

Children use space to think about time

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Space and time are intertwined in our thoughts, as they are in the physical world. For centuries, philosophers have debated exactly how these dimensions are related in the human mind. According to a paper to appear in the April 2010 issue of *Cognitive Science*, children's ability to understand time is inseparable from their understanding of space.

To probe the relationship between [space](#) and [time](#) in the developing mind, Daniel Casasanto of the Max Planck Institute for [Psycholinguistics](#) in Nijmegen, the Netherlands, and colleagues at the Aristotle University of Thessaloniki and Stanford University showed [children](#) movies of two snails racing along parallel paths for different distances or durations. The children judged either the spatial or temporal aspect of each race, reporting which animal went for a longer distance or a longer time.

When asked to judge distance, children had no trouble ignoring time. But when asked to judge time, they had difficulty ignoring the spatial dimension of the event. Snails that moved a longer distance were mistakenly judged to have traveled for a longer time. Children use physical distance to measure of the passage of time.

Time in language and mind

When English speakers talk about time, they can hardly avoid using spatial words. They hope for short meetings and long vacations. Was children's confusion the result of using words that have both spatial and temporal meanings? Importantly, this study was conducted in Greek-

speaking children. Greek tends to use a different kind of spatial vocabulary for time, describing time as accumulating in 3-dimensional space, rather than extending in linear space. In Greek, it was possible to phrase questions naturally while avoiding any ambiguous words like 'long' or 'short'. Children's responses were not caused by superficial confusions in wording, rather they reflect deeper conceptual links between space and time.

Relativity of psychological time

If time is judged relative to space, do our minds intuitively grasp the same relationship between these dimensions found modern physics? "Einstein posed a similar question to the child psychologist, Piaget", says Casasanto. "But it's unlikely that our intuitions about time are shaped by something as counterintuitive as Einstein's Relativity." Rather, this research shows a different relationship. In the physical world, space and time are theorized to be mutually inseparable. In the mind, however, they are asymmetrically separable. Children can think about space independent of time, but it appears they cannot conceptualize time independent of space.

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