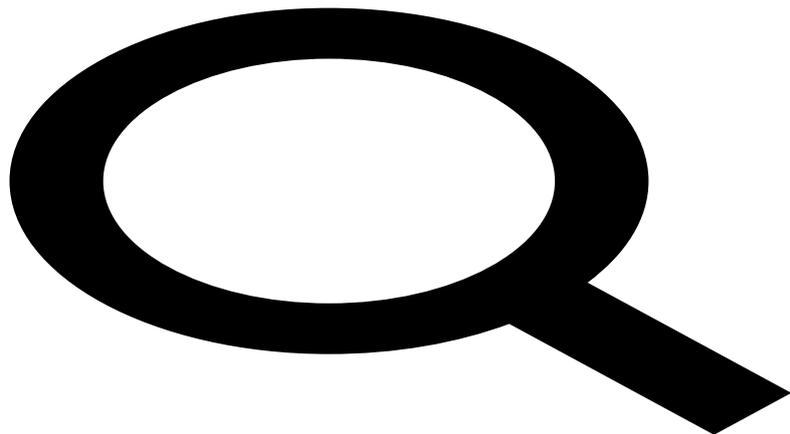


Over the past few decades, there has been a lot of research published on 'psychological essentialism', which has been observed cross-culturally in young children. Essentialism is the tendency to think about animals, plants and social categories in terms of hidden 'essences'. The earliest experiments that indicated psychological essentialism in children were by Frank Keil (1989, [Concepts, Kinds, and Cognitive Development](#), MIT Press, Cambridge, MA) who asked preschoolers what would happen if an animal was surgically altered to look like a member of another species. For example, would a raccoon that is surgically modified to look and smell like a skunk actually be a skunk? Young children believed that the creature would still be a raccoon. Three-year-olds and four-year-olds believe that also an apple seed, planted in a flowerpot would still grow out to be an apple tree, or that a cow raised by foster parent pigs would still exhibit normal bovine behavior (Gelman & Wellman, 1991. *Insides and essences: Early understandings of the non-obvious*. *Cognition*, 38, 213-244). What is more, children are even more essentialist than adults. For instance, Indian preschoolers believe a Brahmin child remains Brahmin, even when raised by untouchables; Five-year-olds believe that French babies brought up by English-speaking parents will grow up to speak French. Essentialism has been documented in several non-western cultures, indicating that this psychological tendency may be a stable part of human cognition (Gelman 2004, [Psychological essentialism in children](#). *Trends in Cognitive Sciences*, 8, 404-409).

This raises the question: Is essentialism restricted to humans, or does it also occur in other species? Obviously, the experimental procedures I just discussed all rely on language, so experimental design should be radically adapted to probe psychological essentialism in other animals. Yesterday, I was observing (in an unsystematic way) my cat's behavior (an adult male), and his behavior motivated me to think that essentialism may have its roots in the way animals make concepts.



Let me elaborate. Since he was a young kitten, Leibniz, my cat, has been playing with balls of various sizes and in various materials. Ping pong balls, small rubber balls with bells, soft, fluffy balls, etc. Whenever he is presented with a ball and he is in a playful mood, he will gently tap the ball with his front paw. Occasionally, he sees a ball that is obviously too large to play with. Even then, he will try to tap the ball with his front paw (as he did a moment after the picture was taken) and gives up only after a few tries.

A similar thing happens with boxes. My cat loves to hide in cardboard boxes and to surprise attack people from there. Sometimes he finds a very small box (for instance, for printing paper). Although he hardly fits in those boxes, he will still try to jump in when he sees one. This leads me to think that my cat may have the concepts BOX and BALL, and that he can disregard the particulars.

Next to my anecdotal observations, there is also scientific evidence to show that animals can create sortal concepts (i.e., concepts of objects that can be counted and identified, such as boxes, bananas and blossoms). A study that probed the responses of individual neurons in mice (Lin et al. 2007, [Neural encoding of the concept of nest in the mouse brain](#). PNAS 104, 6066-6071) indicates that mice have specific neurons that fire whenever they see a nest. It does not matter what size or shape the nest has (e.g., triangular, square), or what material it is made of (e.g., cotton wool, porcelain, metal), only the functional properties of the object are important. Mice can thus abstract from particulars to form a high-level concept. Unsurprisingly, apes have also demonstrated a capacity to represent sortal concepts in diverse experimental procedures (e.g., Mendes, Rakoczy and Call 2008, [Ape metaphysics: Object individuation without language](#). Cognition, 106, 730-749)

Such high-level sortal concepts may be psychological precursors of essentialism. If that is the case, essentialism may have roots in cognitive evolution that are present in many nonhuman animals.