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Does Adult Category Verification Reflect Child-like Concepts?

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Introduction

Category verification tasks require subjects to respond as quickly and as accurately as possible as to whether a particular instance is a member of the given category. The variations in reaction time are then used as evidence for the structure of that category. This paradigm led to the view that category structure is based upon graded relations (e.g. Rosch & Mervis, 1975). More recently it has been argued that a theory-based approach is necessary for categorization (Murphy & Medin, 1985). In particular, children are shown to use naïve theories to guide their conceptual development (Carey 1985; Keil, 1989). But surprisingly developmental trends are not usually followed to the structure of the adult endstate (Coley, 2000).

The present research examines the adult endstate of the category living thing. That is, young children tend to conflate animacy, or generalized movement, with alive, while plants are seen as inanimate things and not as biological entities. Reaction times allow a fine-grained analysis to determine if this developmental foundation is present within the adult structure of living thing. The question is whether the acquisition of a well-developed biological theory completely overwrites the misconceptions of childhood.

Method

In each of three experiments, approximately 30 subjects (undergraduates at the University of Pittsburgh) were asked to confirm or deny in a category verification task whether the presented words represent living things. The words were drawn randomly from lists that reflected theoretically motivated contrasts (see below). Relevant lists were yolk matched according to average word frequency, letter length, and number of syllables. Subjects responded to each word three times across 480 trials.

Experiment 1 tested whether adults would be slower and less accurate in denying that animate things (e.g. cloud, car, etc.) are living than they are denying inanimate things (bed, coat, etc.). Experiment 2 predicted that adults would be slower and less accurate in affirming that plants (tulip, elm, etc.) are living things when compared to animals (robin, tiger, etc.). Experiment 3 differentiated the 'no' responses into four word lists: natural animate (ocean, blizzard, etc.), animate (yacht, airplane, etc.), natural inanimate (mountain, pebble, etc.), and inanimate (napkin, desk,

etc.) things. It was predicted that instances more similar (e.g. natural animate things) to the category living thing would cause more difficulty in denying membership. Experiment 3 was also expected to replicate the findings of Experiments 1 and 2.

Results and Discussion

The predictions for Experiment 1 were supported. Adults were slower, by about 20ms (Paired samples t-test, $t=3.82$, $p<.001$), and less accurate, by more than 4% ($t=6.14$, $p<.001$), in denying animate things in contrast to inanimate things for the category living thing. In Experiment 2, subjects were slower, by more than 50ms ($t=7.52$, $p<.001$), and less accurate, by almost 10% ($t=8.31$, $p<.001$), in affirming plants than animals. These effects were replicated in Experiment 3. In addition, adults had significantly more difficulty with instances that are highly similar to the category of living things, yet cannot be considered members. Subjects were about 50ms ($t=8.07$, $p<.001$) slower and over 12% less accurate ($t=11.95$, $p<.001$) for natural animate instances than for inanimate things. Adults also had some difficulty denying membership to natural inanimate and animate things.

The results provide an intriguing view into the adult endstate for biological knowledge. It seems that feature associations learned early in childhood remain embedded in the adult structure of the category living thing, even after the formation of a well-developed biological theory. Developmental vestiges would seem to be at the heart of the adult category structure. Future work will be aimed at further clarifying these results in light of traditional views on conceptual change.

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