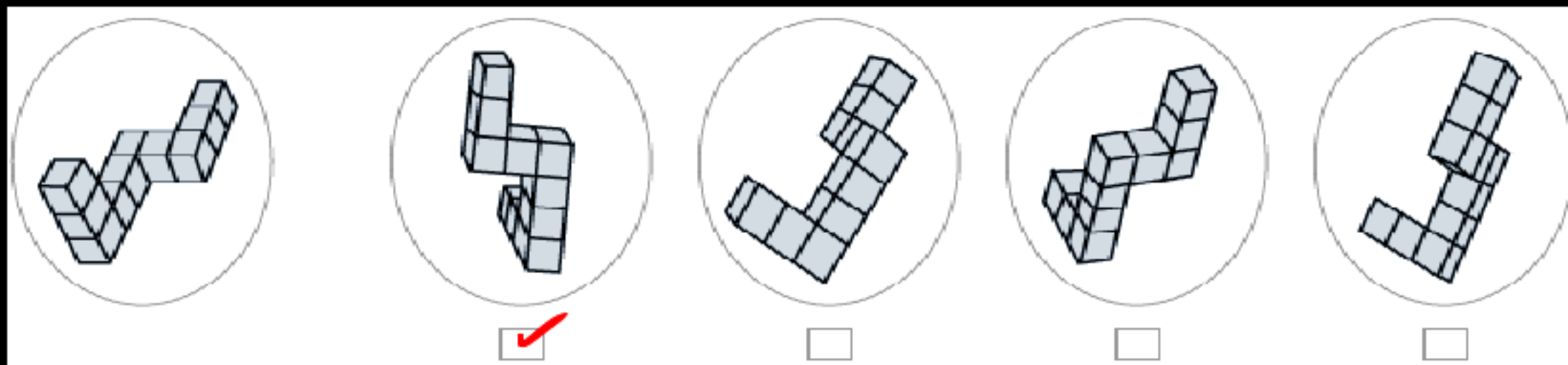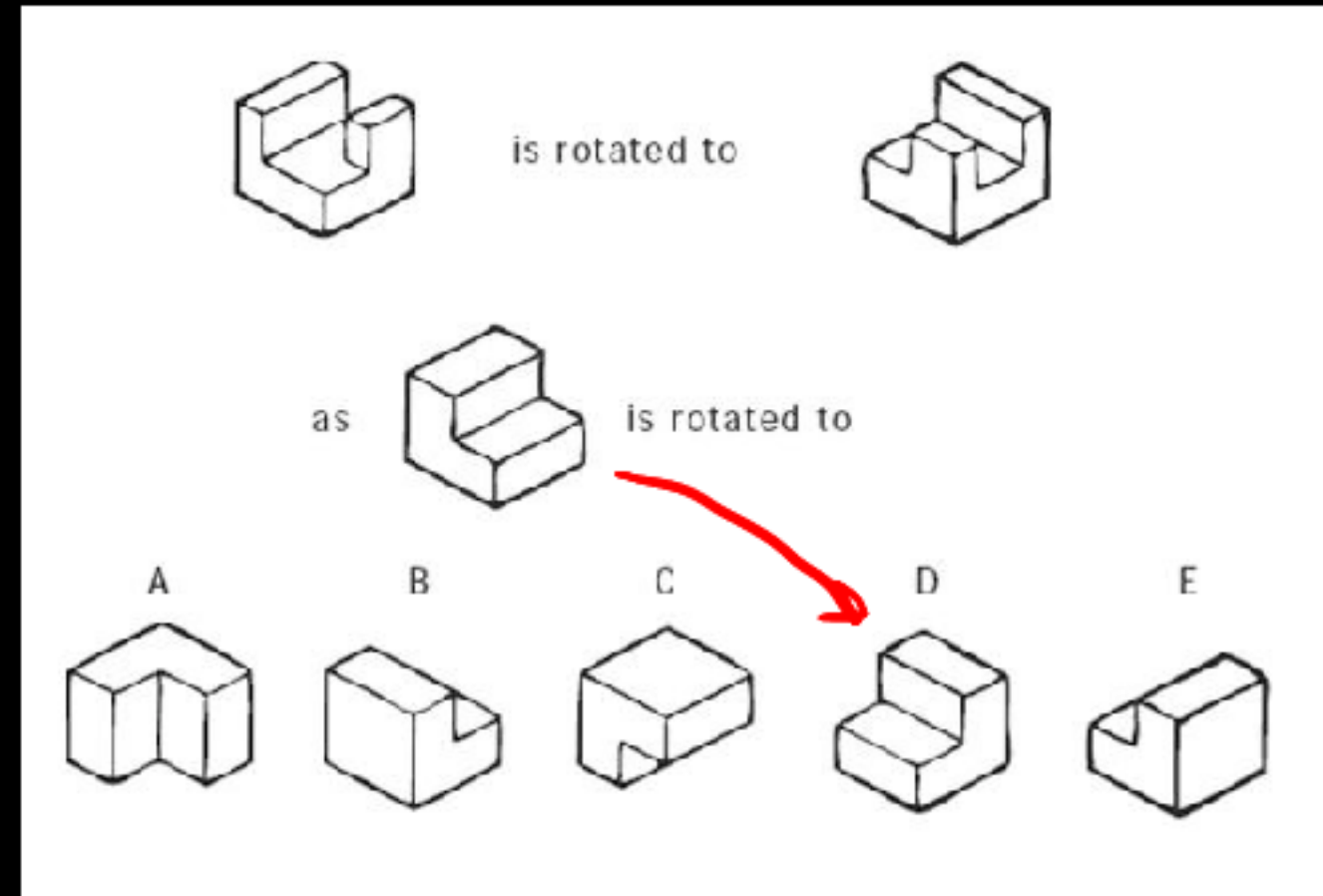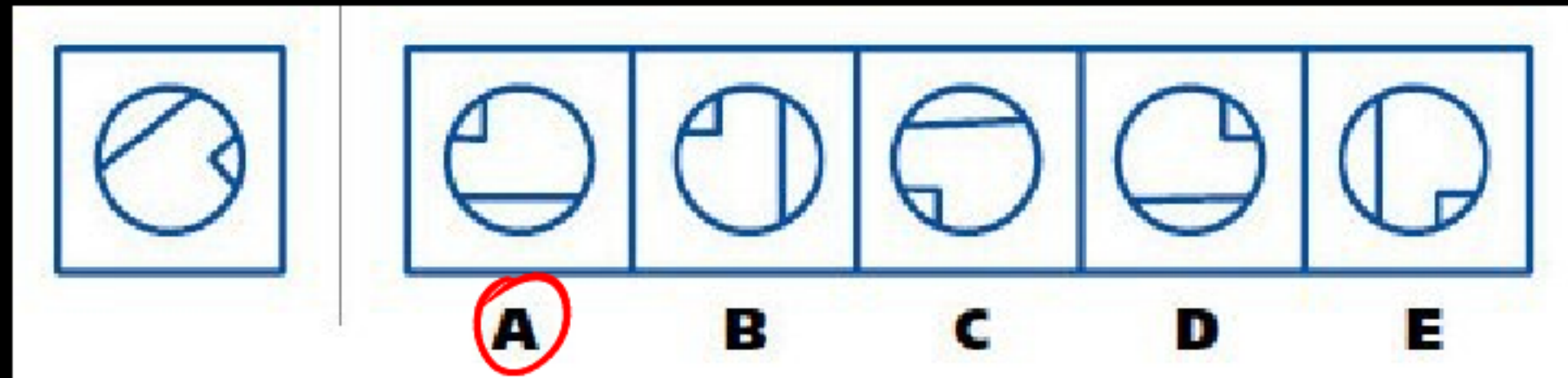# Spatial Reasoning

- The ability to think in terms of spatial information, such as shape and orientation

- Includes

  - Regressing from image to 3D model

  - Representing a concept as a spatial model

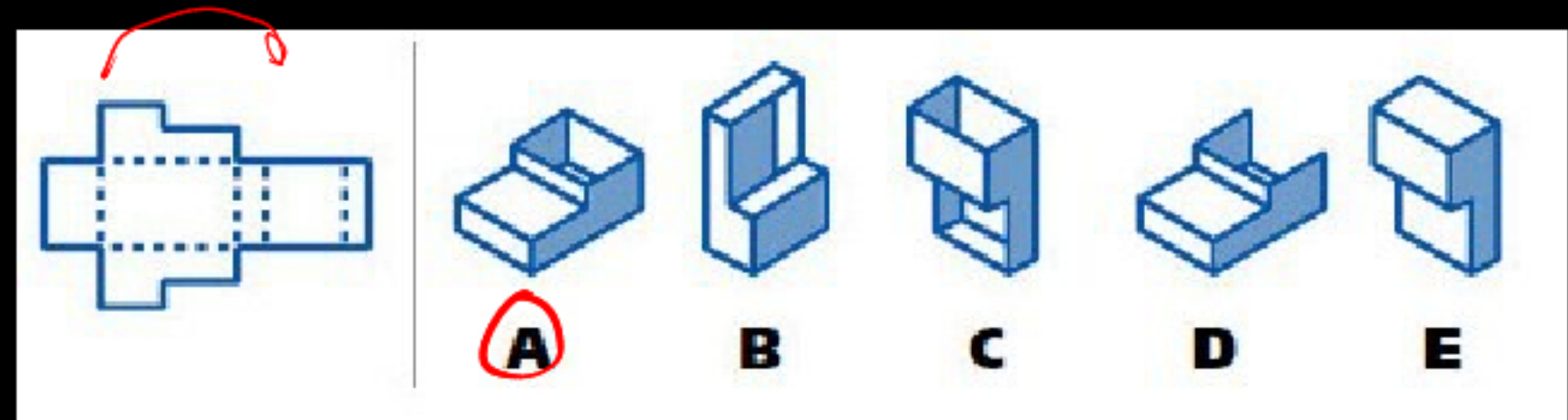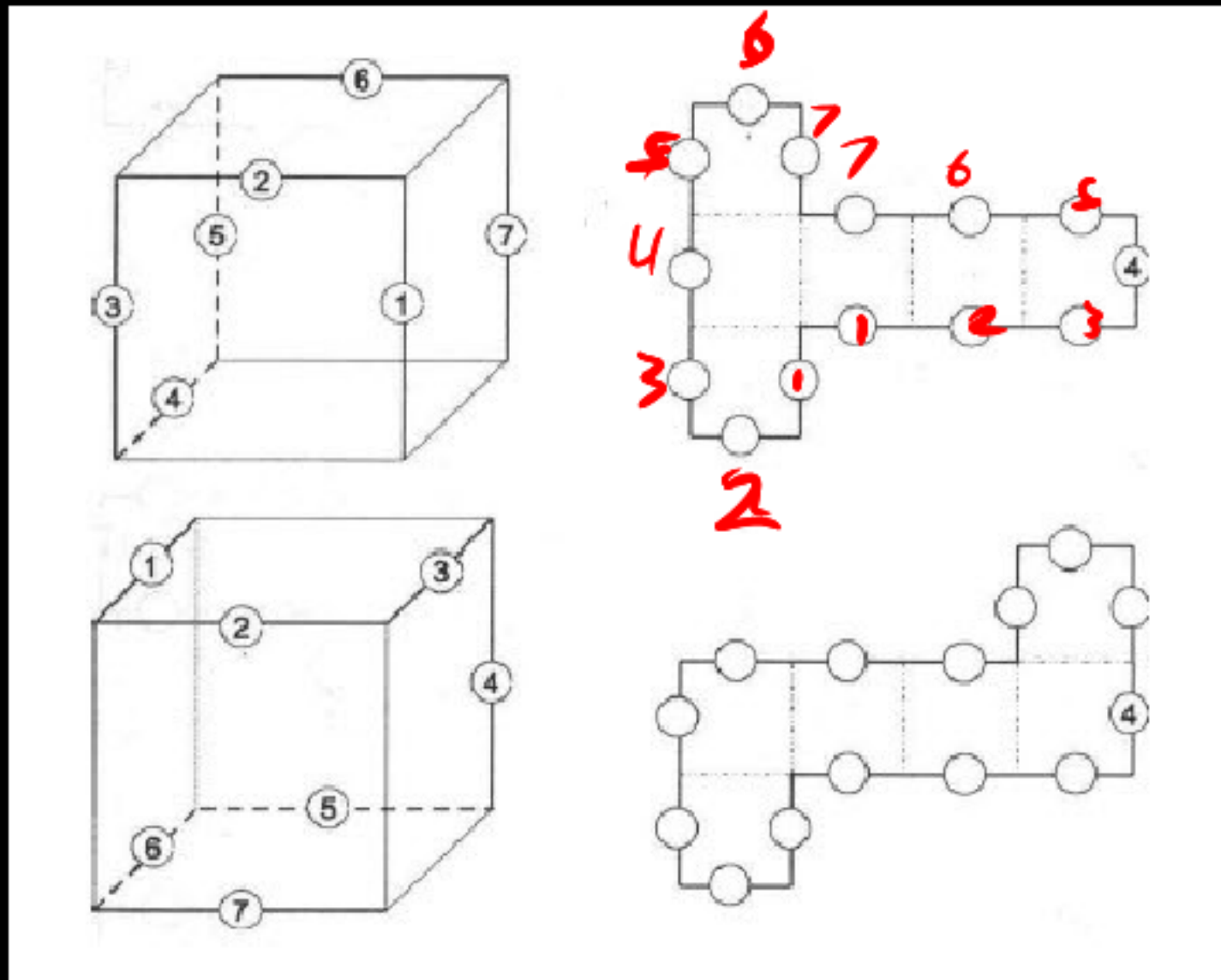 - Manipulating spatial models in the mind

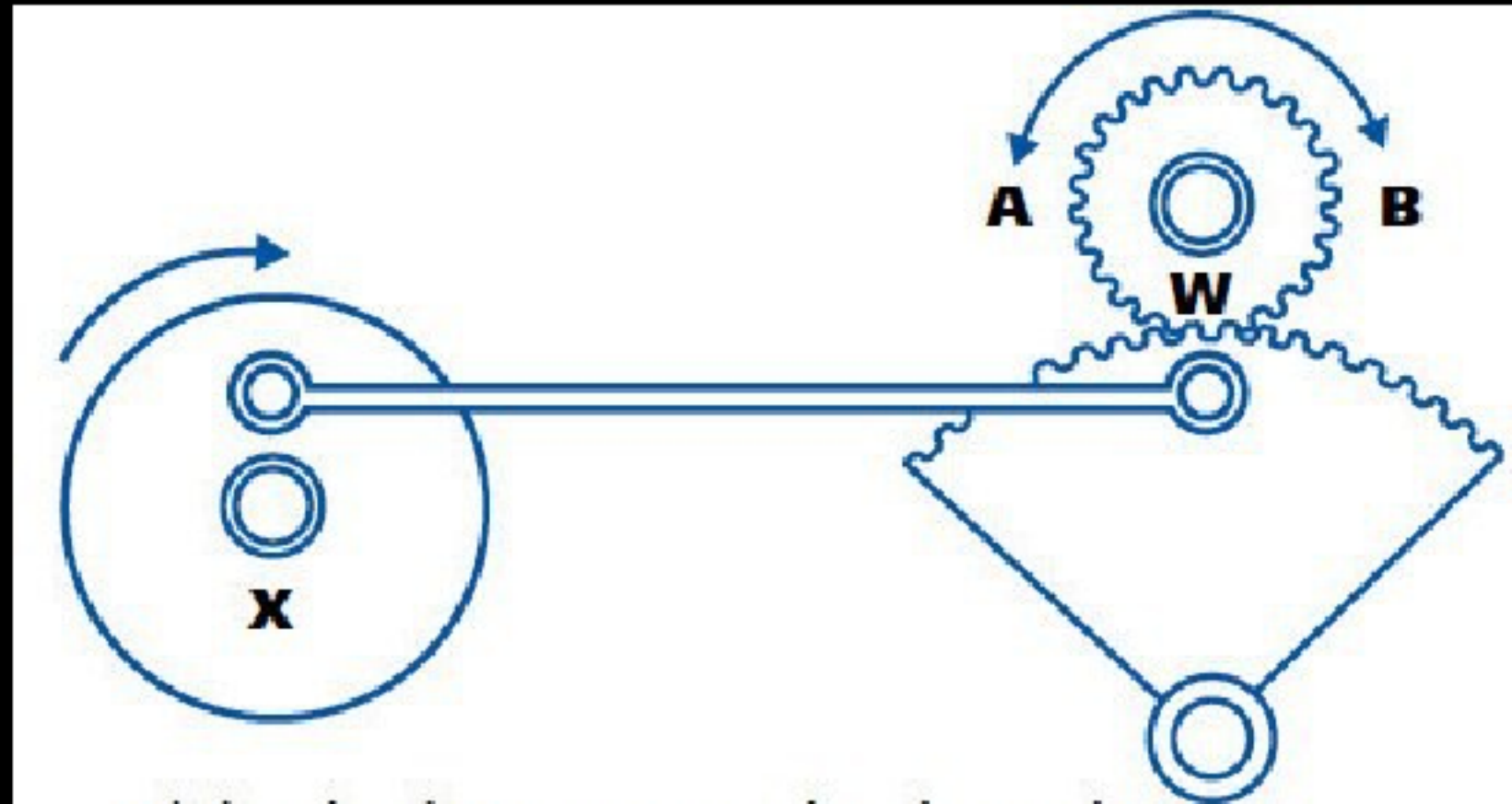# Measuring Spatial Skill

Rotating

Measuring Spatial Skill

Folding

Measuring Spatial Skill

Mechanisms

While wheel **X** turns round and round in the direction shown, wheel **W** turns
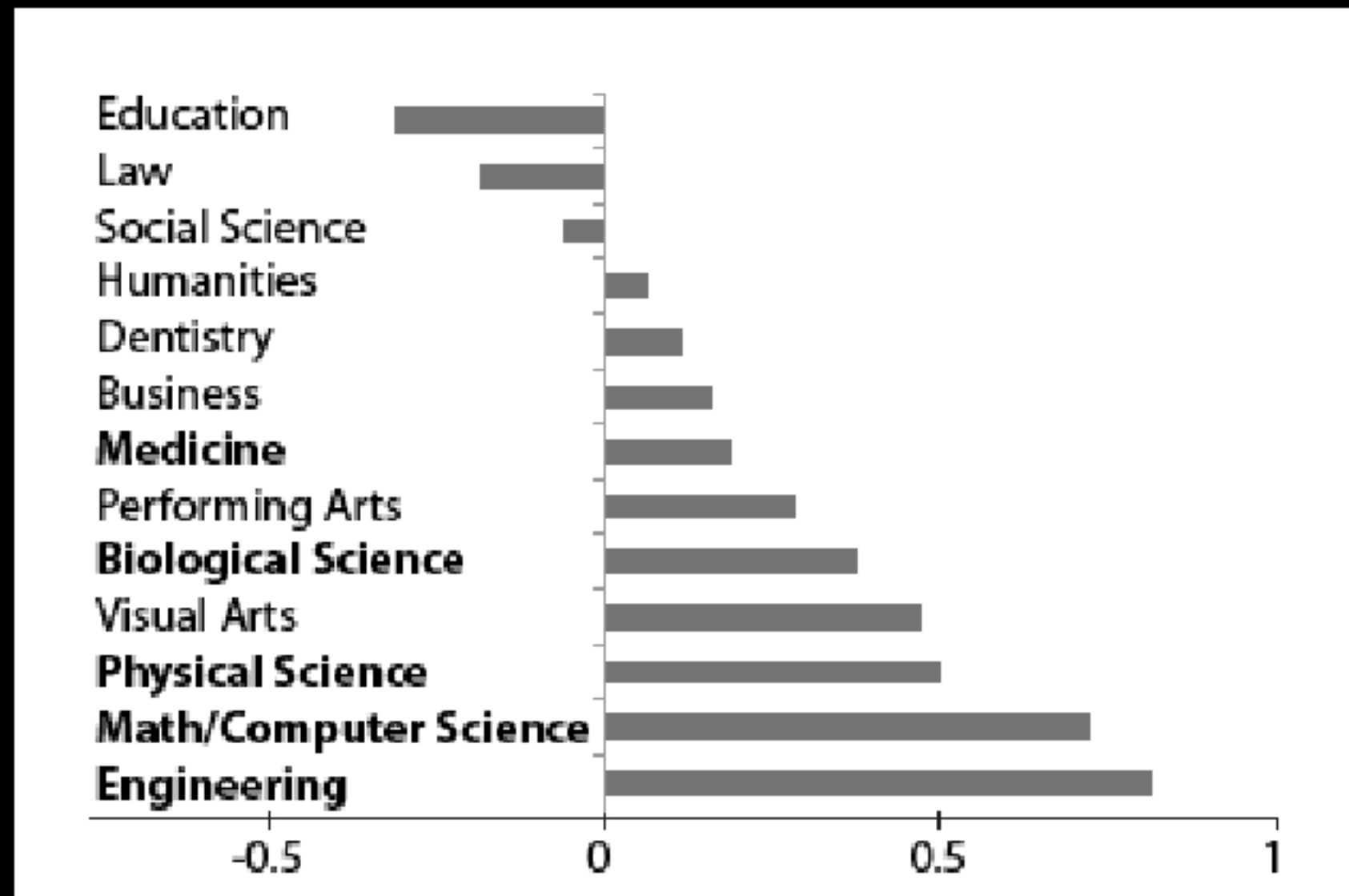   A. in direction **A**.
    B. in direction **B**.
    C. first in one direction and then in the other.

On a scale from 1 to 10,
where 1 is non-spatial fields like singing
and 10 is highly spatial fields like sculpture,
how spatial is computing?

5 8 9 7 7½ 1 8 5 10

Spatial Reasoning in CS

- Correlation between HS spatial ability and career choice

Spatial Reasoning Matters

- Correlates with ability in many fields, including **computing**

- Correlation appears **causative** (increasing spatial reasoning skills has been shown to **increase performance** in related fields, including computing courses)

Why Does it Matter?

- Definitive answer not known

- Some ideas:

  - We **teach** concepts visually

    - Variables = boxes, addresses = arrows, ...

  - Computing **terminology** is visual

    - Stacks, trees, threads, flow, branching, nesting, lining up, moving, addresses, ...

Why, continued

- Challenge: find a **computing concept** that is **not visual** in terminology and that you can explain **without a spatial analogy**

recursion

int/float

binary
addition
modulo