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#### **Authors**

Zaitchik, Deborah  
Solomon, Gregg

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# Inhibitory Mechanisms and Impairment in Domain-Specific Reasoning: Studies of Healthy Elderly Adults and Patients with Alzheimer's Disease

**Deborah Zaitchik (dzaitchiksamet@partners.org)**  
Department of Psychiatry, Massachusetts General Hospital  
Charlestown, MA 02129 USA

**Gregg Solomon (gesolomo@nsf.gov)**  
Division of Research on Learning  
National Science Foundation  
Arlington, VA 22230 USA

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## Domain-specific impairment

Recent studies suggest that reasoning in the conceptual domain of living things is especially vulnerable to impairment due to Alzheimer's disease (AD). It is broadly claimed that AD patients have a progressive, bottom-up impairment in the hierarchical organization of semantic knowledge (e.g., they might have trouble identifying a zebra as a zebra rather than as a horse, but not as an animal rather than as a vegetable). Our finding of the re-emergence of the phenomena of *animism* and the *failure to conserve species* supports the claim that the domain is particularly vulnerable to impairment, but undermines the claim that the degradation of higher order concepts is based on degradation in lower-order concepts. We discuss the likely role that general inhibitory mechanisms play in development.

There is growing understanding that a conceptual domain specifies not only a taxonomy, but also a rich set of causal concepts (Solomon et al., 1996; Zaitchik & Solomon, 2001). Our everyday concepts of living things are organized into a coherent intuitive *theory*. Development in this domain appears to involve the acquisition of two theories – an early *behavioral* theory that focuses on *action* and *movement* – and a later *biological* theory proper that focuses on *bodily processes and the life cycle* (e.g., birth, growth, death).

## Empirical evidence

Using well-established methods from developmental psychology, we discovered the re-emergence of two striking phenomena characteristic of preschoolers' early *behavioral* theory: 1) *animism* – the attribution of life to inanimate but active entities such as the sun and cars (Zaitchik & Solomon, in press); and 2) *the failure to conserve species* – the judgment that an animal can change its species simply by changing its appearance (Zaitchik & Solomon, 2006).

Control tasks from the domains of naïve physics and naïve psychology showed spared performance relative to performance on tasks in the domain of naïve biology (Lombrozo et al., 2007; Zaitchik et al., 2006).

## Failure to inhibit?

We hypothesize that the responses that the early behavioral theory would generate (e.g., attend to autonomous motion) are typically inhibited by the mature concepts of the later *biological* theory. This suggests that old concepts and outgrown theories are never 'overwritten' but continually 'overridden'. If this is right, then inhibitory mechanisms play a crucial role in reasoning, learning, and conceptual change. We conclude by discussing whether the failure in most AD patients of their mature *biological* concepts to inhibit the earlier *behavioral* concepts arises because of the degradation of specific concepts in the domain or because of impairment to more general inhibitory mechanisms.

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