Domain-Specific Knowledge in Human Children and Non-Human Primates: Artifact and Food Kinds

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Introduction

One of the most important things an organism needs to recognize is how to direct its attention. In order to act effectively, an organism needs to focus its attention on properties and events that are relevant to the problem at hand. The task of discovering what information to attend to, and what to ignore, presents a challenge because different types of information must be selected in different situations. For example, a monkey in the canopy searching for a branch to climb on must pay attention to the shape, size, strength, and position of potential branches, ignoring other information such as the color of the branches and smell of the fruit. Later, the same monkey looking for a ripe piece of fruit must attend to color and smell, the very features he disregarded a few seconds earlier. How do organisms decide which features to attend to in order to build effective strategies for classifying the complicated assortment of objects in their world?

Researchers in a number of fields including cognitive development (Gelman 1990; Hirschfeld and Gelman 1994; Keil 1989), evolutionary psychology (Cosmides and Tooby 1994; Pinker 1997), animal cognition (Gallistel 1990; Hauser 2000; Shettleworth 1998), neuropsychology (Caramazza 1998; Santos and Caramazza, in press), anthropology (Sperber 1994), and archaeology (Mithen 1996) have answered this question by appealing to notions of domain-specific constraints on learning. From a domain-specific perspective, the mind consists of a collection of specialized learning systems designed for processing different types of input. Advocates of the domain-specificity view argue that organisms are endowed with domain-relevant content that both biases and guides their attention to conceptually relevant perceptual inputs. The domains that make up an animal's cognitive architecture are thought to have evolved in response to the computational problems that were most salient over the animal's phylogenetic history.

In the past decade, considerable research has investigated the ontogeny of human domains of knowledge (Gelman 1990; Hirschfeld and Gelman 1994; Keil 1989; Keil et al. 1998). Relatively little work, however, has explored whether the domains of knowledge that constitute the human mind are shared with our closest evolutionary relatives, the non-human primates. If accounts of domain-specificity are correct, then many of the domains of understanding that comprise human cognition may be phylogenetically quite ancient and thus, shared by other non-human animals, especially non-human primates. It is also possible, of course, that human evolution led to the emergence of new domain-specific systems (e.g., Mithen 1996).

We have attempted to address this problem by examining how human children and two non-human primate species- captive cotton-top tamarins and free-ranging rhesus monkeys- reason about problems in two different domains. Specifically, we have focused on the features that primates use when categorizing foods and artifacts. Here, we systematically contrast the knowledge about food and artifacts shown by mature tamarins and rhesus monkeys with the human child's developing knowledge of these domains. We argue for important similarities in the ways that these three species reason about objects in these domains.

Children's understanding of the relevant features of artifacts

Human children are surrounded by artifacts from birth. As one might predict from this rich early experience, humans develop some understanding of artifacts at a rather young age. Five-year old children understand which properties are important for classifying artifacts (e.g., shape, rigidity, size) and perceive these as distinctive from the set of features that are important for categorizing other kinds of things such as animals (e.g., color, material composition, surface