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**Steps to an ecology of knowledge:
Continuity and change in the genealogy of knowledge**

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Abstract

The present paper argues for a more complete integration between recent ‘genealogical’ approaches to the problem of knowledge and evolutionary accounts of the development of human cognitive capacities and practices. A structural tension is pointed out between, on the one hand, the fact that the *explicandum* of genealogical stories is a specifically human trait and, on the other hand, the tacit acknowledgment, shared by all contributors to the debate, that human beings have evolved from non-human beings. Since humans differ from their predecessors in more ways than just the lack of a particular concept or cognitive ability, this casts doubt on the widely shared assumption (the ‘Constancy Assumption’) that, when constructing a genealogical narrative for a particular concept (e.g., our contemporary concept of knowledge), it is permissible to hold all other factors (e.g., individual ‘on-board’ cognitive capacities) fixed. What is needed instead, I argue, is an ecological perspective that views knowledge as an adaptive response to an evolutionary constellation that allows for a diversity of selective pressures. Several examples of specific conceptual pressures at different stages in human evolution are discussed.

1. Introduction

In recent years, the term ‘genealogical’ has come to be used as a label for a number of epistemological positions that, in one way or another, depart from ‘mainstream’ analytical epistemology.¹ In the present paper, I analyse the background assumptions that underlie the genealogical method in epistemology. While genealogical approaches provide an important corrective to more traditional analytical epistemology, I argue that the genealogical project will remain incomplete until it is more fully integrated with empirically informed accounts of how human cognitive behaviour has evolved over time.

The remainder of this paper is organised into three sections. The next section (Section 2) analyses contemporary applications of the genealogical method to the problem of knowledge. Taking its lead from Edward Craig’s attempt at a ‘practical explication’ of the concept of knowledge, the section goes on to discuss the generalised

¹ E.g., Craig (1990, 2007), Williams (2002), Fricker (2008).

problem of the role of, and the interplay between, continuity and change in imaginary genealogies. Section 3 challenges an assumption shared by several contemporary approaches, according to which the ‘on-board’ epistemic faculties of individuals are to be held constant throughout the hypothetical evolution of the concept. This ‘Constancy Assumption’, I argue, unduly restricts the scope of the genealogical method and risks distorting our overall picture of how human cognitive capacities – and with them our concept of knowledge – have developed. The challenge to the Constancy Assumption is two-fold: first, one might worry that our individual cognitive capacities themselves are mischaracterised if they are being presupposed as ‘genealogically prior’ (Section 3.2); second, one can point to paleoanthropological evidence that casts doubt on the Constancy Assumption (Section 3.3).

Section 4, finally, provides a general framework for bringing evolutionary considerations to bear on our attempts to understand the nature of knowledge. Filling in the details of how knowledge as a concept has evolved as an adaptive response to the conceptual pressures experienced by epistemically interdependent social beings, I suggest, is as much a task for philosophers as it is for cognitive scientists and others who are well-versed in the empirical study of human cognition and its origins.

2. Continuity and change in the genealogy of knowledge

Recent attempts to apply the genealogical method to the problem of knowledge are born of a sense of dissatisfaction with the familiar epistemological project of stating necessary and sufficient conditions for when a true belief should count as knowledge. The exclusive focus on necessary and sufficient conditions, so the argument goes, unduly restricts the scope of philosophical inquiry; in particular, it overlooks that conceptual analysis does not exhaust the point and significance of our concepts. What is called for instead is ‘conceptual synthesis’ (Craig 1990) – an approach, that is, which aims at identifying the conceptual need that is filled by our (current) concept of knowledge. Such an explication of the functional role of a concept may be said to be ‘genealogical’ in character when it takes the form of an explanatory narrative describing a way the extant concept ‘came about, or could have come about, or might be imagined to have come about’ (Williams 2002: 20). An epistemological approach that fits this mould was initially put forward by Edward Craig under the label of ‘the practical explication of knowledge’ (Craig 1986), and has since been elaborated on by Bernard Williams (2002) as well as by Craig himself (1990, 2007), along with an increasing number of other contributors to the debate (e.g., Fricker 2008, Kusch 2009).

Since Craig’s genealogical account of the emergence of knowledge (or, rather, our concept of knowledge) has been ably summarized elsewhere, I shall here only give a truncated version of his story, which emphasizes those aspects of the interplay

between continuity and change that are relevant to my subsequent argument.² The starting point of Craig's genealogical narrative about how the need for the concept of 'knowledge' might have emerged is his notion of an (imaginary) epistemic 'state of nature' (Craig 1990: 9). This idea invites us to consider a 'simplified, imaginary, environment', which is inhabited by 'a group of of human beings who co-operate but are not kin' (Williams 2002: 21). While the inhabitants of the State of Nature live in a social world that lacks the kind of epistemic division of labour found in advanced societies, they are nonetheless imagined as by and large identical to human beings like us, insofar as they are equipped with the same 'kinds of human interests and capacities, which, relative to the story, are taken as given' (ibid.). In Craig's terminology, the inhabitants of the State of Nature have the same "'on-board" sources' of information – perception, memory, inferential capacities – as we do (Craig 1990: 11), and these constitute the core of epistemic abilities around which a genealogy of our (generalised) concept of knowledge must be built.

Ex hypothesi, in the State of Nature, there exists no social differentiation into, say, experts and laypersons – in this sense, all members are epistemically on a par with one another (barring, perhaps, some natural variation of epistemic capacities). It will of course still be the case that, with regard to particular facts, some members will be better placed than others to have information about them, if only because they happened to be in the right place at the right time. This, Craig argues, creates a shared conceptual need 'to flag approved sources of information' (Craig 1990: 11) – that is, to pick out reliable and sincere informants. Let us call the concept involved in identifying good informants *protoknowledge* (following the example of Fricker 2008: 40, and Kusch 2009: 65). Which properties of an informant are relevant to attributions of protoknowledge will, of course, vary from case to case. For example, 'being 6ft tall' may be a relevant factor when the object of one's epistemic desire is surrounded by a wall that is 5 ft high, but in other contexts may be entirely incidental.

As the name suggests, *protoknowledge* is not identical to *knowledge*, and we still need to give an account of how the concept of knowledge – knowledge 'as we know it', so to speak – arises from the need for picking out good informants. What connects the two, according to Craig, is a process of *objectivisation*. As collectives of individuals evolve from the State of Nature into more complex societies, it becomes more difficult for them to keep track of which specific factors are relevant in each case. As a result, our appraisals of others as good informants gradually become detached, both from our own practical needs and epistemic capacities and from the context of specific testimonial encounters. At the same time, novel applications of the concept become possible: for example, inquirers may begin to question whether they themselves have what it takes to count as a (proto)knower, when previously such assessments were solely directed at others. At the end of this process of objectivisation, one arrives at 'the

² For a concise summary of Craig's genealogical story, see (Kusch 2011), especially sections 2 & 3.

idea of someone who is a good informant as to whether p whatever the particular circumstances of the inquirer, [...] someone with a very high degree of reliability, someone who is very likely to be right' (Craig 1990: 91). Objectivisation thus turns out to be a driving force in what one might call the 'transmutation' of the (epistemic) State of Nature, with its ascriptions of protoknowledge to others, into *actual* epistemic communities with their high degree of division of cognitive labour and their collective (as opposed to agent-specific) standards of what constitutes knowledge.

Speaking of 'transmutation' in this context might seem to obfuscate the relation between the imaginary State of Nature and the empirically real *status quo* that stands in need of explication. One might be tempted to regard the genealogical story simply as a hypothetical scenario – and thus a potential explanation – of how our contemporary conceptual framework *actually* evolved from more primitive predecessors. Interestingly, however, this is not how Craig (or Williams, for that matter) wants the role of genealogies to be understood. Both Craig and Williams draw a clear contrast between imaginary genealogies (of the sort associated with State of Nature stories) and both *real genealogies* (in historical time) and *biological changes* (over evolutionary time-periods). Genealogies, we are told, are not to be conflated with (actual) human prehistory – in Williams's memorable slogan: 'The State of Nature is Not the Pleistocene' (Williams 2002: 27). Craig likewise disregards both the need to treat the development of the concept of knowledge 'diachronically' and the usefulness of looking 'at our cognitive faculties as as adaptive responses to changing circumstances and changing needs to information' (Craig 1990: 10). The empirical aspects of how our cognitive faculties and practices have emerged, for Craig, simply have no bearing on 'the core of the concept of knowledge', which he thinks depends only 'on certain very general facts about the human situation; so general, indeed, that one cannot imagine their changing whilst anything we can still recognise as social life persists' (ibid.).

It is puzzling that Craig should discount real, explanatory accounts of the emergence of our cognitive practices in favour of a quasi-transcendental argument from the conditions of possibility of social life. After all, if State of Nature genealogies are meant to throw light on the nature of some of our most important concepts, why must we categorically reject any attempt, however tentative, to situate them in time? Indeed, what has fascinated many social epistemologists about the genealogical approach, is its promise to expand epistemology 'not only laterally across the social space of other epistemic subjects, but at the same time vertically in the temporal dimension' (Fricker 2008: 30). Our genealogies of knowledge, it seems to me, will have more traction with social epistemology at large if they construe the temporal dimension as real, or possibly real, rather than as purely imaginary or fictional. In the remainder of this paper, I shall pursue this line of questioning, by attempting to show that genealogies, though logically distinct both from accounts of human prehistory and from scientific reconstructions of our evolutionary past, should not be artificially kept apart from them. Instead of sticking to the illusion that concepts somehow emerge 'timelessly', and that genealogies merely

serve an illustrative (or explicative) function, I want to suggest that genealogies should ‘cast their net wide’ and explore links with related – e.g., evolutionary – accounts of how human cognitive behaviour has reached contemporary levels of complexity.

The sense of puzzlement becomes even more acute if one reflects on the central role of change in the kinds of genealogies discussed so far. In Craig’s account, our (present) concept of knowledge is thought to be the end product of a gradual process of objectivisation, by which the initial concept of *protoknowledge* transmutes into the kind of (objective, inquirer-independent) *knowledge* that we take to be part of our ordinary conceptual framework. What such genealogies invite us to imagine is a temporal process of continuous change, and without continuity through (imaginary) time we would be hard-pressed to see why the concept we are trying to elucidate should stand in any sort of privileged relationship to the ‘proto-concept’ of the State of Nature. Note also that not all concepts involved in the genealogical scenario are equally subject to change; indeed, it is crucial that the State of Nature, together with the subsequent trajectory that leads us to our present conceptual framework, be described in such a way as to *isolate* precisely the features that are deemed relevant to the emergence of the conceptual practice in question, while holding all other factors constant. However, unless this choice of relevant features is informed by independent considerations, such as evolutionary accounts of how human cognition has developed over time, it would seem to operate in an empirical vacuum. This suggests that, by separating imaginary genealogies from scientific-explanatory considerations, one does not, in fact, gain a higher degree of generality (as Craig seems to believe), but risks losing out on genuine empirical insights. Thus, for an imaginary genealogy to be plausible, it should cohere with scientific, or otherwise empirically informed, accounts of how the corresponding practice has *actually* emerged.

3. Questioning the Constancy Assumption

In the previous section, I argued that by treating genealogies as purely imaginary exercises, with little or no empirical input, one is depriving oneself of the opportunity to gain valuable, scientifically grounded insights into the evolution of human cognitive capacities and practices. In the present section, I shall go one step further by arguing that such alternative accounts, to the extent that they are available, tend to undermine an important assumption underlying the purely conceptual approach favoured by Craig. This assumption, which I shall dub ‘the Constancy Assumption’, concerns the constancy of what Craig calls the ‘on-board’ sources of epistemic agents: perception, memory, inference and ‘powers of reasoning’ (Craig 1990: 11), which are held constant throughout the genealogical scenario. Before discussing specific challenges to the Constancy Assumption, it is worth noting two general considerations that should make one sceptical of any overly ‘static’, abstract conception of conceptual genealogy. First,

there is a tension between the fact that the *explicandum* of our genealogies is a specifically human trait and the acknowledgment, shared by all participants in the debate, that human beings have evolved from non-human beings (which differ from humans in more ways than just the lack of a particular concept or ability). A genealogical story that begins with organisms that are already equipped with the same set of cognitive capacities as us, except that they lack the concept of knowledge – or the capacity of language acquisition, or whatever else one’s *explicandum* might be – thus is known in advance to be incomplete.³ Second, there are limitations to the genealogical approach that result from the coarse-grained way in which it conceives of our epistemic faculties. Consider the division of the “on-board” sources’ into perception, memory, and inference. It is by now a well-established fact of empirical cognitive psychology that each of these categories is itself an umbrella term for a diverse set of more specific abilities and capacities. Upon closer inspection, the seemingly unitary phenomenon of memory disintegrates into a multiplicity of learning mechanisms and ‘memory systems’ (see Michaelian, forthcoming); the same applies to inference. Our perceptual capacities are a similarly diverse bunch and exhibit some degree of heterogeneity even within the same sensory modality. Any genealogy that glosses over such empirical differences also risks turning a blind eye to the interdependencies that may exist at the conceptual level.

3.1 *The Constancy Assumption*

The existence of what Craig calls stable “on-board” sources’ of information plays a central role in genealogies of knowledge, since it is via these sources that epistemic agents receive ‘a primary stock of beliefs’ (Craig 1990: 11). That ‘on-board’ sources of some kind must exist is, of course, beyond doubt and can legitimately be presupposed in any genealogical State of Nature story. (How would one even begin to construct a State of Nature story without them?) However, it is one thing to acknowledge that *some* on-board sources must exist, before a communal practice of sharing information (and with it a need for ascriptions of knowledge to others) may come into existence; it is quite another to posit that these on-board sources are unitary in character, and identical to the ones we find ourselves currently equipped with. Yet Craig commits himself to the Constancy Assumption when he asserts that the on-board sources he identifies provide ‘a firmly fixed point to start from’ (Craig 1990: 11). Lest it be thought that this is merely a comparative statement – in the sense that we have (or at least: would like to think we have) a better grasp on how, say, inference functions as a source of knowledge than we do in the comparative case of testimony – it is worth noting that Craig reiterates

³ A similar issue pervades discussions about the evolutionary origins of language. Languages seem at once too complex and too perfect to be the product of evolution, yet lest one endorse an unattractive saltationist picture of human cognitive and linguistic evolution, one must look beyond the current linguistic evidence for long-term trends that explain the gradual emergence of linguistic capacities. (See also Section 3.3.)

the point in a later paper, where he accords the assumption of constancy central methodological importance. Having characterised the distinction between (imaginary) State of Nature theory and (real) genealogy as ‘like that between starting from what we know about human beings and their situation quite generally, and starting from what history tells us about them at a particular place and time’ (Craig 2007: 196), Craig asserts that without the assumption of constancy, ‘state-of-nature theory’ would be ‘uncomfortably stretched across two very disparate procedures’:

Only those who believe that the human condition has a constant component will see much relationship between them, and then only when restricted to features of human life that are agreed to belong to this unchanging core. (Craig 2007: 197)

It is this assumption of constancy of our ‘on-board’ resources, and of our inferential capacities in particular, which I believe is unduly restrictive and risks distorting our overall picture of how human cognitive capacities have developed. The next two subsections lend substance to this criticism: Section 3.1 questions whether individual cognitive capacities – such as our capacity to engage in explanatory inferences – can be adequately characterised if they are treated as ‘genealogically prior’; Section 3.2 discusses empirical evidence for the co-evolution, from early on in human evolution, of certain ‘basic’ cognitive capacities and cooperative social behaviour.

3.2 Testimony and inference

I shall take my lead from a recent proposal, put forward by Peter Carruthers, which links our practice of seeking good informants to our capacity to make explanatory inferences (and, furthermore, to the very possibility of creative thinking itself). Our capacity to make inferences to the best explanation, Carruthers suggests, is intimately connected to the emergence of language as a means of conveying information. He identifies as one characteristic feature of human cognitive development the appearance, early in childhood, of an ability ‘to generate, and to reason with, novel suppositions or imaginary scenarios’ (Carruthers 2003: 511). This ability manifests itself in much childhood behaviour, for example pretend play, but it extends well into adulthood, where it underlies most forms of creative thinking. How, Carruthers asks, could such an ability – ‘to suppose that something is the case (that the banana is a telephone; that the doll is alive), and then think and act within the scope of that supposition’ (ibid.) – have arisen within the human cognitive apparatus? On the assumption that the human mind consists of (or at least includes) mental modules, each of which is adapted to a relatively narrow, domain-specific class of cognitive tasks, one can then give a functional explanation of why such an ability might have developed. On this view, much of the cognitive activity that accompanies behaviours such as pretend play and creative supposition-generation takes the form of rehearsed ‘inner speech’, through which contents can be globally broadcast across a number of mental modules and, by being

placed in novel cognitive contexts, can associatively give rise to new contents. (See Carruthers 2006: 334.)

However, new contents are not solely generated for the sake of novelty, but also in response to specific problems, as well as in contexts that require action. To this end, agents must also ‘come to believe some of [their] suppositions’. (Carruthers 2003: 512) Tasks such as deciding on the best solution to an abstract problem, or choosing from among a range of scenarios of action, all engage the very inferential capacities that are commonly seen to be at work in abductive reasoning. Making an inference to the most likely outcome of a proposed course of action involves reflecting on a number of hypotheses about what will, or might, happen. If it is indeed plausible that much of this reflection takes the form of rehearsing and evaluating various options and hypotheses in ‘inner speech’, then it is perhaps significant that, as Carruthers argues, when ‘the hypotheses in question are expressed in language, the problem of inferring the best explanation reduces to the problem of deciding which of the candidate sentences to believe in the circumstances.’ (Carruthers 2006: 364). The problem of deciding between candidate sentences we are faced with is, of course, an eminently familiar one: it is simply a version of the problem of which testimonial claims to accept. Hence, according to Carruthers, it seems plausible ‘that the principles of testimony-acceptance are historically and developmentally prior to the principles of inference to the best explanation.’ (Carruthers 2003: 514).

Carruthers’s line of argument suggests that there is room for a great deal more evolutionary interdependence between our cognitive faculties (including our inferential capacities) and our epistemic practices than is compatible with the artificial division into ‘on-board’ sources (which are presumed to have been the same throughout human cognitive evolution) and ‘external’ sources (that is, presumably, testimony). This puts significant pressure on the Constancy Assumption as a premise in the construction of epistemological genealogies, and makes vivid the need for a broader conception of genealogy that treats philosophical State of Nature stories as constrained by other (e.g., evolutionary) accounts of the emergence of our cognitive capacities-*cum*-practices.

3.3 Prospective reasoning and the possibility of planned cooperation

Carruthers’s account, as outlined in the preceding subsection, may itself be regarded as a form of genealogy – not a genealogy of the concept of knowledge *per se*, but of a class of inferential practices, based on a combination of cognitive-theoretical and evolutionary considerations. While this demonstrates that there is room for alternative genealogies with respect to various aspects of our cognitive existence, it does not yet show what the impact of empirical findings on our genealogies should be. In the remainder of this section, I shall address this question more directly, by discussing a specific example of how empirically grounded insights into human evolution may help identify conceptual pressures that push towards the concept of knowledge.

A key feature of human cognitive life is the ability to use symbolic language to represent, and deliberate about, situations that are not present.⁴ While the capacity to form representations in the presence of external cues is shared by many species, the ability to suppress occurrent sensations, along with present needs, in favour of prospective planning for future needs, is only common among the great apes.⁵ Among the latter, humans stand out by their systematic use of symbolic systems, whose meanings and interpretations are established conventionally. For humans, ‘use of representations as stand-ins for entities, present or just imagined’ comes to replace ‘the use of environmental cues in communication’ (Gärdenfors & Osvath 2010: 111). Importantly, symbolic representation allows for a qualitatively new degree of cooperation, in that it enables the coordination of *inner worlds* across individuals (where the term ‘inner world’ refers to ‘the collection of all detached [=uncued] representations of an organism and their interrelations’; Gärdenfors & Osvath 2010: 105). For collectives of individuals to engage in cooperative prospective planning, it is essential that they be able both to communicate their inner representations of future needs and to coordinate future sequences of actions; symbolic language is essential to both.

Peter Gärdenfors and Matthias Osvath (2010) have recently provided an evolutionary account, based on archaeological findings, that seeks to explain the emergence of symbolic means of representation in terms of shifts in the ecological conditions faced by hominins during the Lower Paleolithic. As ice sheets formed in the Northern hemisphere, Africa experienced deforestation and an expansion of the savannahs. Whereas tropical forests are a source of carbohydrate-rich fruit, savannahs are less productive, yet offer a larger mammal biomass; this resulted in selective pressures on hominins to change their diet from predominantly vegetarian to more animal food sources. Interestingly, the resulting Oldowan culture is marked by ‘[t]he appearance of the first sharp-edged stone tool in the archeological record’ (Gärdenfors & Osvath 2010: 107), along with the (selective) transport of stone tools as well as pieces of carcasses, sometimes across ‘considerable geographical distances between the sources of tool raw material sources and killing sites’ (Gärdenfors & Osvath 2010: 108). As Gärdenfors and Osvath put it, the Oldowan ‘lifestyle’ was marked ‘by an extension in time and space’ (ibid.). This required a high degree of prospective planning and social coordination, of both occurrent behaviour and future goals. As Thomas Plummer points out, Oldowan behaviour – specifically the use and transport of tools – was not opportunistic in character, but instead reflected the ‘pressure to curate or economize, based on a current or projected need’ (Plummer 2004: 133).

⁴ The present paragraph draws on the discussion in (Gärdenfors & Osvath 2010); see also (Bickerton 2002).

⁵ And, apparently, among certain species of birds, notably the Western scrub jay (*Aphelocoma californica*).

Much remains unclear about the details of Oldowan culture and early human evolution. Recent research suggests that the Oldowan period coincides with a period of brain evolution that is marked by increased language abilities (Holloway et al. 2004), and brain imaging studies indicate that brain activity during the manufacture of tools during the Lower Paleolithic partially overlaps with areas associated with language, ‘suggesting a possible coevolution of these two systems’ (Toth & Schick 2009: 232). What the empirical data suggests, however, is that, already in these earliest Stone Age cultures, selective pressures existed that favoured collective prospective planning and the coordination of inner representations across individuals. While it would be hasty to credit Oldowan hominins with anything like our concept of knowledge, it is nonetheless plausible to conclude, given the archaeological evidence, that several of the key pressures that push towards greater objectivisation of appraisals of others as good informants were already operative. This applies in particular to the need to recognize informants not only ‘here and now’, but also (and sometimes primarily) in the future. Note, however, that the main driver of this process, on the account I have sketched here, is not the perceived individual need ‘of someone seeking information on the point as to whether or not *p*’ (Craig 1990: 12), but the collective need for social coordination across individuals. An empirically informed perspective on the evolution of human cognitive capacities, thus, should be grist to the mill of a more thoroughly social conception of the genealogical method in epistemology.⁶

4. Evolutionary constraints on the concept of knowledge

The title of the present paper is inspired by Gregory Bateson’s *Steps to an Ecology of Mind*, originally published in 1972 as a collection of essays on a variety of topics ranging from anthropology to learning theory and evolutionary biology. In his introduction, Bateson gives a statement of the kinds of questions he regards as central:

The questions which the book raises are ecological: How do ideas interact? Is there some sort of natural selection which determines the survival of some ideas and the extinction or death of others? What sort of economics limits the multiplicity of ideas in a given region of the mind? What are the necessary conditions for stability (or survival) of such a system or subsystem? (Bateson 2000: xxiii)

Bateson’s modest goal is ‘to clear the way so that such questions can be meaningfully asked’ (ibid., xxiv); he does not claim to provide an overarching unified account of the social and ecological aspects of knowledge. However, the questions he raises fit well with genealogical attempts at conceptual synthesis – as can easily be seen by substituting the word ‘concept’ for each occurrence, in the quoted passage, of the word

⁶ See also (Kusch 2009).

‘idea’. What makes Bateson significant in the present context is his keen awareness that human cognitive and communicative capacities are in important ways continuous with communication and cognition in non-human animals. This leads him to question overly restrictive rational reconstructions, which too readily dismiss the complexity of the process of communication in humans and non-human animals: ‘all that we learn from such [...] criticism is that it would be bad natural history to expect the mental processes and communicative habits of mammals to conform to the logician’s ideal’ (Bateson 2000: 180).

In his essay ‘A Theory of Play and Fantasy’ (included in *Steps to an Ecology of Mind*), Bateson discusses the phenomenon of *play*, which of course is not restricted to humans but can be found in many mammals. In particular, he recounts the experience of observing two monkeys *playing*, that is: *enacting* ‘an interactive sequence of which the unit actions or signals were similar to but not the same as those of combat’ (Bateson 2000: 179). As Watzlawick, Beavin and Jackson (1967) emphasise, all nonverbal behaviour – including the playful actions in monkeys witnessed by Bateson – is governed by the analogic code, ‘according to which the original intent is displayed in the actions of the body’ (Freedman 1989: 283f.). This raises an interesting challenge for the communication of such intentions – in the case described by Bateson, the monkey’s intention to engage in (playful) combat-like behaviour without *actually* entering into combat. It is generally assumed that, in *symbolic* languages – which, unlike analogic code, allow for symbolic negation – the problem has effectively been solved, precisely by affording their users the capacity to express the negation of what their outward behaviour might seem to suggest – in the case of playful combat-like behaviour, that is it *not* their intention to inflict harm on the other.⁷ However, as Bateson insists, it would be quite wrong to conclude that, simply in virtue of its symbolic form, verbal testimony, say, is always received in the spirit in which it is given. In order to avoid misunderstandings, all communication must include metacommunicative information, even in simple communicative acts – for example, in order to indicate that the combat-like sequence of actions should not be mistaken for an actual confrontation. This general need, of course, persists in the case of verbal communication, which is why the same sorts of challenges (or, in Bateson’s terminology, ‘paradoxes’) ‘must make their appearance in all communication more complex than that of mood-signals, and that without these paradoxes the evolution of communication would be at an end’ (Bateson 2000: 193).

Human communication, as compared with animal signalling, exhibits an important additional level of complexity, since humans, unlike other animals, can form representations of the mental states of their interlocutors. One might expect such complexity, and the potential it opens up for deception and manipulation, to dampen the prospects for stable patterns of truthful communication. Dan Sperber, in a recent paper

⁷ On this point, see also Wilden (1980), esp. chapter 7.

that applies the findings of ethologists and behavioural ecologists on animal signalling to epistemological issues of human testimony, appears to come to just such a conclusion when he writes that '[c]ommunication produces a certain amount of disinformation in the performance of its function' (Sperber 2001: 406). Once communication – whether in animals or humans – is recognised as simply one of numerous evolved traits of a given species, philosophical arguments in favour of the 'wholesale' reliability of communication might seem to lose their plausibility: Given that evolution is driven by competition among individuals, communication as a diachronically stable practice can only be expected to be as reliable as is necessary to sustain it as a behavioural trait, whereas individuals will be as self-interested (and hence manipulative) in their communications as they can get away with. Richard Dawkins and John Krebs, in one of their early papers (whose main conclusion its authors have since toned down), went so far as to regard it as an essential part of communication that senders are 'selected to manipulate the behaviour' of recipients. Furthermore, 'as an inevitable by-product of the fact that animals are selected to respond to their environment in ways that are on average beneficial to themselves, other animals can be selected to subvert this responsiveness for their own benefit' (Dawkins and Krebs 1978: 285).

It would be hasty, however, to conclude that evolutionary considerations conclusively rule out the emergence of, say, dispositions to honesty and trust in human communication. While they do count against *unconditional* trust and veracity as evolutionarily stable strategies, the kinds of dispositions at stake in human communication, as Kirk Michaelian rightly points out, 'are not well-modelled by unconditional strategies' (Michaelian 2008: 188). The possibility of rational lying, and other forms of deception and unreliability on the part of the speaker, makes it rational, on occasion, to reject a particular piece of testimony, yet this need not, in and of itself, undermine the rationality of a default stance of accepting a piece of testimony, all else being equal: trusted acceptance and the possibility of rational rejection are both desiderata of our testimonial practices. (On this point, see Gelfert 2008.) Broadening one's conception of the pressures that shape the evolution of communicative behaviour, one can also muster evolutionary arguments in support of the emergence of by-and-large truthful communication. Thus, Mitch Green (2008) has suggested that participation in a norm-guided social practice can be considered an evolutionary *handicap*. On the standard construal, evolutionary handicaps are signals that function as reliable indicators of an organism's fitness and are difficult to fake. In the famous case of the peacock's tail, females prefer males with flamboyant feather displays because, it is thought, a male's ability to survive *in spite of* the increased visibility to predators, the metabolic cost associated with growing extra feathers etc. is a reliable indicator of his excellent overall fitness, not least since it is impossible to fake the signal – that is, grow extravagant plumage – without *actually* incurring the disadvantages of increased visibility, decreased mobility, and so forth.

If difficulty to fake a signal is a precondition of its counting as a handicap, one might think that verbal communication is an unlikely candidate. After all, isn't one worry about testimony precisely that it is so easy for interlocutors (and, indeed, sometimes in their rational self-interest) to lie to us? To be sure, uttering a false statement is no more 'metabolically costly' than asserting a truth. However, as social, norm-guided creatures we may incur costs also in more indirect ways – for example in the form of exclusion from an entrenched social practice, following a norm violation. The existence of norms of communication, as Green puts it, 'make a signal costly to produce not by exacting calories or territory, but rather by making an agent *subject to a loss of credibility*' (Green 2008: 154). Credibility, understood as an attribute of an agent, gives that agent access to the conversational practices of giving and receiving information, offering and requesting reasons, and engaging in cooperative inquiry; loss of credibility, in turn, is associated with loss of the benefits that may be gained from the information in question – as well as with loss of social status. Given the ever-present possibility of error, an interlocutor, in making an assertion, incurs a 'liability to a loss of credibility' (Green 2008: 157); all else being equal, speakers will therefore take care not to 'overplay their hand' and only assert as much as is warranted in the situation at hand.⁸

The idea that human verbal communication, in spite of its symbolic form and high degree of differentiation, is nonetheless subject to many of the evolutionary constraints that govern communication among non-human animals, lends substance to the methodological suggestion put forward in the previous section: that imaginary genealogies (e.g., philosophical State of Nature stories) should always be understood as constrained by scientifically informed (e.g., evolutionary) accounts, rather than as existing in an empirical vacuum. In the remainder of this section, I shall provide a rough sketch of how to think in evolutionary terms about the emergence of the concept of knowledge and its functional role. The basic starting point is the thought that social animals, including humans and their predecessors, have an evolutionary rationale for developing collective mechanisms that minimise the wasting of limited resources.⁹

Given that limitations on resources are a driving force behind biological evolution, it is only natural to expect similar repercussions for the evolution of concepts, including that of our concept of knowledge. Traditional philosophical analyses of knowledge, despite some notable exceptions, for the most part have tended to sidestep the issue of limitations on available resources. However, for the purposes of any 'practical explication' of the concept of knowledge, limitations on how much enquiry is feasible in a given situation, will be of paramount importance. After all, one reason for relying on others for knowledge is precisely the recognition that it is not always possible, let alone practical, to ascertain matters first-hand. Even when we do accept

⁸ Unless, of course, they *know* that they can get away with more.

⁹ As discussed in Section 3.3, the capacity to engage in collective prospective planning may likewise be regarded as an adaptive response to the pressure to economize.

that we must often rely on others for knowledge, the problem of how far one should take enquiry – for example, how much corroboration from independent testifiers one should seek – remains. This suggests that, in addition to a need for ‘tagging’ good informants, there exists a parallel need for indicating collective agreement that, in the particular case at hand, enquiry has been taken far enough. Klemens Kappel, in a recent paper, has referred to this role of the concept of knowledge in the process of enquiry as the need for an ‘*enquiry-stopper*’ (Kappel 2010: 74).¹⁰ As Kappel sees it, this need is the result of a trade-off between what can be gained, in terms of certainty, from further enquiry and how much additional time and effort would need to be expended:

At any given point in enquiry we face a decision task, which consists in weighing the risk of being wrong about p against the risk of wasting time and resources on further enquiry whether p in the event that p is true. [...] In addition, there will be a point where even beginning to calculate in this way risks being a waste of time and energy, though for obvious reasons it may be even more difficult to decide when this point has been reached. (Kappel 2010: 76)

From an evolutionary point of view, the decision task faced by an individual epistemic agent is but the flip side of the general problem of how to allocate limited shared resources. A population of epistemically interdependent beings thus experiences a conceptual need for tagging instances where enquiry has, for all intents and purposes, been taken far enough. The concept of knowledge may then be thought of as, at least in part, a response to the epistemic coordination problem of indicating collective agreement on when enquiry has reached closure. There might seem to be a world of difference between the need for an ‘enquiry-stopper’ and the other two conceptual pressures identified earlier: first, the individual need to pick out reliable informants (as emphasised by Craig), and second, the collective need to coordinate inner representations as a precondition for joint planning (as discussed in Section 3.3). This difference, however, does not translate into any fundamental incompatibility. On the contrary, all three accounts can easily be subsumed under a unified account in terms of the allocation of limited resources, both at the individual and the collective level. Relying on others as a source of information is often an effective way of reducing one’s own expenditure of time and energy (provided one knows when to stop searching for more corroborating information), just as entering into jointly planned, long-term projects prevents a community from having to ‘reinvent the wheel’.

The emergence, in human evolution, of the concept of knowledge may thus be understood as an adaptive response to the selective pressures and conceptual needs experienced by epistemically interdependent, social creatures. This constellation of evolutionary pressures includes, but is not limited to, the need to tag good informants, the pressure not to waste limited resources by taking enquiry further than necessary, and the benefits that may be gained from collective prospective reasoning. The likely

¹⁰ For a related discussion, see also (Kelp 2011).

incompleteness of any particular list of conceptual pressures should not be construed as a shortcoming of the evolutionary approach: It merely attests to the fact that, instead of a monocausal analysis of knowledge, what is called for is an ecological perspective that views knowledge as an adaptive response to an evolutionary constellation that, in all likelihood, included a diversity of selective pressures. Retracing the steps that lead from this evolutionary constellation to our contemporary concept of knowledge requires both a vivid theoretical imagination and a sensitivity to the contingent and changing nature of the empirical constraints that have determined the shape of human cognitive evolution.

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