

Andrew Whiten - selected references

- 1 Whiten, A. (2014). Animal behaviour: Incipient tradition in wild chimpanzees. *Nature*, 514, 178-179.
- 2 Whiten, A. (2013). Behavioural biology: Archaeology meets primate technology. *Nature*, 498, 303-305.
- 3 Whiten, A. (2013). Monkeys, apes, imitation and mirror neurons. *Cortex*, 49, 2941-2943.
- 4 Whiten, A. & Erdal, D. (2012). The human socio-cognitive niche and its evolutionary origins. *Philosophical Transactions of the Royal Society.B: Biological Sciences*, 367, 2119-2129.
Notes: Hominin evolution took a remarkable pathway, as the foraging strategy extended to large mammalian prey already hunted by a guild of specialist carnivores. How was this possible for a moderately sized ape lacking the formidable anatomical adaptations of these competing 'professional hunters'? The long-standing answer that this was achieved through the elaboration of a new 'cognitive niche' reliant on intelligence and technology is compelling, yet insufficient. Here we present evidence from a diversity of sources supporting the hypothesis that a fuller answer lies in the evolution of a new socio-cognitive niche, the principal components of which include forms of cooperation, egalitarianism, mindreading (also known as 'theory of mind'), language and cultural transmission, that go far beyond the most comparable phenomena in other primates. This cognitive and behavioural complex allows a human hunter-gatherer band to function as a unique and highly competitive predatory organism. Each of these core components of the socio-cognitive niche is distinctive to humans, but primate research has increasingly identified related capacities that permit inferences about significant ancestral cognitive foundations to the five pillars of the human social cognitive niche listed earlier. The principal focus of the present study was to review and integrate this range of recent comparative discoveries
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- 5 Whiten, A., Hinde, R. A., Laland, K. N., & Stringer, C. B. (2011). Culture evolves. *Philos.Trans.R.Soc.Lond B Biol.Sci.*, 366, 938-948.
Notes: Culture pervades human lives and has allowed our species to create niches all around the world and its oceans, in ways quite unlike any other primate. Indeed, our cultural nature appears so distinctive that it is often thought to separate humanity from the rest of nature and the Darwinian forces that shape it. A contrary view arises through the recent discoveries of a diverse range of disciplines, here brought together to illustrate the scope of a burgeoning field of cultural evolution and to facilitate cross-disciplinary fertilization. Each approach emphasizes important linkages between culture

and evolutionary biology rather than quarantining one from the other. Recent studies reveal that processes important in cultural transmission are more widespread and significant across the animal kingdom than earlier recognized, with important implications for evolutionary theory. Recent archaeological discoveries have pushed back the origins of human culture to much more ancient times than traditionally thought. These developments suggest previously unidentified continuities between animal and human culture. A third new array of discoveries concerns the later diversification of human cultures, where the operations of Darwinian-like processes are identified, in part, through scientific methods borrowed from biology. Finally, surprising discoveries have been made about the imprint of cultural evolution in the predispositions of human minds for cultural transmission

- 6 Whiten, A. (2011). The scope of culture in chimpanzees, humans and ancestral apes. *Philos.Trans.R.Soc.Lond B Biol.Sci.*, 366, 997-1007.
Notes: More studies have focused on aspects of chimpanzee behaviour and cognition relevant to the evolution of culture than on any other species except our own. Accordingly, analysis of the features shared by chimpanzees and humans is here used to infer the scope of cultural phenomena in our last common ancestor, at the same time clarifying the nature of the special characteristics that advanced further in the hominin line. To do this, culture is broken down into three major aspects: the large scale, population-level patterning of traditions; social learning mechanisms; and the behavioural and cognitive contents of culture. Each of these is further dissected into subcomponents. Shared features, as well as differences, are identified in as many as a dozen of these, offering a case study for the comparative analysis of culture across animal taxa and a deeper understanding of the roots of our own cultural capacities
- 7 Whiten, A., McGuigan, N., Marshall-Pescini, S., & Hopper, L. M. (2009). Emulation, imitation, over-imitation and the scope of culture for child and chimpanzee. *Philos.Trans.R.Soc.Lond B Biol.Sci.*, 364, 2417-2428.
Notes: We describe our recent studies of imitation and cultural transmission in chimpanzees and children, which question late twentieth-century characterizations of children as imitators, but chimpanzees as emulators. As emulation entails learning only about the results of others' actions, it has been thought to curtail any capacity to sustain cultures. Recent chimpanzee diffusion experiments have by contrast documented a significant capacity for copying local behavioural traditions. Additionally, in recent 'ghost' experiments with no model visible, chimpanzees failed to replicate the object movements on which emulation is supposed to focus. We conclude that chimpanzees rely more on imitation and have greater cultural capacities than previously acknowledged. However, we also find that they selectively apply a range of social learning processes that include emulation. Recent studies demonstrating surprisingly unselective 'over-imitation' in children suggest that children's propensity to imitate has been underestimated too. We discuss the

implications of these developments for the nature of social learning and culture in the two species. Finally, our new experiments directly address cumulative cultural learning. Initial results demonstrate a relative conservatism and conformity in chimpanzees' learning, contrasting with cumulative cultural learning in young children. This difference may contribute much to the contrast in these species' capacities for cultural evolution

- 8 Whiten, A. & Mesoudi, A. (2008). Review. Establishing an experimental science of culture: animal social diffusion experiments. *Philosophical Transactions of the Royal Society.B: Biological Sciences*, 363, 3477-3488.
Notes: A growing set of observational studies documenting putative cultural variations in wild animal populations has been complemented by experimental studies that can more rigorously distinguish between social and individual learning. However, these experiments typically examine only what one animal learns from another. Since the spread of culture is inherently a group-level phenomenon, greater validity can be achieved through 'diffusion experiments', in which founder behaviours are experimentally manipulated and their spread across multiple individuals tested. Here we review the existing corpus of 33 such studies in fishes, birds, rodents and primates and offer the first systematic analysis of the diversity of experimental designs that have arisen. We distinguish three main transmission designs and seven different experimental/control approaches, generating an array with 21 possible cells, 15 of which are currently represented by published studies. Most but not all of the adequately controlled diffusion experiments have provided robust evidence for cultural transmission in at least some taxa, with transmission spreading across populations of up to 24 individuals and along chains of up to 14 transmission events. We survey the achievements of this work, its prospects for the future and its relationship to diffusion studies with humans discussed in this theme issue and elsewhere
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- 9 Whiten, A. & Van Schaik, C. P. (2007). The evolution of animal 'cultures' and social intelligence. *Philosophical Transactions of the Royal Society.B: Biological Sciences*, 362, 603-620.
Notes: Decades-long field research has flowered into integrative studies that, together with experimental evidence for the requisite social learning capacities, have indicated a reliance on multiple traditions ('cultures') in a small number of species. It is increasingly evident that there is great variation in manifestations of social learning, tradition and culture among species, offering much scope for evolutionary analysis. Social learning has been identified in a range of vertebrate and invertebrate species, yet sustained traditions appear rarer, and the multiple traditions we call cultures are rarer still. Here, we examine relationships between this variation and both social intelligence--sophisticated information processing adapted to the social domain--and encephalization. First, we consider whether culture offers one

particular confirmation of the social ('Machiavellian') intelligence hypothesis that certain kinds of social life (here, culture) select for intelligence: 'you need to be smart to sustain culture'. Phylogenetic comparisons, particularly focusing on our own study animals, the great apes, support this, but we also highlight some paradoxes in a broader taxonomic survey. Second, we use intraspecific variation to address the converse hypothesis that 'culture makes you smart', concluding that recent evidence for both chimpanzees and orangutans support this proposition

- 10 Whiten, A. (2006). The dissection of imitation and its "cognitive kin" in comparative and developmental psychology. In S.J.Rogers & J. H. G. Williams (Eds.), *Imitation and the social mind: Autism and typical development* (1 ed., pp. 227-250). New York: Guilford Press.
- 11 Whiten, A. & Boesch, C. (2001). The cultures of chimpanzees. *Scientific American*, 284, 60-67.