Abstract

The present study analyzed whether individual differences in spatial skill are correlated with event timing and number line bisection ability. It was hypothesized that superior spatial skill is associated with more accurate timing of mental events and number line bisection. The results of a correlational data analysis indicated that scores on the Multidimensional Aptitude Battery are correlated with both number line bisection accuracy and mental event timing accuracy; however, bisection accuracy and timing accuracy are not correlated.

Theoretical Background

Theory of Embodied Cognition

- Cognition is grounded in modality specific systems (Niedenthal et al., 2009)
- Therefore, we understand the world in terms of our experience in an environment that is 3-dimensional, has gravity, etc.
- Predicts that higher order concepts are grounded in a shared spatial ability

Development of Research Question

Rossetti et al. (2005)

Prism adaptation improves mental number bisection performance in neglect patients

Göbel et al. (2006)

After rTMS to posterior parietal lobe, reported number line midpoints were shifted to the right

Casasanto and Boroditsky (2008)

The spatial distance over which an event occurs affects estimations of its duration

Research Question

The present study sought to extend previous research by determining if spatial skill predicts performance on spatially grounded tasks, and whether unrelated spatially grounded tasks rely on the same spatial and motor resources.

It was hypothesized that superior spatial skill would be associated with more accurate timing of mental events and more accurate number line bisection; these results would indicate that unrelated spatially grounded tasks rely on the same spatial resources.

Method Overview

Edinburgh Handedness Inventory (Oldfield, 1971)

5min Quantitative measure of handedness

Multidimensional Aptitude Battery (Jackson, 1984)

10min Part III; Measure of spatial ability

Task 1 in Casasanto and Boroditsky (2008)

11min Measure of event timing accuracy

Task 1 in Göbel et al. (2006)

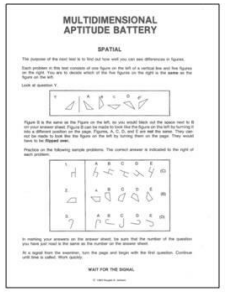
11min Measure of number bisection accuracy

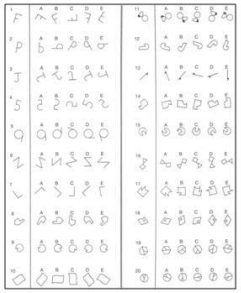
Edinburgh Handedness Inventory

- Determines handedness score by asking hand preference for a variety of activities

Multidimensional Aptitude Battery

- Provides measure of general spatial ability
- Participants asked to mentally rotate 2D objects in a 'multiple choice' format



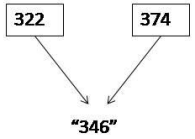


Task 1 in Casasanto and Boroditsky

- Provides measure of event timing skill
- Lines of varying length move across computer screen at varying speeds
- Participants asked to time 'line growth' event

Task 1 in Göbel et al.

- Provides measure of number line bisection ability
- Pairs of 3-digit numbers presented aurally
- Participants asked to bisect the numbers, as quickly as possible, without calculation



Results

MDAB with Scaled Timing Error

$r(26) = -.58$, $p = .002$

MDAB with Number Line Bisection Error

$r(26) = -.54$, $p = .005$

Bisection Accuracy with Timing Accuracy

$r(26) = .19$, *ns*

Discussion: Findings

Performance on the Multidimensional Aptitude Battery was significantly negatively correlated with mental event timing error and mental number line bisection error:

> *As MDAB scores improve, event timing and number bisection accuracy improves*

Mental event timing accuracy and mental number line bisection were not significantly correlated:

> *There is no significant relationship between event timing and number bisection accuracy*

Discussion: Implications

The results of the present study indicate, in accordance with the hypothesis:

- Superior spatial skill is correlated with more accurate timing of mental events and with more accurate number line bisection
- Unrelated spatially grounded tasks rely on the same spatial resources

The results also lend support to a prediction offered by the theory of embodied cognition

References

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