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Brief Report

The development of adaptive memory: Young children show enhanced retention of animacy-related information

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A B S T R A C T

Previous developmental work has indicated that animacy is a foundational ontogenetic category that is given priority already early in life. Here, we investigated whether such priority is also present in children's episodic memory, examining whether young children show enhanced retention of animacy-related information. Kindergartners and younger and older elementary school children were presented with fictitious (non)words (e.g., BULA, LAFE) paired with properties characteristic of humans (e.g., "likes music"), (non-human) animals (e.g., "builds nests"), and inanimate things (e.g., "has four edges") and were asked to rate the animacy status of each nonword. After a retention interval, a surprise recognition test for the nonwords was administered. We found enhanced recognition of nonwords paired with human and animal properties compared with (the same) nonwords paired with inanimate properties. The size of this animacy advantage was comparable across age groups, suggesting developmental invariance of the advantage over the age range examined (i.e., 4–11 years). The results support a functional–evolutionary view on memory, suggesting that already young children's memory is "tuned" to process and retain animacy.

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Introduction

Evolutionary psychologists propose that human cognition evolved through natural selection to solve adaptive problems faced by our ancestors in the *environment of evolutionary adaptedness* (Symons, 1992). Although our ancestors were surely confronted with a variety of problems in their daily lives, problems related to animate—as opposed to inanimate—entities were likely of particular fitness relevance. Indeed, living a harsh and hazardous life in small social groups of hunters and gatherers, it was both necessary and inevitable for our ancestors to interact successfully with animate agents of different kinds, be it to secure mating partners, capture prey, escape predators, or avoid otherwise dangerous animals (e.g., snakes, spiders). Given their ubiquity and often very direct consequences on survival and reproduction, evolutionary psychologists have proposed that such interactions with animate agents exerted strong selection pressure on human cognition, ultimately leading to the evolution of information-processing systems that prioritize the processing of animates and/or animacy-related information (e.g., Barrett, 2005; Nairne, VanArsdall, Pandeirada, Cogdill, & LeBreton, 2013; New, Cosmides, & Tooby, 2007).

Nairne and colleagues (2013) recently tested this proposal by examining the role of animacy in human memory. Using both experimental and nonexperimental procedures, these authors found that animacy is a significant predictor of item recall, with nouns representing animate entities (e.g., baby, duck) being recalled at higher rates than nouns representing inanimate entities (e.g., drum, tent). Notably, this mnemonic animacy advantage remained even when the two stimulus classes were equated—either statistically or experimentally—along a number of potentially relevant dimensions (e.g., word frequency, concreteness, meaningfulness). Subsequent work replicated Nairne and colleagues' original finding and extended it to paired-associate learning (VanArsdall, Nairne, Pandeirada, & Cogdill, 2015) and picture recognition (Bonin, Gelin, & Bugaiska, 2014). To circumvent potential item selection effects, VanArsdall, Nairne, Pandeirada, and Blunt (2013) used the same materials across conditions and manipulated whether information, per se neutral in terms of animacy, was processed as animate or inanimate. Participants were presented with fictitious nonwords (e.g., FRAV, JOTE) paired with properties characteristic of either humans (e.g., believes in God) or inanimate objects (e.g., has sharp edges) and were asked to rate the likelihood that each nonword represented a living or nonliving thing. Following the rating task, participants' retention of the nonwords was assessed using recognition and free recall testing. Consistent across two experiments, nonwords processed as humans were remembered better than (the same) nonwords processed as inanimate objects. Taken together, these findings provide support for the functional–evolutionary view that human memory was shaped by ancestral selection pressures to prioritize the processing of animacy.

Previous work examining the role of animacy in human memory has focused exclusively on adult participants. However, if our memory system is "tuned" to process animacy, such tuning might be present quite early in life. Indeed, evolutionary developmental psychologists emphasize that ancestral selection pressures operated not only on (sexually mature) adults but also—and sometimes even stronger—on (sexually immature) children (e.g., Bjorklund & Pellegrini, 2000). The general argument is that our ancestors needed to survive their pre-reproductive ontogenetic stages before being able to reproduce and pass along their genes to the next generation (the sine qua non of evolution). Given that this could have been a quite difficult task during ancestral times, especially for a slow-developing species such as humans, there should have been evolutionary pressure to select for (early-emerging) cognitive skills that helped children to survive and reach reproductive adulthood (e.g., Volk & Atkinson, 2008). In particular, given the critical role that animate agents should have played for not only adults' but also children's (immediate) survival and (later) reproduction (e.g., Barrett, 2004, 2005), one might hypothesize that an early-emerging cognitive bias toward preferential remembering of animacy would have conferred a (delayed) fitness advantage to children and, thus, been favored by natural selection.

There is some (indirect) evidence in support of this hypothesis, although the issue has not yet been examined directly. For instance, previous developmental research has found that children can distinguish between animate and inanimate entities at a very young age (e.g., Mandler & McDonough, 1998;

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