or have just gotten rusty over the years.

"What you choose to do over your life can affect your spatial reasoning," said Gold. "It doesn't need to be video games or Legos specifically—but you should engage in something that's spatially demanding. It can really make a difference."