

Call Cultures in Orang-Utans?

Serge A. Wich^{1,2*}, Michael Krützen^{1,3}, Adriano R. Lameira^{3,9}, Alexander Nater¹, Natasha Arora¹, Meredith L. Bastian⁴, Ellen Meulman¹, Helen C. Morrogh-Bernard⁵, S. Suci Utami Atmoko⁶, Joko Pamungkas⁷, Dyah Perwitasari-Farajallah⁷, Madeleine E. Hardus⁸, Maria van Noordwijk¹, Carel P. van Schaik¹

1 Anthropological Institute and Museum, University of Zurich, Zurich, Switzerland, **2** Sumatran Orangutan Conservation Programme (PanEco-YEL), Medan, Sumatra, Indonesia, **3** Behavioural Biology, Utrecht University, Utrecht, The Netherlands, **4** Department of Anthropology, Boston University, Boston, United States of America, **5** University of Cambridge, Wildlife Research Group, Cambridge, United Kingdom, **6** Fakultas Biologi, Universitas Nasional, Jakarta, Indonesia, **7** Primate Research Centre, Bogor Agricultural University, Bogor, Indonesia, **8** Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, Amsterdam, The Netherlands

Abstract

Background: Several studies suggested great ape cultures, arguing that human cumulative culture presumably evolved from such a foundation. These focused on conspicuous behaviours, and showed rich geographic variation, which could not be attributed to known ecological or genetic differences. Although geographic variation within call types (accents) has previously been reported for orang-utans and other primate species, we examine geographic variation in the presence/absence of discrete call types (dialects). Because orang-utans have been shown to have geographic variation that is not completely explicable by genetic or ecological factors we hypothesized that this will be similar in the call domain and predict that discrete call type variation between populations will be found.

Methodology/Principal Findings: We examined long-term behavioural data from five orang-utan populations and collected fecal samples for genetic analyses. We show that there is geographic variation in the presence of discrete types of calls. In exactly the same behavioural context (nest building and infant retrieval), individuals in different wild populations customarily emit either qualitatively different calls or calls in some but not in others. By comparing patterns in call-type and genetic similarity, we suggest that the observed variation is not likely to be explained by genetic or ecological differences.

Conclusion/Significance: These results are consistent with the potential presence of ‘call cultures’ and suggest that wild orang-utans possess the ability to invent arbitrary calls, which spread through social learning. These findings differ substantially from those that have been reported for primates before. First, the results reported here are on dialect and not on accent. Second, this study presents cases of production learning whereas most primate studies on vocal learning were cases of contextual learning. We conclude with speculating on how these findings might assist in bridging the gap between vocal communication in non-human primates and human speech.

Citation: Wich SA, Krützen M, Lameira AR, Nater A, Arora N, et al. (2012) Call Cultures in Orang-Utans? PLoS ONE 7(5): e36180. doi:10.1371/journal.pone.0036180

Editor: Carles Lalueza-Fox, Institut de Biologia Evolutiva - Universitat Pompeu Fabra, Spain

Received: October 11, 2011; **Accepted:** March 28, 2012; **Published:** May 7, 2012

Copyright: © 2012 Wich et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Funding: This work was supported by the Netherlands Organisation for Scientific Research (NWO), L.S.B. Leakey Foundation, National Geographic Society, Swiss National Science Foundation, Messerli Foundation, A.H.-Schultz Foundation, PanEco, Claraz-Schenkung, Portuguese Foundation for Science and Technology, Wenner-Gren Foundation for Anthropological Research, Dobberke Foundation, Lucie Burgers Foundation for Comparative Behaviour Research, Schure-Beijerinck-Popping Funds, Ruggles-Gates Fund for Anthropological Scholarship of the Royal Anthropological Institute of Great Britain and Ireland, Primate Conservation, Inc., and Fundação Calouste Gulbenkian. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Competing Interests: The authors have declared that no competing interests exist.

* E-mail: sergewich1@yahoo.com

† These authors contributed equally to this work.

Introduction

Recent studies on various species, especially primates, examined geographic variation in a wide range of behaviours to examine the presence of traditions or cultures (defined as behaviors that are common in at least one site, but are absent in at least one other site, without concomitant genetic or environmental differences among these sites [1]). Comparisons of different populations of well-studied species such as chimpanzees, orang-utans, spider monkeys and capuchin monkeys yielded a large number of behaviours that systematically varied among populations [2,3,4,5]. Application of the method of exclusion (or ‘ethnographic method’) suggested that individuals acquired many of those variants through

socially mediated learning rather than through environmental induction or genetic canalisation because these are excluded by statistical analyses [2,3,6,7]. Recent tests that partially control for the effects of environmental and genetic differences among populations support this interpretation for orang-utans without directly demonstrating social learning (hence the absence from the definition above) [8]. Moreover, the cultural interpretation is consistent with experimental evidence for observational learning in captive great apes [9] and selective visual attention to techniques thought to be cultural among wild immatures [10], as well as with experimentally induced diffusion of behavioural alternatives through captive populations of primates [11,12]. Taken together, it has been suggested that these studies indicate that the first