Animal cultures: but of which kind?

Hugo Viciana

Received: date / Accepted: date

Abstract The concept of animal culture began to be increasingly used in the context of animal behaviour research around the 1960s. In spite of its success, I shall argue that animal culture as it is currently conceived does not represent a fully articulated “natural kind”. But how does it fail in this regard and what consequences follow? Firstly, an analysis of the epistemological landscape of author keywords related to the concept of animal cultures is presented. I then systematically enumerate the ways in which culture cannot be considered a natural kind in the study of animal behaviour. Finally, a plausible interpretation of the scientific status of the animal culture concept is suggested that is congenial to both its well established use in animal behaviour research and its inferential limitations.

Keywords animal behaviour · natural kinds · social learning · text mining · definition of culture · eliminativism

1 Introduction: Imagine there’s no culture

Anthropology has questioned the validity of the concept of culture since its inception as an academic discipline. Curiously enough, towards the late 20th century, this concept was rejected or at least was unendorsed by many of anthropology’s chief practitioners (see, for instance, Brumann 1999), yet around...
the same time, it might be regarded as one of the most successful philosophical concepts of the last two hundred years.

Equally ironic is the fact that around the same time that some of the main figures of anthropology sought to abandon “culture” as a theoretical term, it found fertile ground in the discipline of animal behaviour, hinting to some form of strong naturalization of this elusive idea. Indeed, as different strands of anthropology negated the theoretical power of “culture” as an explanatory device, the term’s use continued to spread eventually permeating animal ecology textbooks (Manning & Dawkins 1999; see previously Elton 1930 about animal “tradition”). During this period, many philosophers and social commentators also continued using the concept of “culture” or the adjective “cultural” in a theoretically loaded way (see references in Pinker 2003; Ramsey 2007), often presupposing this predicate’s high inferential power, that is, an ability to refer to a property whose very attribution warrants the inference of other properties that are related to it in principle. Tacitly assuming such inferential powers, one thing or behavior being termed ‘culture’ or ‘cultural’ usually meant that a diverse bundle of properties could be attached to it (Bueno 1996).

But does “culture” really constitute one such natural kind from which reliable inferences toward other interesting and meaningful related properties or states of events can be made? This question has certainly been raised many times before — mainly in the context of the nurture vs. culture controversy, as well as in classical debates concerning the explanation vs. interpretation of social facts. However, it has never been raised as such specifically in an effort to examine the status of “animal culture” as a natural kind. This is not an ineffective approach to the problem of determining the scientific value of

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1 This grandiloquent seeming statement can be affirmed on the basis of some simple statistics regarding the frequency with which it has been used over time. The substantive “culture” was used only very rarely up until the end of the 18th century, after which time it began to take hold. And indeed, what little use was made of the term occurred mostly in reference to the cultivation of certain specific artistic or humanistic abilities. As the theoretical scope of the term expanded during the 19th century within both philosophy and the nascent discipline of anthropology, it was used with greater frequency, until penetrating everyday language in the main Western languages, especially after World War II. According to Google’s N-Gram research engine based on millions of digitalized books and journals (Michel et al. 2011), there was less than 1 occurrence of “culture” for every 50,000 words at the beginning of the 19th century. Nevertheless, the word attained frequencies exceeding 7 occurrences every 50,000 words by the end of the 20th century. Compare this with the relative failure of the word “civilization” during this same period at frequencies bordering on 1 occurrence every 100,000 words — exceptions to this trend took place during brief periods peaking around 1920 and 1940 at 1 occurrence every 25,000 words; although “culture” is a polysemic term in English, similar results are obtained for other languages. This suggests that the spread of the notion of culture may be one of the most noticeable examples of the way that philosophy and science penetrate everyday language, even though this says nothing about the validity of the notion as a general scientific term.

2 I will here overlook the subtleties that may derive from the consideration that the American Anthropological Association, the main anthropological association in the world in terms of membership, decided to erase the word “science” from its mission statement a few years ago. Since several very influential scientific anthropologists have also raised serious doubts about the relevance of “culture” as a theoretical term I believe my reference to a philosophy of science take on anthropological perspectives is warranted.
the concept of culture. Triumph in revealing the contours of the kind “animal culture” may provide a basis for its naturalization more generally. Conversely, lack of success in establishing a scientific natural kind may also be judged, in the extreme, as an indicator of the unreasonableness of trying to make culture part of the natural furniture of the world, to be conceived on equal footing with other more prototypical natural concepts such as electrons, chemical elements, cells, or galaxies.

2 A conceptual landscape in animal behaviour research

First, let’s explore the way scientists use the term culture in the context of animal behaviour research.

When researchers in animal behaviour publish a contribution in this area, they are usually asked to provide an abstract of what their contribution amounts to, as well as a few keywords describing connected topics. After assembling a data base of around three hundred and fifty articles which were published in some of the main journals of animal behaviour, primatology, and ornithology, and which included the notion of “culture” or “tradition” in the title, abstract or keywords, a few preliminary, purely descriptive observations can be made. Particularly visible are what one might call the main “epistemological interests” or subjects on which the researcher is able to generate

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3 This data base intends to be widely representative without of course being exhaustive. For details on its elaboration see the online appendix.
Fig. 2 Twelve most connected author-keywords in articles related to “animal culture”. Thickness of links is proportional to frequency of co-occurrence of these author-keywords.

publishable material. In Fig. 1, you can see the most frequently used conceptual stems in the abstracts of these articles. A series of epistemological interests are clearly apparent: the notion of learning, a marked interest in behavioural ecology, the study of differences between groups, as well as the stability and variability of behaviour are among the interests that researchers allude to in the most visible part of their publication.

The conceptual landscape can be represented in a more articulated manner once the links between author-keywords enter the picture. This can be seen in Fig. 2 with its depiction of the twelve main keywords connecting the articles of this data base. Links between concepts represent the co-occurrence of two keywords together within the same article. The thickest links represent pairs of concepts that co-occur more often than others. This figure is helpful in representing the actual areas in animal behaviour research in which the concept of culture appears most often in connection to.

Curious about what the broader picture in which these concepts emerged looks like? A conceptual landscape of animal culture can be generated by plotting those keywords that appear at least in two articles. In this picture (see Fig 3), different colors refer to relatively different modular networks or relatively independent areas of research. Some of the main regions seem to constitute different epistemological approaches, at least in the sense that the most highlighted epistemological interests or keywords do not completely overlap with
3 A minimal definition of animal culture

Which concept of culture unites all of the aforementioned work in the study of the evolution of behaviour? Let me be clear about the precise nature of the question I am addressing: success in solving this question should be determined by the adequacy of the definition for describing generally the researchers’ activity in this area of knowledge. If I was to advance a definition of culture that does not address what researchers do and how they use the language of culture to describe their findings, I would have either failed miserably or have attempted something entirely different. Some philosophers have attempted to offer a normative concept of culture, proposing how scientists should use the
term. My aim here is descriptive. In order to pursue this goal, I will mostly follow a definition of the concept “animal traditions” proposed by Susan Perry and Dorothy Fragaszy (2003) and adapt it to a general definition of animal culture.

There is no intrinsic originality in this definition. Indeed, anthropologists Alfred Kroeber and Clyde Kluckhohn famously brought together and inventoried more than 150 definitions of culture in the 1950s. Their list has surely expanded considerably since that time. The definition that now follows owes much to a long tradition of definitions going back at least to Franz Boas, the famous forefather of American cultural anthropology. Again, my aim here is to establish a reasonable minimal concept capable of capturing the commonalities shared by the hundreds of contributions to the study of animal behaviour that deal with the idea of culture or tradition.

With no further ado:

A phenotypic character, an artifact or any byproduct of an individual’s behaviour can be said to be ‘cultural” to the extent that it fulfills at varying degrees the following cultural properties:

(a) being the result of a specific mechanism of social learning
(b) being distributed in a population
(c) having a certain stability or permanence in time.

A corollary to this definition is that each of these different dimensions of what constitutes a cultural entity admit of degrees.

This proposed minimal concept of culture has a number of characteristics that are worth mentioning (for details see Anonymized):

– It is transparent to the extent that it is independent of strong theoretical commitments.
– It is a concept based on prototypes or instances of what actual practicing scientists consider cultural behaviour.
– It is a distributional or populational concept, to the extent that variation is an intrinsic part of its characteristics (Godfrey-Smith 2009). Under

I basically take Susan Perry’s and Dorothy Fragaszy’s proposal of what an animal tradition is and wearing the philosopher’s hat divide it into three different cultural properties.

A reader of a previous version of this article complained that the concept allowed promiscuous inferences regarding traits not always thought to be “cultural” traits. For instance, the reader claimed, if courtship behaviors are socially learned, then successful mating will be the result of a specific mechanism of social learning. And if the mating produces offspring, they (and their genetic constitution) will be the result of a specific mechanism of social learning. It follows that genetic differences, and their associated phenotypic trait differences, are cultural. Whereas my critic saw it as a weakness of the concept of culture which I endorse here, I certainly do not. This kind of promiscuous inferences, though initially counterintuitive, explain a number of crucial phenomena of gene-culture coevolution. See Sperber (2007) for the need of a concept of culture which captures gene-culture coevolution. Also, please note that the ‘intuitive plausibility test” that the critic was proposing would be relevant if I was implying that the offspring genetic differences are strongly cultural in all or just one of the cultural dimensions, which I am not. The study of cultural influences in mate choice decision making in non-human animals is an active research program registered in Fig. 3.
this definition, behaviours, and effects of behaviour can be “more or less cultural” (Sperber 1996).

At the risk of being redundant, our aim here is not to provide a brand new definition, but rather to take stock of what unites all of the interesting animal behaviour research conducted to date that treats of the notion of culture.

4 An elusive natural kind

As we have shown above, the concept of culture has been prevalent in the study of animal behaviour for some decades now. However, the question arises as to whether or not animal culture is a natural kind. But why is this an interesting question at all? Why does it matter?

The question should arise particularly considering the previously proposed culture concept. Such a concept, which attempts to represent what most researchers in animal behaviour refer to when they use the notion of culture, is a very minimal concept. In fact, the requirements for the behaviour of a social animal to qualify as cultural are very low indeed. Under this concept of animal culture, animal culture becomes an almost trivial phenomenon by itself. With such a low threshold for qualifying as a cultural behaviour, the interesting question becomes not so much whether a certain animal behaviour is cultural, but rather: how is it cultural? In other words, what are the mechanisms contributing to the propagation of behaviour? What are the diffusion patterns followed in its propagation? What is the ecological function of these mechanisms?

Given the general nature of this concept, any apprehension one might have concerning the prospects of understanding culture in terms of a natural kind might be justified. A typical argument for what it means to be considered a natural kind states that a grouping of entities within the framework of a well-corroborated scientific theory is a natural kind if the category that is formed by those entities is underpinned by a series of deep and intrinsic characteristics that allow a series of coherent causal generalizations to be based on the existence of that category.

In philosophy it is often claimed that an inventory of natural kinds aspires to capture the “furniture of the world” or at least the main elements that emanate from the scientific view of reality. Typically, the most basic categories of the physical sciences, such as electrons or chemical components are considered to be prototypical bona fide natural kinds.

More recently, however, an increasing number of voices in philosophical theory have recognized the need to expand this view to include a larger set of natural kinds. On this more liberal view, it is not only the hard sciences that can provide us with the most basic elements of reality, but largely corroborated elements of “soft” sciences such as psychology or economics are also candidate natural kinds.

Under this new view of natural kinds, it is no longer the case that scientific categories are either natural or spurious. Rather, certain scientific kinds can be
seen as positioned somewhere between two extremes, one purely explanatory of the structure of reality and the other linked to more particular interests of a pragmatic kind (Craver 2009). Kinds can be seen as more or less natural. Our concern, therefore, should not be so much to list or inventory the deep constituents of reality, but rather to establish some rigorous regulative ideals as to what kind of categories should be part of science⁶. The aim, to be sure, is both regulative and descriptive, for by examining the way scientific communities structure their conceptual landscapes, questions about the naturalness of kinds may also inform us about which practices are useful to the pursuit of scientific knowledge.

To further understand the relevance of the question, it may first be useful to quickly mention two different ways in which animal culture was seriously (and unsuccessfully) thought to be based on a natural kind.

The way the concept of animal culture is currently used in animal behaviour research is largely independent of the exact social learning mechanisms at the root of cultural propagation. In fact, the great diversity of mechanisms of social learning has been and continues to be a subject of intense study (see Whiten et al. 2004; and also Hoppitt & Laland 2013, Chapter 4). Up until the 1990s, however, imitation was considered by some researchers to be a key diagnostic sign of the presence of culture in a species.

In 1992, in a much cited article provocatively titled “The question of animal culture”, Bennett Galef (who later became president of the Animal Behavior Society for a number of years) noted that in absence of proof of the existence of real imitation, certain behaviours observed in birds or chimpanzees could not be said to be cultural. Primatologist Michael Tomasello took the logic behind this idea a bit further by conceiving of a general model of cumulative culture in which such a form of cultural propagation was not possible without what he then termed “true imitation” (Tomasello 1999).

Despite their considerable influence in this area of research, Galef and Tomasello did not succeed in imposing their terminological and theoretical points of view. The view linking true imitation and culture no longer holds. Forms of true imitation have been observed in other animals, including apes. Since then, the use of the animal culture concept has expanded considerably without really taking into account the requirement of a very specific form of social learning. The presence of what amounts to a diversity of forms of imitative learning has also been established in chimpanzees. And both Galef and Tomasello have revised their initial positions on this matter.

To be clear, appeals to true imitation as a diagnostic sign of the presence of culture were not gratuitous, but were rather aimed at establishing a genuine natural kind based on the evolutionary study of behaviour. Part of the logic at work here was that if social learning was sustained by true imitation, then a series of nomothetic cultural dynamics should follow (for example what Tomasello called the “ratchet effect” of cultural propagation). Stated more

⁶ This is of course a very rough summary of a complex issue in the philosophy of science (for a detailed account see Lemeire 2015; Ereshefsky & Reydon 2015; Martinez 2015). For a rebuttal of the philosophical project of natural kinds altogether, see Hacking 2007
simply, the operation of the social learning mechanism of true imitation was thought to provide an inductive basis robust enough to characterize a natural form of culture, i.e., natural, in the sense that one could use the concept of culture to justify meaningful generalizations based on a causal account. This is not the place to discuss the specifics, but the empirical basis for the inductive generalizations premised on true imitation is not as strong now as it once was thought to be (Morin, 2015).

Another once relatively popular stance on the question of the naturalness of culture can be linked to the popularity of memetics, or if you prefer, to the belief in the existence of an entity that underlies culture, that is, a cultural substance. Although one can accept that modeling the causality of cultural propagation in this way can be useful in some instances, it is certainly not the case that this results in a valid general characterization of culture. The memetic approach to culture typically appeals to models provided by Mendelian genetics, population dynamics, and DNA replication. In this manner, culture is considered as a form of heredity that allows one to infer a number of nomothetic regularities and causal generalizations. On other related accounts, those nomothetic regularities are supposedly derived from the nature of culture as “information” (Lewens 2014; Ramsey 2013). The problem with this approach is that it places undue focus on the general characteristics of so-called ‘cultural information’, thereby disregarding the specific diversity of mechanisms that drive social learning and propagation. Moreover, however useful the culture as information approach might prove as a modeling simplification in some instances, if taken as a definition of culture in general, it seriously hinders our ability to understand cultural phenomena. The main reasons (for details see Anonymized), are twofold:

1. By appealing to the concept of information one may be presupposing exactly what deserves an explanation, namely the nature of social influence and the properties (both evolutionary and mechanistic) that make that influence relatively lasting and relatively widespread in a population.
2. In the case of “animal culture” reifying information is very much at odds with the current practice and methodology of most studies on the phenomena linked to this concept. In these studies, information as such is seldom invoked as an explanatory resource (if anything it serves as an explanandum more often than as an explanans). Information, it is true, is a concept that is frequent in the mathematical modeling approach to the evolution of cultural capacities. Such a use, however, may be easily considered to be one of the assumptions or simplifications at work in those models rather than as a very solid ontological statement regarding the reality that these models aim to describe.

Given the range of diverse social learning mechanisms by which a form of animal behaviour can be said to be cultural, and given the lack of any general causal property or substance (“cultural information”) that offers a solid inductive basis for making valid generalizations, it seems legitimate to
ask whether animal culture is a natural kind. And if it isn’t then how might we best describe it?

4.1 Homology

In order to tackle the naturalness of the concept of animal culture, other more promising strategies than the two already outlined still remain. We might find inspiration in the way that other wide-ranging biological or psychological traits have been characterized as natural kinds. Two general strategies can be deployed in an effort to carve biological traits at nature’s joints: the search for homologies, and the search for an evolved function.

The first approach relates to the quest for biological precursors to human culture in other animals. Since the publication of Darwin’s *The Origin of Species*, homology has been considered to be the product of descent by modification. In the same way, from a natural kinds perspective, it is descent by modification that might explain the resemblance among biological traits, and that guarantees the inductive generalizations which may derive from such resemblance (Brigandt & Griffiths 2007). Thus, human dispositions for culture may maintain certain homology relations with other capacities present in primates, most especially, our closest living relatives, the great apes.

But homology of what? At what level is a resemblance to be traced in order for the category of culture to have some basis in homology? Usually, findings of anatomical homologies enjoy a more robust theoretical status. The notion of anatomical homology is less disputed and less controversial than the notion of functional homology (Love 2007). However the notion of anatomical homology is also problematic in the context of searching for precursors to a given type of behaviour. Linking anatomy or genetics with behaviour is not a straightforward task. Besides, the description of behaviour itself typically requires the use of finalistic or functional language. In practice, when faced with the lack of precise genetic or cerebral data needed for sustaining a comparative approach between human cultural capacities and those of other primate species, behavioural level functional homologies (Herrmann et al. 2007) have been the most intensively studied in the search for the naturalness of animal culture. Such was the state of the field when the debates about the lack of true imitation in other species arose. One way of framing the question about true imitation was to ask whether it was a human evolutionary innovation or what is referred to in systematics as an *apomorphy*, or whether it was shared with other primates by common descent thus constituting a *synapomorphy*.

Our actual knowledge of the comparative study of behaviour shows that our species shares several behavioural synapomorphies with other species that are relevant to the description of social behaviour (Gomez 2005). However, our species also presents a series of behavioural apomorphies that probably were not present in our common ancestor with other great apes (see Carruthers 2006, pp. 154-157 for a long list of plausible candidates). The existence of these apomorphies, many of which may have cultural significance, as well as
the ubiquity of animal cultures in taxa as distant from each other as corvids, primates, or even fruit-flies (Lihoreau & Simpson 2012; Logan et al. 2016) may suggest that the homological approach is very limited in its ability to respond to the question of the naturalness of animal culture.

4.2 General selection pressures

What about the other option of grounding a biological natural kind on its evolved function? This approach is linked to the quest for selection pressures that are strong and general enough to account for the emergence of cultural capacities. If such sufficiently strong and general selection pressures are detected, these could in principle inform us about the form and function of the adapted trait in a relatively wide range of environments, thus providing a causal basis for inductive generalizations.

The idea of convergent evolution supposes that given enough biological variation, natural selection is able to produce highly similar biological traits in fairly distant taxonomic lineages provided their evolutionary environments are sufficiently similar. Much in the same way dolphin fins and shark fins resemble each other by virtue of their common evolutionary environment, different forms of animal culture may resemble each other by virtue of a given trait or disposition’s more general evolved function.

The most common critique against this approach is certainly the limiting role of morphogenetic factors (see Thierry 2000). Not just anything can evolve from anything. A great deal of the time, behavioural ecological theory is just theory in search of empirical corroboration. To assume, for argument’s sake, that this is not an issue is to subscribe to the usual “phenotypic gambit” (Grafen 1991), a working hypothesis that can be legitimately pursued as such. So let’s judge this approach on its own terms.

Certain evolutionary models that are general enough in scope could in principle provide an anchor based on sufficiently strong and general selective pressures. For instance, the “costly information hypothesis” (Coolen et al. 2003; Kendal et al. 2011) links the evolution of a general form of social learning with the costs and benefits of exploring problems in the environment when these problems have already been tackled by other individuals. According to other general models linking cultural learning with certain forms of variability in the selective environment, the development of a cultural form of life would be closely linked with changing selection pressures and the need to adapt to a plurality of environments (see Potts 1998 on the variability selection thesis). It follows that culture would be, in Robert Boyd and Peter Richerson’s (2000) felicitous phrase, “built for speed not for comfort”. In other words, a capacity for acquiring adaptive solutions that have already been acquired by some other individual in response to problems in the environment. Such a disposition would be especially well-suited for rapidly changing selective environments.

However rich these general models might be in theoretical insights they also have obvious limitations when it comes to providing a general explanation for
the vast domain of animal cultures. Some of these limitations are intrinsic. For instance, variability selection models are only valid within certain parameters of environmental variability, leaving aside other forms of social learning mechanisms that would be expected under different conditions (McElreath & Strimling 2008). Moreover, *ceteris paribus*, cultural stability as such (“animal traditions”) is not selected for in rapidly changing selective regimes.

But other limitations are extrinsic, almost by definition. Thus, in as much as certain forms of social learning could be an evolutionary accident or byproduct of other evolved characteristics, an evolved function, no matter how general, could not cover those cases that are not strictly functional. In this case, the developmental constraints that we had ruled out for the sake of the argument, would come back with a vengeance. They would do so not so much in the form of evolutionary constraints but rather as components and aspects of certain social learning processes not strictly covered by an approach that focused exclusively on evolutionary function.

5 Possible ways forward

5.1 Homeostatic cluster?

Another one of the most recently favored notions of what a biological natural kind is, points to yet another distinctive approach. This is the concept of a natural kind as a “homeostatic property cluster” (Boyd 1991). According to this modern view of natural kinds, many natural kinds are not so much characterized by necessary and sufficient conditions that establish membership, but rather by a more flexible set of properties, some of which tend to cluster together following causal regularities. Thus, the presence of one or several of these characteristics may be considered a reliable indicator of the statistical cooccurrence of other properties. In order for the category to constitute a natural and not simply notional kind, this statistical cooccurrence must be established on a causal basis.

In recent years, certain wide-ranging biological categories whose naturalness was also disputed (the concepts of “species”, “organism” or the concept of “life” itself) have been approached from this point of view (Dieguez 2013).

The fact that the most common concept of animal culture is composed of what we called “cultural properties” may provide an idea of how to proceed. If the aforementioned cultural properties tended to cluster together on a sufficiently reliable basis, established from the causal properties of certain forms of social learning mechanisms, then it would make sense to talk of a homeostatic property cluster of culture. Is this indeed the case?

The answer cannot be given on an a priori basis. A population of cultural agents can satisfy some of the properties of a cultural behaviour (social learning, stability, relative frequency in the population) to varying degrees without those properties being necessarily linked. Logical necessity is precisely the kind of necessity that is invoked and rejected here. The empirical details depend on
the specifics of the social learning mechanisms and the diffusion process (see Claidiere & Sperber 2010).

The homeostatic property cluster of culture may be positively regarded as an ambitious but interesting working hypothesis in the search for a natural kind of culture. It is not, however, a hypothesis whose methodology appears straightforward. Louis Lefevbre, Simon Reader and collaborators have shown how a related behavioural kind—the rate of behavioural innovation—can be evolutionarily associated to a cluster of biologically relevant characteristics such as rate of social learning or relative size of association areas in the brain in both primates and birds (Reader & Laland 2002; Lefevbre et al. 2004). The use of a similar methodology could test the foundations of some forms of homeostatic property cluster concepts of culture. Success, however, is not guaranteed in advance.

5.2 Reduction

Considering the diversity of mechanisms and patterns of diffusion that potentially participate in the propagation of cultural behaviour one might reasonably wager that if any clusters of properties are to be found, the most reliably co-occurring ones will be found at a specific rather than general level.

Were clusters—or even families of clusters—of interesting causal properties to be discovered exclusively at a lower level, that could, in principle, also be a reason for a reduction of the original category. In this kind of reductionism, the upper level category is now absorbed by a narrower category. The loss of extension of the older term could then be justified to the extent that the new category has a more robust inductive structure. The division of previously established biological or psychological categories into more natural categories (Griffiths 1997)—thereby resulting in the older categories’ loss of extension—is not without precedent.

On this scenario, considering the naturalness of culture, the bottle is half full. According to this, we may have one or various populational concepts of animal cultures well anchored in the existence of generally recognized case studies or prototypes (Catherine Driscoll’s 2016 proposal amounts to a similar strategy). This general reduction strategy allows the proliferation of special models to explain different cultural dynamics. Stated in the terms of a prominent text book on the categories of the philosophy of biology, the naturalness of a kind is discovered “not through the construction of definitions at the beginning of inquiry, but, if we are lucky, as the culmination of inquiry” (Sterelny & Griffiths, 1999, p. 357).

5.3 Elimination

One can also claim that the bottle is empty. A few years ago, asked to state one scientific idea whose time is due, several researchers in anthropology answered
with the concept of culture. As mentioned in the introduction, this is not a radically new idea in that discipline.

Consider anthropologist Pascal Boyer’s argumentation, and how it can be similarly applied to the case of animal culture. Briefly, he argues that if culture is an overly encompassing concept there may be nothing of interest which can be said “in general” about it. In the same sense that there can not be a science of trees—he claims—there can be no science of culture. Group dynamics and social psychological models may allow for generalizations at a lower level, but not at the most general one. Pascal Boyer is calling for what philosophers of science call an “elimination” of the concept of culture.

Perhaps, in the field of animal behaviour, there is but a small step between the actual landscape in which culture is an articulated concept inside a network of other concepts, and an eliminativist landscape in which social learning occupies the large central node of the network much as it does already. Consequently, the other properties associated with cultural phenomena (stability, distribution in a population, etc.) should be referred to in a more explicit fashion. In fact, “social learning” does already play a larger articulating role than that of “culture”, a term which tended to be avoided by some researchers (e.g. Fragaszy & Perry 2003 considered the epistemological interest of the term “culture” to be too anthropocentric). A weaker version of this eliminativist position may still accept the use of the concept in a descriptive fashion, as an *explanandum*, while proscribing its role as an *explanans*. Under such a view, the culturality of a trait is a feature in search of an explanation (not an explanation itself). The adjective “cultural” can thus survive easily (Sperber 1996), whereas the reference to culture would be unduly essentialist. The strongest eliminativist version calls for a stricter use of language and proscriptions against the idea of culture altogether.

6 Conclusion: Carving into an outdated epistemic object

I have shown that there are serious reasons why one can doubt that animal culture is a natural kind in its current state. The fact that it is not solidly anchored in one of the several available theories (homology, selection pressures, information, etc.) purported to reveal its inductive nature is the main obstacle. It was reasonably hoped that the animal culture concept could in principle provide a basis for the foundation of the natural kind of culture. That it did not, also raises doubts as to the naturalness of the idea of culture in general. If I have suggested a methodologically challenging way to explore Homeostatic Property Cluster concepts of animal culture, the truth is that elimination (in some of its different forms) appears as the risk-averse choice from a natural kinds perspective.

7 The question was asked by the Edge Foundation and the answers are available at: www.edge.org/contributors/what-scientific-idea-is-ready-for-retirement

8 Although the notion of social learning is not entirely without problems either, both from a mechanistic perspective (Reisman 2007) and as a contender for a natural kind (Heyes 2012).
One could also glean a less radical epistemological lesson from the previous analysis of the conceptual network of animal culture. Even strong eliminativists such as Pascal Boyer recognize that culture is a convenient term to describe “cultural stuff”, however various and disparate this stuff might be. Moreover, scientific research does sometimes need central concepts that are not strictly natural kinds. Culture might be seen in retrospect to have played the role of “epistemic object” (Müller-Wille & Rheinberger 2012), a placeholder whose definition and conceptual range remain vague and yet nevertheless prove powerful enough to assemble a field of research and create wide meaningful connections deemed worthy of exploration due in part to the existence of available techniques. In the field of animal behaviour, a series of research methods and techniques have been deployed both in the lab and in the field in the pursuit of this epistemic object that is culture (Sabater Pi 1978; Whiten et al. 1999; Rendel & Whitehead 2001; Horner & De Waal 2009; and more generally Hoppit & Laland 2013, Chapters 5-7). These methods and techniques opened a new space to build knowledge around a topic that was almost entirely ignored only a few decades ago. And yet these methods and techniques come with their own array of limitations which have already been pointed out in the past (e.g. Laland & Janik 2006; Langergraber et al. 2016; Koops et al. 2014) and which leave their own grey areas.

There have always been influential figures in this field of research which at some time or other have called a halt on using the concept of culture altogether. I suspect that the simple removal of the central term of an important amount of work led in this area cannot transform the field by mere fiat. Pragmatic interests might also privilege the continued use of the term for the purpose of scientific communication. However, understanding the crudeness of the ethological concept of culture can only promote progress. For this partly outdated epistemic object (recall its humble XIXth century roots!) should be considered a rough rock from which to smooth and carve more specific causal models related to learning mechanisms, behavioural ecology, diffusion dynamics and the stability of traditions.

Acknowledgements:

Earlier versions of this work were presented in seminars and workshops at the University of Cambridge, University of Paris-1, and University of Granada. I am particularly indebted to Riana Betzler for thoughtful reading and commentary of an early version of this work, as well as to John Alwyine-Mosely, Robert Brandon, Camilo Cela-Conde, Jean Gayon, Tim Lewens, Gabi Lipede, and Manolo de Pinedo for their feedback.
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