

ABSTRACT

The success of humans as a species can, in many ways, be attributed to the development of language, tool use and large-scale social organisation through culture. All of these are predicated upon an ability to understand, learn and remember sequences. It has been proposed that humans are better than other animals at doing so. The research



described below is focused specifically on primates, investigating in a broader scope, compared to previous research, how well monkeys, apes and humans can understand the order of performed actions.

THE EVOLUTION OF SEQUENCE COGNITION IN PRIMATES

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METHODOLOGY

The “paper towel task” – the smaller green container reliably hiding a “cop-out” low-value reward. The chimney-like box containing



a high-value reward only after the “AB” sequence combination is demonstrated.

A – a paper towel is inserted into the tube

B – a reward is inserted into the tube

The aim is to realize that a high-value reward is attained when it is inserted and doesn't irretrievably fall into the box through the tube.

OUTCOMES

- Consistent with previous research, it has been found that the squirrel monkeys have the least developed capacity for understanding sequences of the studied primates, often not being able to get past the opt-out training phase. This is linked to their less expanded cerebellum and smaller brain size compared to capuchins and the Great Apes.
- Capuchins follow in ascending order for successful completion of the paper towel task. This is a species that engages in extractive foraging, but not in tool use.
- Interestingly, younger chimpanzees fared better at the task, perhaps because of greater neural plasticity during their development. This is a species with greater sociability, known to use tools.
- Human children were more likely to successfully obtain more high-value rewards the older they were.

The question of human cognitive uniqueness is one that has been put under a lot of academic debate. The characteristics described as distinctively human that allowed our success as a species include language, enhanced cooperation and technical intelligence, all of which are underpinned by human enhanced capacity for sequence cognition (DeCasien et al., 2022: 432-445; Laland and Seed, 2021: 689-716).

Ecological factors and extractive foraging have come to the forefront of understanding the reasons behind primate brain evolution. For example, the spatial distribution of plant nutritional resources is hypothesised to play a major part (Milton, 1981: 534-548) and extractive foraging, most notably, has been found to correlate with larger brains and enhanced cognitive abilities (Barton, 2012: 2097-2107). Even though Great Apes understand the physical and social world in largely the same way as humans, and cognitively operate similarly, humans possess brains three times larger than our closest relatives, the chimps, at 1300cc versus 400cc. Based on other child and primate studies, it has been concluded that humans' social-cognitive skills operate at a much higher capacity than other apes (Tomasello and Herrmann, 2010: 3-8). non-human animals have also been shown to be devoid of a working memory for stimulus sequences (Lind et al., 2023) and the capability to understand and represent the hierarchical structure of sequences is a lot less ample in non-human primates, meaning there is an insurmountable bottleneck for an ability to have language (Conway and Christiansen, 2001: 539-546).



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