PS5012: The Origins of Human Cognition

'The baby, assailed by eye, ear, nose, skin and entrails at once, feels it all as one great blooming, buzzing confusion'

James. 1890. I. 488

How do we come to parse the 'blooming buzzing confusion' of our physical and social environments into meaningful representations? In the physical world are objects, their properties and the causal underpinnings of their interactions. The social world contains agents, their actions, and the mental states (e.g. beliefs, desires, intentions) behind them. This course will examine the extent to which these features are processed by developing humans and other animals during problem solving, and investigate the evidence for the proximate mechanisms underlying the abilities seen. Are pre-verbal infants and non-verbal animals restricted to using sensory/perceptual information when interacting with their environment, or can we see the origins of conceptual/abstract representations before the emergence of language? What can their competence tell us about how cognition has evolved?

This course will deal with some of the most controversial and thorny issues in comparative cognitive science. For each of the readings you are encouraged to prepare a single page document summarising the main points and outlining points for clarification and discussion. During the afternoon sessions there will be time to complete the reading if needed. We will explore the material through a mixture of demonstrations, exercises, and discussion sessions where each member of the group will present an informal 5-10 minute summary and some questions for discussion from one of the required readings.

Background reading:

Carey, S. (2011). Précis of The Origin of Concepts. *Behavioral and Brain Sciences, 34*(3), 113-124. doi:10.1017/S0140525X10000919
https://www.harvardlds.org/wp-content/uploads/2018/05/Carey.-2011.-Precis-of-the-origin-of-concepts.pdf

Gelman, S. A. (2008). Learning from Others: Children's Construction of Concepts. *Annual Review of Psychology, 60*(1), 115-140. doi:10.1146/annurev.psych.59.103006.093659
https://www.annualreviews.org/doi/pdf/10.1146/annurev.psych.59.103006.093659

Seed, A. M., & Mayer, C. M. P. (2017). Problem Solving. In J. Call (Ed.), *APA Handbook of Comparative Psychology: Vol. 2. Perception, Learning, and Cognition*: APA.

Assessment:

The module will be continuously assessed: - 25% from a 1000 word summary of a debate position, 75% of the mark will come from a 3000 word review essay.

Debate position: In the first session, you will be assigned to the role of supporting or opposing one of the following two articles. We will hold the debates in session 5. Before then, you need to prepare a 1000 word summary of your argument, which will be assessed.

1. Tomasello, M., Carpenter, M., Call, J., Behne, T., & Moll, H. (2005). Understanding and Sharing Intentions: The Origins of Cultural Cognition. Behavioral and Brain Sciences, 28(5), 675-735.
2. Penn, D. C., Holyoak, K. J., & Povinelli, D. J. (2008). Darwin's Mistake: Explaining the Discontinuity Between Human and Nonhuman Minds. Behavioral and Brain Sciences, 31(2), 109-130.

Essay: Discuss the evidence that human cognition is unique with respect to:

- Representing objects and their properties
- Causal reasoning
- Insight
- Inference
- Representing agents and intentions

Aims and Objectives:

- To understand research methods by becoming familiar with current literature.
- To realise limits in methods and theory through critical evaluation.
- To formulate new studies to advance the field.
- To debate the extent to which problem-solving is underpinned by conceptual thought and reasoning in humans and other animals.
- To communicate a reasoned argument grounded in evidence and current theory both verbally and in writing.

Week	*Content*	*Afternoon Session*
1	Introduction, Objects	Designing an experiment
2	Causality	Designing a poster
3	Insight and reasoning	Writing a press release
4	Agents and Intentions	Class discussion
6	Debates	
8	Essay deadline	

Session 1: *Introduction to the study of the origins of conceptual thought: The case of objects and their properties.*

Afternoon session: Experimental design practical.

Required reading -

1. Spelke, E. S., Breinlinger, K., Macomber, J., & Jacobson, K. (1992). Origins of Knowledge. *Psychological Review, 99*(4), 605-632.
2. Santos, L. R. (2004). 'Core Knowledges': A Dissociation Between Spatiotemporal Knowledge and Contact-Mechanics in a Non-Human Primate? *Developmental Science, 7*(2), 167-174.
3. Hood, B., Carey, S., & Prasada, S. (2000). Predicting the Outcomes of Physical Events: Two-Year-Olds Fail to Reveal Knowledge of Solidity and Support. *Child Development, 71*(6), 1540-1554.
4. Keen, R., & Shutts, K. (2007). Object and event representation in toddlers. In C. von Hofsten & K. Rosander (Eds.), *Progress in Brain Research* (Vol. 164, pp. 227-235): Elsevier.

Background/Additional reading
Object representation as a central issue in cognitive science
Laurie R. Santos & Bruce M. Hood
https://www.researchgate.net/profile/Bruce_Hood/publication/252633591_Object_representation_as_a_central_issue_in_cognitive_science/links/5576ff3a08ae7536375388b9/Object-representation-as-a-central-issue-in-cognitive-science.pdf

Session 2: *Causality*

Afternoon session: Designing a poster

Required Reading –

1. Blaisdell, A. P., Sawa, K., Leising, K. J., & Waldmann, M. R. (2006). Causal Reasoning in Rats. *Science, 311*(5763), 1020-1022.
2. Völter, C. J., Sentís, I., & Call, J. (2016). Great apes and children infer causal relations from patterns of variation and covariation. *Cognition, 155*, 30-43. doi:https://doi.org/10.1016/j.cognition.2016.06.009
3. Schulz, L. E., Gopnik, A., & Glymour, C. (2007). Preschool children learn about causal structure from conditional interventions. *Developmental Science, 10*(3), 322-332.
4. Buchanan D. W., & Sobel D. M. (2011). Mechanism-Based Causal Reasoning in Young Children. *Child Development, 82*(6), 2053-2066. doi:10.1111/j.1467-8624.2011.01646.x
5. Taylor, A. H., Cheke, L. G., Waismeyer, A., Meltzoff, A. N., Miller, R., Gopnik, A., . . . Gray, R. D. (2014). Of babies and birds: complex tool behaviours are not sufficient for the evolution of the ability to create a novel causal intervention. *Proceedings of the Royal Society B: Biological Sciences, 281*(1787). doi:10.1098/rspb.2014.0837

Background/Additional reading

Völter C.J, & Call, J. (2017) Causal and Inferential Reasoning in Animals In J. Call (Ed.), *APA Handbook of Comparative Psychology: Vol. 2. Perception, Learning, and Cognition*: APA.

http://dx.doi.org/10.1037/0000012-029

Session 3: *Insight and reasoning*

Afternoon session: Science in the popular press

Required reading -

1. Taylor, A. H., Medina, F. S., Holzhaider, J. C., Hearne, L. J., Hunt, G. R., & Gray, R. D. (2010). An Investigation into the Cognition Behind Spontaneous String Pulling in New Caledonian Crows. *PLoS ONE, 5*(2), e9345.
2. Loissel E, Cheke LG, Clayton NS (2018) Exploring the relative contributions of reward-history and functionality information to children's acquisition of the Aesop's fable task. PLoS ONE 13(2): e0193264. https://doi.org/10.1371/journal.pone.0193264
3. Logan CJ, Jelbert SA, Breen AJ, Gray RD, Taylor AH (2014) Modifications to the Aesop's Fable Paradigm Change New Caledonian Crow Performances. PLoS ONE 9(7): e103049. https://doi.org/10.1371/journal.pone.0103049
4. Call, J. (2007). Apes know that hidden objects can affect the orientation of other objects. *Cognition, 105*(1), 1-25. https://doi.org/10.1016/j.cognition.2006.08.004

Background reading
Shettleworth, S. J. (2009). Animal Cognition: Deconstructing Avian Insight. *Current Biology, 19*(22), R1039-R1040.
https://doi.org/10.1016/j.cub.2009.10.022

Session 4: *Agents and Intentions*

Afternoon session: Discussion of papers

1. Call, J., Hare, B., Carpenter, M., & Tomasello, M. (2004). 'Unwilling' Versus 'Unable': Chimpanzees' Understanding of Human Intentional Action. *Developmental Science, 7*(4), 488-498.
2. Saxe, R., Tenenbaum, J. B., & Carey, S. (2005). Secret Agents: Inferences About Hidden Causes by 10- and 12-Month-Old Infants. [doi:10.1111/j.1467-9280.2005.01649.x]. *Psychological Science, 16*, 995-1001.
3. Meltzoff, A. N., Waismeyer, A., & Gopnik, A. (2012). Learning about causes from people: Observational causal learning in 24-month-old infants. *Developmental Psychology, 48*(5), 1215-1228. http://dx.doi.org/10.1037/a0027440
4. Bering, J. M., & Parker, B. D. (2006). Children's attributions of intentions to an invisible agent. *Developmental Psychology, 42*(2), 253-262. doi:10.1037/0012-1649.42.2.253

Background/Further reading:
Kaminski, J. (2017). Mind reading in animals? In J. Call, G. M. Burghardt, I. M. Pepperberg, C. T. Snowdon, & T. Zentall (Eds.), *APA handbooks in psychology. APA handbook of*

comparative psychology: Perception, learning, and cognition (pp. 723-744). Washington, DC, US: American Psychological Association. http://dx.doi.org/10.1037/0000012-032

Session 5: *Debates*

Discussion of 2 theories of human uniqueness. We will have 2 debates - using 2 BBS articles: **These are long articles, please leave plenty of time to read them!**

3. Tomasello, M., Carpenter, M., Call, J., Behne, T., & Moll, H. (2005). Understanding and Sharing Intentions: The Origins of Cultural Cognition. Behavioral and Brain Sciences, 28(5), 675-735.
4. Penn, D. C., Holyoak, K. J., & Povinelli, D. J. (2008). Darwin's Mistake: Explaining the Discontinuity Between Human and Nonhuman Minds. Behavioral and Brain Sciences, 31(2), 109-130.

In each case proposers will put forward the argument made by the authors, and then opponents to argue against the 'motion' using a combination of the responses and their own critique. The first debate will be at 9, the second at 2. Half of the class will participate in each debate, the other half will listen and ask questions.