**Course Proposal: The Origins and Evolution of Cognition**

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**Course Description**

This course explores the fundamental mechanisms of cognition by using a comparative framework that examines non-human primates, humans in different cultures, and other animal species (e.g. elephants, birds, bees, cetaceans). Throughout the course, we will examine the history of comparative cognition research and its contributions to our knowledge of the evolution of cognition. Students will be exposed to seminal theoretical works as well as recent research articles that cover the variety of methods used in both captivity and the field. Critically, in this course we will consider the practical importance of cognitive abilities in shaping the adaptive behaviour that helps non-human primates (and human ancestors) disentangle social and ecological problems. Lectures will take a discussion-based format where students are encouraged to articulate the theoretical implications of research findings and the significance of these findings for human evolution.

**Course Aims**

The primary objective of this course is to foster an understanding of evolution as applied to cognition, especially how species and cross-cultural comparisons enlighten the origins of human cognition. Students will also learn to apply evolutionary theory to the similarities and differences in the cognitive abilities of humans and animals, with an emphasis on non-human primates.

**Course Outline**

**Part I: Introduction to Primate Cognition**. What is human cognitive evolution? These introductory lectures will encourage students to consider the term ‘intelligence’ as it applies to humans, and the aspects of cognition that make humans unique. We will first discuss the benefits of adopting a comparative approach and the evolutionary processes at play, such as convergent evolution and sexual selection. We will cover the basic principles of animal intelligence, discussing the concepts of complex versus simple mechanisms (i.e. Clever Hans). Looking at the fundamentals of cognition, we will systematically review human and animal cognitive abilities beginning with perception and motivation, before moving on to the precursors of Theory of Mind (such as intentionality attribution and joint attention) in non-human primates and cross-cultural non-verbal infants.

**Part II: Theory of Mind**. We will use Gricean theory to explore the classic examples of uniquely human cognitive paradigms: false-belief and mirror self-recognition. We will also examine tactical deception. Considering evidence from non-human primates, animals, non-Western cultures, autists, and deaf children, we will compare the abilities of non-human primates with non-WEIRD human populations to encourage discussion on the importance of mental state attribution in human cognition and the ecological validity of ToM testing.

**Part III: Intelligence and the Brain**. Here we explore several theories regarding encephalization and the evolution of intelligence. We will debate whether social complexity necessitates cognitive capacities, and examine evidence that diet and ecology play a role in the evolution of cognitive abilities in humans and animals (e.g. birds and cleaner wrasse). Additionally, we will review brain structure in human and non-human primates and its relation to flexibility and other cognitive abilities, particularly intentionality attribution.

**Part IV: Mind Maps and Memory.** In this section, we will examine spatial navigation of wild primates and hunter-gatherer tribes to encourage a discussion of the practical needs for cognitive abilities over the course of human evolution. As part of a broader conversation on cognitive mapping, we will also discuss decision making and future planning, both in humans and wild/captive non-human primates. This will segue into exploring working memory, including counting comprehension and economic decision making in non-human primates and elephants. We will conclude by examining comparative evidence for episodic memory.

**Part V: Tool Use and Cultural Transmission.** What cognitive abilities are involved in tool use and cultural spread? These lectures introduce the complexities of tool use in human ancestors, non-human primates, and other species (e.g. New Caledonian crows and dolphins). Topics include problem-solving, social learning (including mimicry and imitation), cultural conformity, and causal reasoning. We will also discuss recent research on innovation and cumulative culture, and emphasize comparative studies of non-human primates and human children.

**Part VI: Cooperation and Future Directions**. Here we discuss human mutualism and the problem of cheaters, reviewing theories such as the prisoner’s dilemma to illustrate the evolutionary advantages of thwarting cooperation. We examine behaviour such as cooperative problem solving and cooperative hunting (e.g. big cats and eels/grouper) as evidence that animals may have mentalistic capabilities we have not yet measured. We will also discuss the possibility that cooperative behaviour in animals is a product of simpler mechanisms, using artificially intelligent robots that pass false-belief tests as an example. The course will conclude by reviewing the cognitive abilities of non-human primates and their similarities/differences to humans. We will discuss the implications of current and future findings for the origins of cognition: Do non-human primates know what we think they know?

**Sample Reading Material**

Clutton-Brock, T. (2009). *Cooperation between non-kin in animal societies*. Nature, 462(7269), 51-57.

Flombaum, J. I., & Santos, L. R. (2005). *Rhesus Monkeys Attribute Perceptions to Others*.

Current Biology, 15, 447–452

Hare, B., Call, J., & Tomasello, M. (2001). *Do chimpanzees know what conspecifics know?*. Animal Behaviour, 61(1), 139-151.

Heyes, C. & Frith, C. (2014). *The cultural evolution of mind reading*. Science , 344, 1243091.

Janmaat, K. R., Ban, S. D., & Boesch, C. (2013). *Chimpanzees use long-term spatial memory to monitor large fruit trees and remember feeding experiences across seasons*. Animal Behaviour, 86(6), 1183-1205.

Seed A, Tomasello M. (2010). *Primate cognition*. Topics in Cognitive Science, 2, 407-419.

Shettleworth SJ. (2001). *Animal cognition and animal behaviour*. Animal Behaviour, 61, 277-286.

Whiten, A., Horner, V., & De Waal, F. B. (2005). *Conformity to cultural norms of tool use in chimpanzees*. Nature, 437(7059), 737-740.