Vertebrate Paleobiology and Paleoanthropology Series

Miriam N. Haidle
Nicholas J. Conard
Michael Bolus *Editors*

The Nature of Culture

Based on an Interdisciplinary Symposium 'The Nature of Culture', Tübingen, Germany

Springer

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Vertebrate Paleobiology and Paleoanthropology Series

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Cover illustration: Left – Description: Chimpanzee using an organic tool. Figure credit: reproduced with kind permission by Ian C. Gilby, Arizona State University. Middle – description: wooden spear from the Lower Paleolithic site of Schöningen, Germany. Figure credit: Copyright University of Tübingen, photo: Nicholas J. Conard. Right – description: venus figurine from the lower Aurignacian deposits of Hohle Fels Cave, Swabian Jura, Germany. Figure credit: Copyright: University of Tübingen, photo: Hildegard Jensen.

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Preface

This volume is the result of an interdisciplinary symposium organized by the research center "The Role of Culture in Early Expansions of Humans" (ROCEEH) of the Heidelberg Academy of Sciences and Humanities held at Hohentübingen Castle at Eberhard Karls University of Tübingen from June 15–18, 2011. Our goal for the conference was to produce a unified model of cultural evolution integrating ethological accounts of culture in great apes, sea mammals, and birds, as well as to debate the nature of culture as viewed from the perspective of the humanities and social sciences. The resulting model of the expansion of cultural capacities consists of two parts: a theoretical framework tracing the developmental dimensions of cultural performances and a model of the expansion of cultural capacities drawn from ethological and archeological data on information transmission. This volume presents many of the ideas that the participants at the meeting presented and reflects an up-to-date assessment of the state of international research on the evolution of cultural behavior.

We sincerely thank our colleagues who supported this publication with their reviews and many constructive comments. Other than the authors and editors, these include: Nick Ashton (University College London), Anne Delagnes (Université de Bordeaux), Robin Dennell (University of Sheffield), Anna Belfer-Cohen (Hebrew University of Jerusalem), Natalie Uomini (University of Liverpool), Christoph Antweiler (Universität Bonn), Gerald Hartung (Universität Wuppertal), Erella Hovers (Hebrew University of Jerusalem), Isabelle Parsons (University of South Africa), Martin Porr (University of Western Australia), Felix Riede (Aarhus Universitet), Rachel Kendal (Durham University), Luke Premo (Washington State University), Robert Boyd (Arizona State University), Paola Villa (University of Colorado Museum), Gerd-Christian Weniger (Neanderthal Museum Mettmann), Thomas Wynn (University of Colorado), Bennett G. Galef (McMaster University), Jürgen Richter (Universität Köln), and Thiemo Breyer (Universität Köln).

We would like to extend our thanks to the series editors Eric Delson and Eric Sargis, and Fermine Shaly and Jeffrey Taub at Springer, for their support, encouragement, and patience in producing this volume. We are grateful to the Heidelberg Academy of Sciences and Humanities for funding ROCEEH, the University of Tübingen for hosting the symposium, and the Deutsche Forschungsgemeinschaft for providing financial support.

Finally, we hope that the lively discussions, debate, and good cheer that accompanied the meeting in Tübingen will be captured in these papers.

Tübingen
March 2015

Miriam N. Haidle
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Chapter 1
The Nature of Culture: Research Goals and New Directions

Miriam N. Haidle, Nicholas J. Conard, and Michael Bolus

How do we define and deal with culture? Paleolithic archaeologists view even the crudest human-made stone tools as material expression of cultural behavior. Primatologists claim that chimpanzees (Whiten et al. 1999), orangutans (van Schaik et al. 2003), and possibly also bonobos (Hohmann and Fruth 2003) exhibit some sort of culture. Similar arguments have also been suggested for cetaceans (Rendell and Whitehead 2001) and birds (Bluff et al. 2010). Other researchers, especially from the humanities, often question these claims or even dismiss the proposed evidence of culture in species other than *Homo sapiens* altogether. In June 2011 we hosted an interdisciplinary symposium at Eberhard Karls University in Tübingen organized by the research center "The Role of Culture in Early Expansions of Humans" (ROCEEH) of the Heidelberg Academy of Sciences and Humanities (Fig. 1.1).

At the conference, archaeologists, primatologists, paleoanthropologists and cultural anthropologists discussed and debated these issues. The participants of the conference aimed to move beyond dichotomic statements of culture versus non-culture, which, according to the chosen definition of the central term 'culture', frequently exclude the evidence that makes a productive examination of a development of cultural behavior possible. Instead, the participants followed a synthetic approach that acknowledged different forms of cultural expression in relation to each other. This approach, if it is to be successful, must also be applicable to different forms of evidence: to birds' songs, to chimpanzees' hand clasps, to material finds from the archaeological record as well as to religious practices.

Building on a draft model circulated before the meeting (see Davidson 2016, Fig. 10.4), the members of the Tübingen symposium developed a revised model of the expansion of cultural capacities consisting of two parts (Haidle and Conard 2011; Haidle et al. 2015): (1) a theoretical model for the developmental dimensions of cultural performances, and (2) a scheme for the expansion of cultural capacities drawn from the ethological and archaeological data on the transmission of information. The theoretical model sees the development of behavioral performances in three multifactorial dimensions. While the biological (e.g., anatomy, instincts) and individual (e.g., experience, trained proficiency) dimensions apply for all kinds of behavior, the historical-social dimension is an additional dimension of and a necessary condition for cultural behavior. Cultural behavior is bound to a social context based on non-genetic transmission of information between individuals of a group. In an advanced form, for example, individuals share a negotiated system of values that guides individual behavior. Additionally, the social component of cultural behavior possesses historical depth. Learned practices are, for example, transmitted to other members of a group for generations, but not necessarily in a descendant line, and with sustainable impact on future behavior. Each cultural performance is based on multifactorial developments in the biological, individual and historical-social dimensions. These

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Fig. 1.1 Speakers, the ROCEEH team and some guests of the symposium 'The Nature of Culture', held at Hohentübingen Castle in June 2011 (*left* to *right* from *bottom*): Andrew Kandel, April Nowell, Michael Bolus, Lyn Wadley, Naama Goren-Inbar, Marlize Lombard, Andrew Whiten, Christine Hertler, Miriam Haidle, Claudio Tennie, Anne Delagnes, Angela Bruch, Nicholas Conard, Mark Collard, Stephen Shennan, Thorsten Uthmeier, Shannon McPherron, James O'Connell, Marian Vanhaeren, Iain Davidson, Sibylle Wolf, Annette Kehnel, Michael Märker, Zara Kanaeva, Duilio Garofoli

dimensions are interdependent of each other with the specific environment of conspecifics, agents and objects affected by and affecting the behavior.

From the set of cultural performances of a defined group, its minimal cultural capacity can be deduced. The maximum of the biological, the individual, and the historical-social

dimensions of all behavioral performances of that group define the minimum status of these dimensions of the potential cultural capacity. Based on this theoretical model of the developmental dimensions of cultural performances and the deduced potential cultural capacities, we introduce a scheme for the expansion of cultural capacities. The empirical basis of this research lies in ethological and archaeological data on historical-social transmission of different types of information. In the archaeological record, the empirical data is confined to a subset of the original set of cultural performances which have material manifestations and can be preserved over time. These limited remains have been categorized as different types of information using the problem-solution-distance approach which is also applicable to tool behavior by animals, thus bridging ethological and archaeological data (Köhler 1926; Haidle 2012). The participants at the conference identified eight grades of cultural capacities, four of which can be found in non-human animal species. While three of these grades delineate only the presence of some of the fundamental elements of a historical-social dimension in behavior including the use of social information, social learning and traditions, the fourth grade of 'basic cultural capacities' is characterized by the whole set of these elements creating a pattern of behavior with historical-social dimension shared within a group. Four more grades of cultural capacity have so far been documented exclusively in hominin behavior: the modular, composite, complementary and notional cultural capacities (see Haidle 2016). This developmental scheme is not conceived as a progression line. The grades do not replace each other, but extend the formerly existing capacity in the three dimensions and thus the range of cultural performances.

The development of the EECC model of the evolution and expansion of cultural capacities as sketched below (Fig. 1.2) and outlined in detail in a joint article (Haidle et al. 2015) is the product of intensive debate. The course of the discussion at the symposium has been described in Haidle and Conard (2011). The chapters in this volume represent individual contributions to the subject. Some are elaborations of the papers presented at the symposium, some changed the focus according to the discussion, and some pick up the model and work on its details or apply it. The contributions in this volume do not fall along one line of argument, but reflect a multifaceted and sometimes controversial examination of the subject of the expansion of cultural capacities.

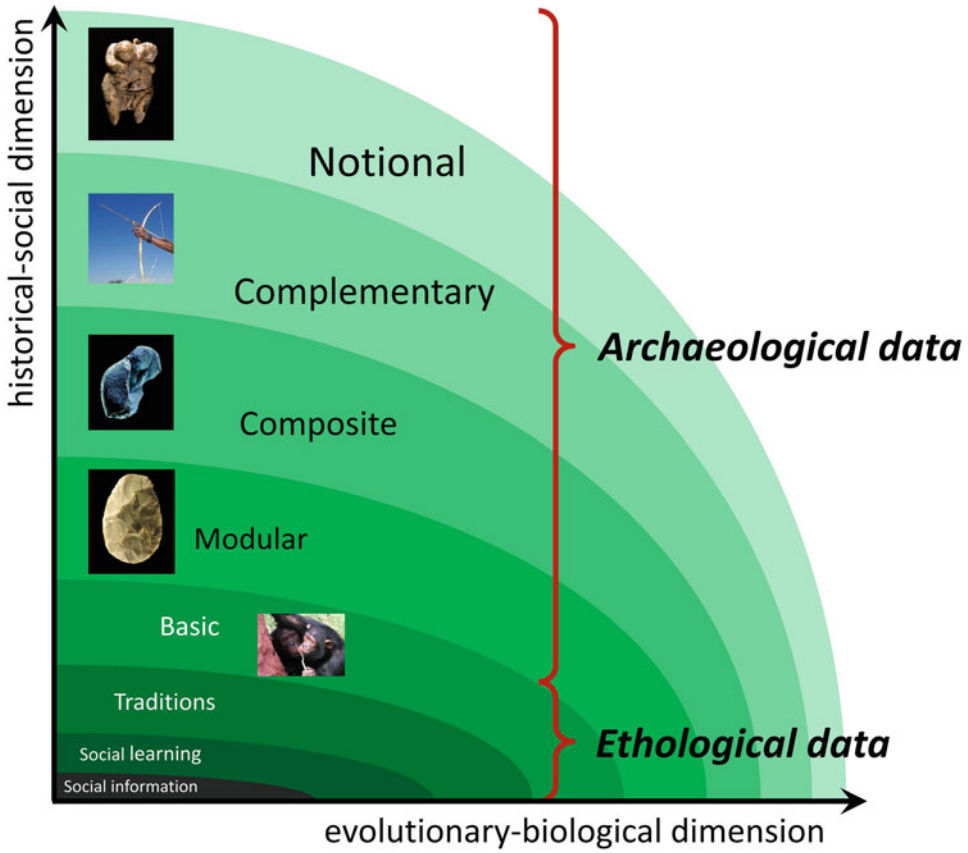

Fig. 1.2 EECC model of the evolution and expansion of cultural capacities in eight grades. The basic four grades ('social information' to 'basic') have been documented in some animal species, while the subsequent four ('modular' to 'notional') have, until now, only been identified in the course of human evolution (modified after Haidle et al. 2015)

The first three chapters in this volume are devoted to general considerations on cultural evolution, cultural performances and capacities, and the link between nature and culture. In "Lessons From Tasmania – Cultural Performance Versus Cultural Capacity" Miriam N. Haidle summarizes the EECC model of the evolution and expansion of cultural capacities and applies it to the example of Tasmanian culture, which has been characterized as 'primitive' and compared with chimpanzee and Middle Paleolithic capabilities (Haidle 2016). A reconsideration of the set of material cultural performances in the Tasmanian ethnographic record and thorough examination using the problem-solution-distance approach shows the presence of modular, composite, complementary and notional cultural capacities. The Tasmanian cultural record is a perfect example of the concept that apparently simple performances cannot be easily equated with archaic or non-modern behavior. Thus, the Tasmanian example complements the evidence of limestone tools from Gesher Benot Ya'aqov presented by Nira Alperson-Afil and Naama Goren-Inbar. These authors address complex behavior in stone tool production, which is situated only within modular cultural capacities (Alperson-Afil and Goren-Inbar 2016). Haidle's chapter picks up the mountaineering principle of cultural evolution developed in Marlize Lombard's contribution (Lombard 2016). It provides the debate with an example that clarifies that the EECC model of the evolution and expansion of cultural capacities does not represent a hierarchical sequence of progressive grades of cultural capacities replacing each other as discussed in Chap. 10 by Iain Davidson (Davidson 2016).

Volker Gerhardt's contribution "Culture as a Form of Nature" elucidates the debate with a philosophical perspective on the very subject of *The Nature of Culture* (Gerhardt 2016). Gerhardt discusses culture as inseparable from nature, more precisely as a part and product of nature. He refers to technology and its active participation in nature and sees the use of signs, symbols and written language not as something completely different, but as a cultural extension of nature based on technology.

A broader primatological perspective is given in Andrew Whiten's chapter on "The Evolution of Hominin Culture and its Ancient Pre-Hominin Foundations" (Whiten 2016). He draws our attention to the nature of culture in the animal world and some very ancient foundations to the series of steps that ultimately culminated in hominin culture. With a focus on great apes, Whiten makes further inferences about the direct evolutionary antecedents of hominin culture, about ancestors humans share with great apes as long ago as 6–14 Ma. Addressing human cultural evolution, he argues that this phase can only be understood in the context of a complex of advances in social and technological cognition, together with other features that include unprecedented encephalization and extended childhood, a topic elaborated upon in this volume by April Nowell (Nowell 2016). Whiten uses a primatological perspective to discuss the deep origins of culture within its wider adaptive niche.

The following four chapters discuss aspects of the archaeological record and their implications for cultural evolution. The chapter by Nira Alperson-Afil and Naama Goren-Inbar: "Scarce but Significant: The Limestone Component of the Acheulean Site of Gesher Benot Ya'aqov, Israel" presents an example of evidence of cultural behavior from the Lower Paleolithic (Alperson-Afil and Goren-Inbar 2016). The limestone assemblage reveals complex life-histories of tools within a single reduction sequence. Percussors, chopping tools, and cores are viewed as interrelated consecutive morphotypes transformed into one another, thus implying behavioral flexibility and contingency. Alperson-Afil and Goren-Inbar present a remarkable instance of complex culture within modular cultural capacity.

Lyn Wadley addresses the difficulties of linking artifacts with cultural capacities and cognition. In the chapter "Technological Transformations Imply Cultural Transformations and Complex Cognition" she draws attention to transformative technology and its implication for other cultural behavior (Wadley 2016). The complex cognitive ability to control material transformations evolved together with the ability to conceptualize cultural transformations. Wadley discusses the transformative technology of Iron Age metallurgy and its links to cultural transformations such as rites of passage manifested in symbolic motifs on artifacts. For the deeper past, she suggests similar connections between technological and cultural transformations.

In his contribution "Neanderthal Utilitarian Equipment and Group Identity: The Social Context of Bifacial Tool Manufacture and Use", Thorsten Uthmeier presents a case study in which he explores the role of bifaces as signals for social identity (Uthmeier 2016). He compares the two main complexes of the European Late Middle Paleolithic with bifaces, the Mousterian of Acheulean Tradition (MtA) and the Micoquian, treating two geographical clusters of the latter, the Central European Micoquian and the Crimean Micoquian, separately. He concludes that bifacial tools can be regarded as social markers which signal social identity in contexts of interactions with socially distant individuals or groups. While Uthmeier understands the MtA and the Micoquian as separated social collectives, he suggests that the two geographical subgroups of the Micoquian represent a single social collective, which consists of at least two extended networks with differing strategies of lithic curation.

In contrast to Uthmeier's optimistic view with regard to the Middle Paleolithic, Michael Bolus in his contribution "Tracing Group Identity in Early Upper Paleolithic Stone and Organic Tools – Some Thoughts and Many Questions" remains pessimistic about the possibility of unambiguously

identifying group identity in the early Upper Paleolithic by analyzing stone and organic tools (Bolus 2016). Instead, he highlights the general problems that arise when trying to interpret single elements of material culture. For instance, one of the major problems when dealing with differences in stone and organic tools is to assess if such differences are always a question of different 'styles' and/or 'identities', or rather a question of different tool 'types'. Other than in more recent periods of Pre- and Protohistory, where different types of artifacts are often interpreted as mirroring ethnic identity, ethnic interpretations of this kind are largely absent from Paleolithic research today.

In her contribution "Childhood, Play and the Evolution of Cultural Capacity in Neanderthals and Modern Humans", April Nowell presents an approach dealing with the biological dimension and the expansion of cognitive capacities in the course of human evolution (Nowell 2016). Play is an important factor during the early life history of humans which has a direct impact on the development of social and cognitive learning and hence on the historical-social dimension of cultural capacity. This means that the impact of learning through play on the connectivity of the brain is heightened by slower maturation rates. Thus she argues that extended childhoods of modern humans relative to Neanderthals help to shape the recent phase of cultural evolution. While play likely existed during the childhood of Neanderthals, fantasy play as part of a package of symbol-based cognitive abilities seems to be limited to modern humans, as is suggested by differences in the nature of symbolic material culture of Neanderthals and modern humans.

The chapter "Stone Tools: Evidence of Something in Between Culture and Cumulative Culture?" by Iain Davidson presents different definitions of 'culture' and discusses the role of stone tools in the evolution of culture (Davidson 2016). Davidson criticizes hierarchical models of cultural evolution and assuming that the EECC model of the evolution and expansion of cultural capacities also has a hierarchical structure, he provides an alternative model. As stated above and as exemplified by Miriam N. Haidle (2016), however, the EECC model does not represent a hierarchical sequence of progressive grades of cultural capacities replacing each other. Our model does not imply an inevitable progression, but focuses on expansion of cultural capacities that integrate achievements in earlier states, thus conforming to expectations of the mountaineering principle of cultural evolution discussed in Marlize Lombard's contribution (Lombard 2016).

The last two chapters focus on the aspect of transmission of information as a variable component in cultural behavior. In their contribution "The Island Test for Cumulative Culture in the Paleolithic" Claudio Tennie, David R. Braun, Luke S. Premo, and Shannon P. McPherron question the assumption that the widespread ability to produce Early Stone Age artifacts was grounded on high-fidelity transmission of behavior such as imitation and teaching (Tennie et al. 2016). Instead they suggest regular reinvention of the production and use of simple flake technology within a "zone of latent solutions", defined by a combination of genetic, environmental, and social factors. Tennie et al. introduce a thought experiment, called the Island Test, which may be useful for distinguishing forms of hominin behavior that require high-fidelity transmission from those that do not.

Finally, in her contribution "Mountaineering or Ratcheting? Stone Age Hunting Weapons as Proxy for the Evolution of Human Technological, Behavioral and Cognitive Flexibility" Marlize Lombard raises the question of whether human cultural development can really be seen as being analogous to the effect of a ratchet as in the cumulative cultural approach advocated by Tennie et al. (2009). As an alternative, Lombard introduces the mountaineering model which fits much better to the ups and downs of human cultural development (Lombard 2016). Although path-dependent, the developmental process from a point reached is not necessarily in a progressive line. In the mountaineering scenario the use of sidetracks and loops, but also steps backwards and rapid abseiling to lower levels are possible, as is reinvention. With this contribution, the discussion of the nature of culture comes back to its starting point in this volume and underscores the non-linear nature of cultural evolution.

The chapters presented in this volume cover only a portion of the topics discussed during the symposium. Other speakers who contributed oral presentations and participated in vivid discussions added many more valuable aspects to the understanding of the 'culture' phenomenon. Anne Delagnes, for instance, provided insight into the nature of the earliest hominin cultures which date to the beginning phases of Earlier Stone Age and provide the first archaeological evidence for modular culture. Marian Vanhaeren concentrated on the role of personal ornaments as an example for elements of material culture expressing identity in the Upper Paleolithic and perhaps in the Middle Paleolithic. Steven Shennan highlighted the influence of demographic factors in the evolution of cultural capacities and demonstrated population size and frequency of interactions as influential factors. James O'Connell, who addressed the question of interdependencies with environmental factors during cultural evolution, added a view from behavioral ecology. He stressed the need to contextualize human behavior within its social and economic constraints, rather than using mechanistic resource ranking and cost benefit analysis as an end in and of itself.

In his keynote lecture, Nicholas Conard drew from his excavations in Africa and Eurasia to argue that the emergence of composite, complementary and notional culture does not reflect unique monocentric developments. Instead,

he demonstrated how cultural evolution follows a polycentric mosaic pattern via the innovation, spread, modification and disappearance of behaviors. Thus, we should not expect cultural evolution to resemble the flipping of a light switch followed by radiation from a point source. The famous mammoth ivory figurines and musical instruments from Vogelherd on display at Hohentübingen Castle, where the conference took place, represent a unique record of symbolic artifacts, but not the only time and place in human history where art and music evolved (Conard 2007, 2010).

Although all contributions to this volume approach the question of how better to understand 'the nature of culture', and although there are many cross-references between these contributions, every chapter can also stand on its own providing case studies or more theoretical considerations. The editors deliberately did not organize the chapters of the volume following a single line of argument. Instead, it was our intention to allow the contributions to mirror the different and sometimes controversial positions presented during the symposium. We hope that the volume will initiate further discussion and innovative cross-taxa and cross-societal research that will improve our knowledge of the evolution of cultural behavior.

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