

Spatial Reasoning and STEM

**STEM
and you**

**Why teach
spatial
reasoning?**

**Any
questions?**

**What is
spatial
reasoning**

**Spatial
reasoning
tools**

**Contact
US**

STEM - What it is and what it isn't.

Officially, it stands for Science, Technology, Engineering, and Mathematics.

However, as we have explained in earlier videos, we think of STEM in a more integrated way.

Regardless of the definition, you are already doing STEM, as we discussed in earlier examples (e.g., water play and building corner).

In this presentation, we want to talk about the importance of spatial reasoning in learning about STEM.

Spatial reasoning is...

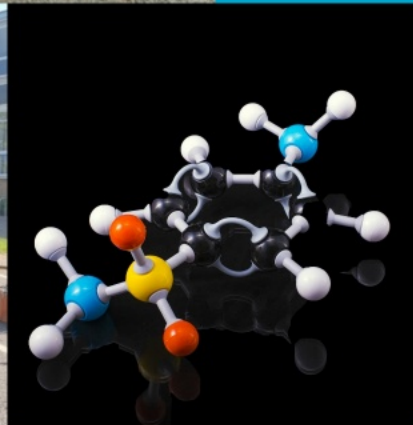
- A broad term for a range of skills
- The mental manipulation of 2D and 3D relations between and within objects
- Used all the time in everyday life
- Used in many STEM tasks

Mental rotation

Perspective-taking

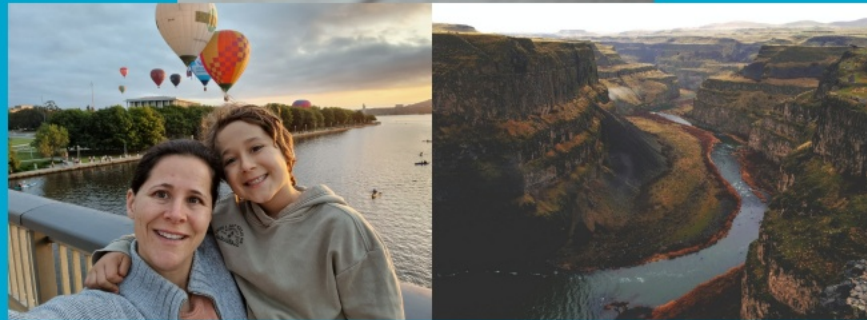
Example: Mental rotation

Imagining an object rotating



Example: Perspective-taking

Imagining viewpoints different from your own



Benefits of teaching spatial reasoning

Research has shown that there are several benefits to teaching spatial reasoning in the early years.

On the next three slides we discuss some of these main benefits.

Improved skills

Improved numeracy

Pathways into STEM

Improved skills

Spatial reasoning skills can be learned and improved.

Spatial reasoning skills are identified in the EYLF and in national curriculum standards:

- spatial awareness and orientation, structure and patterns, representation, spatial language
- active movement, play, and exploration across indoor and outdoor environments.

Improved numeracy

The relation between spatial reasoning and mathematics learning is:

- consistent
- predictive
- strengthens over time

ELSA spatial reasoning skills (e.g., orientation, patterning, and spatial language) are predictive of early mathematics achievement.

Take away message - Improving spatial reasoning skills improves mathematics learning.

The earlier we start the better!

Pathways into STEM

Spatial reasoning skills are the largest predictor of entry into, retention in, and success within, STEM fields.

Low spatial reasoning skills is a barrier to STEM.

Girls are at-risk for having low spatial reasoning skills.

Fostering spatial reasoning skills early can create initial success and interest within STEM, which can have long-lasting and cascading effects by creating pathways into STEM.

Spatial reasoning tools

Spatial reasoning tools are ways to engage children in spatial reasoning. You likely use these in many STEM activities you are already doing.

We want to focus on:

- spatial language
- spatial gestures
- spatial representations

In the next three slides, we explain what each term means and provide examples from the ELSA program.

**Spatial
language**

**Spatial
gestures**

**Spatial
representations**

Spatial language

Words that describe the relation between and within objects. For example:

- **Location and direction:** in, on, behind...
- **Orientations and transformations:** turn, flip...
- **Shapes:** square, triangle, circle...
- **Spatial dimensions:** big, little, wide, narrow...
- **Spatial features and properties:** side, corner...



Spatial gestures

Gestures can include using your hands or body to represent an idea.

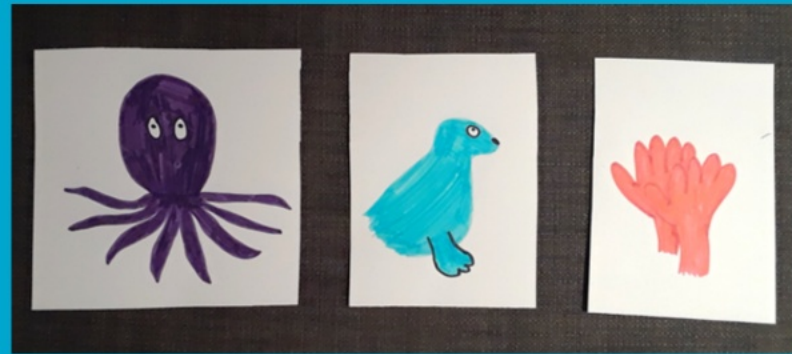
One way gesture helps children (and adults) is by offloading working memory demands into their hands (they don't have to keep the idea in mind because it is represented with their hands).

Another way gesture helps is through embodiment - children understand their world through their actions.



Spatial representation

Representing ideas spatially can help children to better understand spatial concepts.



What would you like to know more about?

- From this presentation?
- In future presentations?
- About the ELSA team and what we do?

Thank you

Today we have spoken about the importance of spatial reasoning in young children's learning.

We hope we've shown you new ways to incorporate spatial reasoning into the STEM activities you already do in your centres.

We hope to see you online again for future presentations - and please look at our earlier presentations.

As parents, and also as a proud "Story Park Grandad", - thanks for all you do for our precious young children.

**Our Contact
Details**

Our contact details

Feel free to explore the ELSA program for your centre – it's full of high-quality STEM resources, and EYLF aligned activities, that can support and extend your existing STEM teaching.

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