Section A

Institution: University of St Andrews

Unit of Assessment: UoA 04: Psychology, Psychiatry and Neuroscience

Title of case study: Influencing UN conservation policy through research on chimpanzee cultures

Period when the underpinning research was undertaken: 2001 - 2016

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Andrew Whiten	Wardlaw Professor	01 October 1975-30/9/2016

Period when the claimed impact occurred: 2014 - 31 December 2020

Is this case study continued from a case study submitted in 2014? N

Section B

1. Summary of the impact

Conservation is traditionally aimed at the level of the species or subspecies. Reports on rare and endangered species usually lead with the number of animals that make up the global population. However, this focus ignores an important feature of animal communities: culture. Culture is the transmission of information through social learning (e.g. through imitation and teaching) and has increasingly been found to be widespread in the animal kingdom. Conservation efforts are only now catching up with the implications of these discoveries. Whiten's research on how chimpanzee communities pass on acquired knowledge has shaped recent United Nations conservation actions and new policies. It is changing the way conservation is presented in the media which through wide dissemination has educated the public. Specifically, the research has:

- guided a report by a United Nations Environment Program (UNEP) Expert Group on Conservation Implications of Animal Culture and Complexity in 2018 to promote inclusion of animal cultural diversity in conservation efforts;
- resulted in the approval by the relevant UN Scientific Council in 2019, and subsequently by a Conference of the Parties in India, in 2020, of a proposal for a Concerted Action across 3 neighbouring African states to conserve a population of chimpanzees characterized by a unique technological culture of cracking nuts using natural hammers;
- contributed to the development of a National Geographic policy of 2018 to focus on animal culture both in a research grants theme and in the magazine (readership: over 6,000,000 subscribers);
- helped to improve understanding of animal culture and its role in conservation through public engagement events including the BBSRC Great British Bioscience Festival, 2015.

2. Underpinning research

Whiten led a consortium of Goodall, McGrew and other research leaders of the long-term chimpanzee study sites across Africa to assemble the first systematic, prospective analysis of the accumulating evidence for regional cultural variations in behaviour. This work (R1, 2001), based on a total of 151 years of study across the sites, was the first to show that like us humans, a non-human species may display cultures composed of multiple and diverse traditions. As many as 39 putative traditions were reported, ranging over tool use, foraging techniques and social behaviour. This research is widely regarded as foundational to the avalanche of further discoveries in the present century, concerning the prevalence of cultural inheritance of behaviour among numerous vertebrate species. Whiten has gone on to publish influential reviews of this growing literature (e.g. R2, 2016).

Since these original discoveries were based on observational data, which can provide only circumstantial evidence that the behavioural variations discovered are indeed socially learned and transmitted, Whiten and colleagues went on to pioneer behavioural and cognitive experimental tests with captive chimpanzees that confirmed their capacities to learn from others in such a way as to sustain the spread and inheritance of traditions (e.g. R3, 2007).

These experiments involved naturalistically designed tasks, such as forms of tool use, but none corresponded directly to putative wild chimpanzee traditions. An opportunity was thus grasped to extend such experimentation to the clearest candidate for a broad African chimpanzee culture, using wooden and stone hammers to crack nuts (see picture). This occurs only in West African regions, being unconfirmed across the rest of Africa (R1, R2, R4). Potential explanations for this include possible environmental variations, genetic differences, or the existence of regional cultures. Supporting the latter hypothesis over the others, Marshall-Pescini and Whiten (R5, 2008) showed experimentally that juvenile East African chimpanzees, who do not crack nuts in the wild, when tested at an Island sanctuary in Lake Victoria, would acquire the skill through observing an expert nut-cracker.

In 2015 Whiten (R4) reviewed the evidence accumulated to that point from the work of his research group and others that nut-cracking is the most clearly regionally based instance of culture in non-human apes. The evidence now includes not only the broad survey across Africa and the experiments outlined above, but a suite of other, converging forms of evidence, including consistent behavioural differences between even neighbouring nut-cracking communities in Côte d'Ivoire.

Cultural transmission of behavioural traditions has also been demonstrated in field experiments by Whiten, van de Waal, and other collaborators on wild African vervet monkeys. In these experiments, whole groups of monkeys were first trained to eat one coloured sample of provisioned maize corn and avoid another colour that was a cue to bad taste. Later tests presenting corn of both colours but now both palatable, showed both that infants adopted the preferences of their mothers, and most strikingly, immigrating males conformed to local colour preferences, even when this reversed the preference of the group from which they had emigrated (R6, 2013).

3. References to the research

The following research outputs are all peer-reviewed, published in international prestigious journals and highly cited. They represent key examples of Whiten's research on animal and human culture from a larger body consisting of more than 100 publications since 2001.

R1. Whiten A, Goodall J, McGrew WC, Nishida T, Reynolds V, Sugiyama Y, Tutin CEG, Wrangham RW & Boesch C. (2001). Charting cultural variation in chimpanzees. *Behaviour*, 138, 1489-1525. DOI: 10.1163/156853901317367717

R2. Whiten, A., Caldwell, C.A. and Mesoudi, A. (2016). Cultural diffusion in humans and other animals. Current Opinion in Psychology 8, 15-21. DOI: 10.1016/j.copsyc.2015.09.002

R3. Whiten A, Spiteri A, Horner V, Bonnie KE, Lambeth SP, Schapiro SJ & de Waal FBM. (2007) Transmission of multiple traditions within and between chimpanzee groups. *Current Biology,* 17, 1038-1043. DOI: 10.1016/j.cub.2007.05.031

R4. Whiten, A. (2015). Experimental studies illuminate the cultural transmission of percussive technology in *Homo* and *Pan*. *Phil. Trans. R. Soc. B,* 370, 20140359. DOI: 10.1098/rstb.2014.0359

R5. Marshall-Pescini S. & Whiten A. (2008). Social learning of nut-cracking behaviour in East African sanctuary-living chimpanzees (*Pan troglodytes schweinfurthii*). *J. Comparative Psychology*, 122, 186-194. DOI: 10.1037/0735-7036.122.2.186

R6. van de Waal E, Borgeaud C. & Whiten A. (2013). Potent social learning and conformity shape a wild primate's foraging decisions. *Science* 340, 483-5. DOI: 10.1126/science.1232769

4. Details of the impact

Development and Approval of a Unique Conservation Proposal Backed by UN Agency

Whiten and colleagues' research has changed international conservation efforts by demonstrating that chimpanzee communities, like human communities, show cultural transmission of information. Consequently, conservation efforts need to ensure the survival, not just of the chimpanzees themselves, but also their local cultural heritage. This work resulted in unprecedented actions of the United Nations Environment Program (UNEP). Firstly, an Expert Group on the implications of animal culture for conservation (2018) was formed to inform UN conversation policy. Secondly, following the recommendations of this Group, both the UNEP Convention on Migratory Species of Wild Animals (CMS) Scientific Council (2019) and the UN Conference of the Parties (CoP; Gandhinagar, India, 2020; S1, p. 59) approved a Concerted Action (CA) to conserve a population of chimpanzees across 3 West African nations (Liberia, Guinea and Ivory Coast) that are unique in exhibiting a culture of nut-cracking using natural hammers (see Figure 1). This is a ground-breaking outcome, the first conservation effort in terrestrial animals targeted not at the traditional entity of a species or sub-species, but at a population defined by its cultural activity. In addition to changing international conservation policy, Whiten's research has contributed both to the development of a National Geographic policy to focus on animal culture and helped to improve understanding of animal culture through events such as the BBSRC Great British Bioscience Festival (2015).

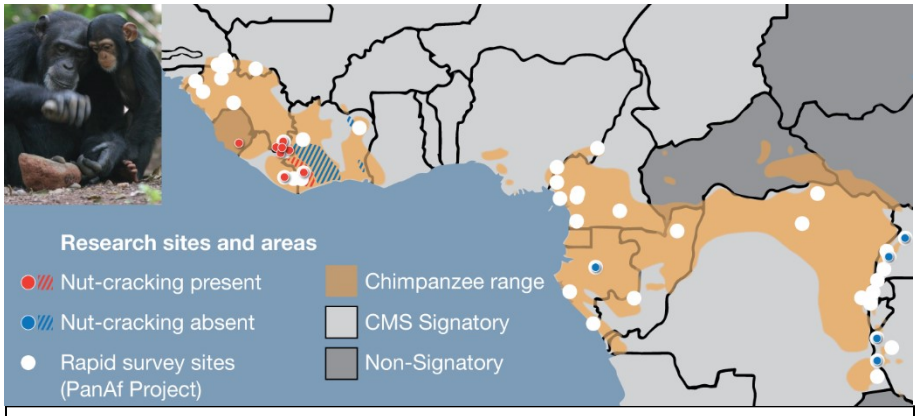

Figure 1: West African nut-cracking chimpanzees range/migrate across national borders

Context: Chimpanzees and their Cultural Diversity Recognised for Protection

The International Union for the Conservation of Nature (IUCN) produces a red list of species that are currently under threat of extinction. In the latest assessment of 2016, the red list maintained the species classification of chimpanzees (*Pan troglodytes*) as Endangered, as it has been since 1996. It went on to estimate "*…a likely species-level reduction in chimpanzee numbers for the period 1975-2050 (approximately three chimpanzee generations) to be in excess of 50 per cent across the majority of its range*". However, while there is a clear need for action to preserve chimpanzees, this focuses on the number of individuals without considering cultural differences that distinguish between different populations of chimpanzee (R1). A recent report in *Science* (S2), that cites Whiten's work, showed that human impacts are reducing chimpanzee cultural diversity. The report concluded that "*our findings support the concept of "culturally significant units," whereby a more integrative approach to conservation is needed"* and proposed the creation of *"chimpanzee cultural heritage sites, with which the behavioural and cultural diversity of this species might be recognized and protected*" (S2, p. 3).

1. UNEP Expert Group recommends conservation of animal cultural diversity

Addressing these issues, the Expert Group of the Convention on Migratory Species of Wild Animals (CMS, a treaty operating within the UNEP) convened a 2018 workshop in Parma, Italy, entitled "Conservation Implications of Animal Culture and Complexity" (S3, pp. 13-14). Whiten's research was central to supporting the overarching recommendations of the Expert Group that conservation efforts should include efforts to protect cultural diversity in animals (S3).

CMS is an international agreement recognising that for species that migrate across the jurisdictions of two or more nation states, Concerted Actions between them may be necessary to conserve endangered species. Accordingly, proposals for specific Concerted Actions are first approved by the Scientific Council (ScC) and then considered for adoption at the succeeding

triennial Conference of the Parties (CoP) attended by representatives of relevant nation states. At the 2018 workshop in Parma, two primatologists were invited to provide expertise on ape culture; one was a gorilla culture expert and the other was Whiten. Significantly, the 2018 workshop participants were provided with a core reading in preparation for the workshop: a review by Whiten that covered not only his ape research but the accumulating evidence for pervasive cultural inheritance of behaviour across numerous avian and mammalian species (R2). That Whiten and colleagues' work was chosen for this indicates the prime influence of their research for these developments. This is confirmed by the current CMS chair who notes "*Whiten's extensive research and publications on chimpanzee cultures, and review of social learning across a variety of taxa provided invaluable expertise for the workshop deliberations*" (S4). At the 2018 Parma workshop, Whiten was appointed to lead one of four subgroups tasked with drafting the report on the findings of the Expert Group, published in 2018 on the CMS website (S3). The CMS chair confirms "*Whiten's earlier research on chimpanzee cultures in general, and the cultural transmission of nutcracking in particular [R1], was crucial.*" (S4) The meeting report makes several recommendations, including raising awareness of cultural diversity in animals and recognising its importance in conservation efforts.

A critical next step in establishing the importance of cultural heritage conservation efforts was dissemination of the conclusions of the meeting. Changes to UN conservation policy require wide reaching support across scientific and conservation agencies and so to ensure wide dissemination of the results of the Parma meeting, the workshop published an article in *Science*'s *Policy Forum* section entitled "Animal Cultures Matter for Conservation" (2019). *Science,* and hence its *Policy Forum,* has a subscriber base of 130,000 including all lay members of the AAAS and the article was picked up extensively by traditional and social media (Altimetric score 350: Full downloads 4,707 over the year following publication). To achieve further exposure to primate research and conservation audiences, Whiten and colleagues published an article "Primate culture and conservation" (2019) in the Primate Society of Great Britain's "Primate Eye", and in the online forum of the International Primatological Society. This paved the way for the concerted action to conserve chimpanzee culture described below.

2. A Concerted Action Proposal to Conserve a Wild Chimpanzee Culture is approved by UN Conference of Parties 2020

A specific and radical proposal discussed in Parma was to encourage conservation bodies to consider not only the traditional conservation efforts based on numbers of individuals of a specific species, but also to consider conservation of the cultural identities of communities of animals. This proposal, supported by Whiten's research (R1-R6), led to the preparation in summer 2018 of a "Proposal for a Concerted Action for the nut-cracking chimpanzees of West Africa (*Pan troglodytes verus*)", submitted for initial consideration at a meeting of the CMS Scientific Council in Bonn, October 2019. The proponents of this proposal comprised an Expert Working Group on Culture and Social Complexity (a group of world-leading experts, including Whiten) and the CMS Ambassador. The CMS ambassador is a leading figure in ape research and conservation and Chair of the Ape Alliance. He notes that "*this [concerted action proposal] would not have come about without the research and publications of Whiten and his collaborators*" (S5). The CMS Scientific Council approved the Proposal, in November 2019 (S6). The Concerted Action was presented at the CoP 2020, attended by over 2,000 people (international delegates). This was preceded by an event publicising the Concerted Action to conference delegates entitled "Chimpanzee Culture: A New Criterion for Conservation", hosted in part by Born Free, the international animal welfare charity, and including a presentation by Whiten on the scientific underpinnings of the proposal. The Concerted Action proposal was presented and approved by the CoP in February 2020, following supporting interventions from the UK and African delegations (S1). This ground-breaking outcome represents a shift in international conservation policy from concentrating solely on numbers of individuals to recognising the importance of cultural traditions in terrestrial animals.

3. National Geographic policy to focus on animal culture

In 2018 National Geographic developed a policy to include animal culture both in a research grants theme and in the magazine. The funding scheme entitled "Making the Case for Nature" determines effective ways to market wildlife discoveries to inspire positive action to save species and ecosystems by applying principles of science communication. Despite this being a new

policy, NatGeo has already funded 5 people (National Geographic Explorers) to examine animal culture (S7) and published articles (readership: approximately 6,000,000) focusing on new developments in animal culture research (S7). These grants and articles cover animal culture in numerous species from chimpanzees to cockatoos to sperm whales. Whiten's research has been critical in NatGeo's decision to focus on animal cultures. Their interest in animal culture stemmed from a meeting convened by NatGeo in Germany in early 2019 that brought together animal culture researchers including Whiten, and writers and research staff of NatGeo to develop plans, for both articles on the topic of animal cultures and support of culture-based conservation efforts. As noted in the meeting report, it "*explored how to use narratives of animal culture as a tool to motivate target audiences to empathize with or find value in wildlife, towards a goal of increased pro-conservation behaviour from those audiences*." (S8, p.1) NatGeo's Senior Director (Europe) noted "*Professor Whiten's research was crucial in setting the scene and making the argument for conservation encompassing cultural units*." (S9).

4. Shaping public opinion on chimpanzee culture and culture-based conservation

Whiten has taken an active role in disseminating to the public his research on primate culture and the importance of taking this into account for conservation. He has taken part in public engagement events each year between 2013 and 2016 (his retirement) and his research has been covered in the international popular press (e.g. The Times, Le Monde). Significantly, the chimpanzee research (R1, R3) was a key element in a large scientific exhibit competitively selected for inclusion in the 2014 BBSRC Great British Bioscience Festival, held in Bethnal Green, London. An independent evaluation by Graphic Science (S10) shows that its aim to attract an ethnically diverse audience of school children and the public generally was successful with 29% of people (BAME attendees) (S10, p.9). A further aim was to "*To overcome barriers to access to contemporary bioscience and scientists for underserved audiences*". Again, this was achieved with 44% of people (attendees) coming from Tower Hamlets (7th most deprived local authority in England) (S10, p.9). The exhibit, manned over 3 days by Whiten's research group, encouraged visitors to try their hand at the same tool use tasks described in R3. A further element referenced the vervet monkey study (R6) presented as an electronic game, also later available online via the Exhibit website. Whiten's exhibit was one of only 19 at the event and the independent evaluation estimated approximately 6,500 people (school children and adults) visited the event. Significantly, 30% of all questionnaire respondents stated that the festival was the first science event they had attended (S10).

As recognition for his work publicising his research on chimpanzee culture, Whiten was awarded the 2014/2015 Senior Public Engagement Prize of the Royal Society of Edinburgh and in 2015 gave the corresponding public lectures on the evolution of culture in apes to high school students of St Matthews Academy, Saltcoats and later to a general audience, in the RSE outreach series TalkScience@Irvine Bay. In 2017, Whiten was invited to give a public lecture on the topic for the National Academy of Sciences of the USA. Overall, Whiten's sustained outreach work has ensured that the research on primate culture has reached a wide and diverse audience both nationally and internationally.

5. Sources to corroborate the impact (indicative maximum of ten references)

S1. Report from CoP 2020 (p.59).
S2. Report in Science detailing human impact on chimpanzee culture (available as pdf) (p.3).
S3. Report of the UNEP CMS Expert Group on Animal Culture and Social Complexity, 2018 (pp. 13, 14, 25, 32, 37&40)
S4. Letter from Chair of the UNEP CMS Expert Group on Culture and Social Complexity.
S5. Letter, Ambassador to UNEP Convention on Migratory Species; Chair, Ape Alliance.
S6. The concerted Action Proposal approved by the Scientific Committee in 2019 (pp. 3, 4, 7&9)
S7. Website details of funded NatGeo Explorers working on animal culture.
S8. Report from Making Case for Nature meeting (p. 1).
S9. Letter from Senior Director, International (Europe), National Geographic.
S10. Evaluation of the 2014 BBSRC Great British Bioscience Festival by Graphic Science.