Social Science Today
Volume 1, Issue 1 (2014), 12-23
ISSN 2368-7169 E-ISSN 2368-7177
Published by Science and Education Centre of North America

Evolutionary Narratives: A Cautionary Tale

Devereaux Kennedy[1*]

[1]Department of Sociology, Grand Valley State University, Allendale, MI, USA

*Correspondence: Devereaux Kennedy, Department of Sociology, Grand Valley State University, Allendale, MI, USA. Kennedde@gvsu.edu

DOI: 10.12735/sst.v1i1p12 URL: http://dx.doi.org/10.12735/sst.v1i1p12

Abstract

While accounts of human action may be strengthened by the addition of a biological component we should be careful not to replace "hard core social constructionism" with oversimplified evolutionary narratives in which human traits are "explained" as the product of natural selection. Narratives have inherent weaknesses as explanatory accounts and evolutionary narratives share these weaknesses. In addition there is no consensus amongst biologists on the target of natural selection and human natural history was anything but a gradual step-by-step process of progressive advancement. Work in the cognitive sciences on the nature and function of human cognitive architecture should be integrated into accounts of human social action. Such integration should be done not by reducing human behavior to its biological prerequisites but by conceives of human biology as the basis for the almost unlimited variety of meaningful interaction characteristic of human culture and social life.

Keywords: evolution, narrative explanations, natural history, cognitive science, human culture, social life, social theory, sociobiology

1. Introduction

Humans do not come into the world, as John Locke intimated, as blank slates to be shaped by their experiences (Locke, 1689). We have a biological nature which shapes our experiences as those experiences shape us. We are living organisms and accounts of ourselves should include an account of what we are biologically.

While accounts of human action should have a biological component, we should be careful how we integrate that component into our accounts. We don't want to reduce accounts of human social action into narratives in which our present is seen as the mechanical and inevitable outcome of an arbitrarily selected evolutionary starting point. We should not replace "hard core social constructionism" (Pinker, 2002) with oversimplified evolutionary narratives in which human social action is "explained" as the product of natural selection.

When we read popular evolutionary narratives we need to understand the difficulties and limitations inherent in narratives as explanations. These difficulties don't disappear when the narratives in question are natural historical. It is possible to tell a plausible evolutionary story without any possibility of critical and empirical verification (Lewontin, 2010). To do so, however, is to replace outdated anthropology with weak biology.

Evolutionary narratives share the weaknesses of all narrative explanations. Moreover evolutionary narratives which attempt to integrate Darwin's account of the evolutionary process with genetics have their own difficulties. There is, for instance, no consensus amongst biologists on the target of natural selection (Hamilton, 1964; Dawkins, 1976, 1982; Lloyd, 2001; Okasha, 2006; Wilson, 2008, 2012; Gintis, 2012). It is also important for students of human social life to keep in mind what evolutionary biologists know about human evolution. The natural history of our own species was not a gradual step-by-step process of progressive advancement. Human descent, like that of all species, was an iffy, haphazard process out of which we emerged as one possibility amongst many.

Recent work in the cognitive sciences on the nature and function of human cognitive architecture is important for the human sciences. Identifying which parts of this cognitive architecture we share with other creatures and which appears to be unique to us is crucial to our understanding of ourselves. I want to argue that it is our innate properties of mind that provide the biological prerequisites for, and the possibility of, the almost unlimited forms of meaningful interaction so characteristic of human culture and social life.

2. The Darwinian Evolutionary Narrative

Neo Darwinians sometimes compare Darwin to Newton and the theory of evolution to the law of gravity (Dawkins, 1989, p.1). The comparison is flawed. Newton was able to make a number of relatively accurate predictions on the basis of his theory, Darwin was not. It is possible to talk about Newton's laws; it is difficult to think of the theory of evolution in such law-like terms. Theoretical physics attempts to be both explanatory and predictive while Darwinian biology attempts to be explanatory without being, or claiming to be, predictive (Scriven, 1959b, p. 477). Darwin's account of evolution isn't a set of theorems or natural laws expressed in mathematical form. It is a natural historical narrative. Even if it is "the richest explanatory story of all" it remains a story (Boyd, 2009, p.1).

Darwin presented evolution in the form of a story with characters, setting, actions and events linked temporally and causally through conflict and resolution. These are the elements that give all stories their coherence and plausibility (Sugiyama, 2005, p.180). Darwin's narrative retains its power*, precisely because it is a narrative.* This should neither surprise nor trouble contemporary Neo-Darwinians who argue that humans are "story telling" or even "literary animals" (Gottschall & Wilson, 2005). The telling of evolutionary narratives is an exercise of this central part of our nature.

The problem with narratives is that we often become trapped in them. What happens is seen as the inevitable outcome of what has come before. Often our stories distort and simplify reality in the process of making it meaningful.

Analytic philosophers have conducted detailed analyses of narratives as historical explanations (Gardiner, 1959; Hempel, 1965; Scriven, 1959a & 1959b; Dray, 1959; Nagel, 1961; Danto, 1965).

Viewed in analytic terms a story is an account of how change from beginning to end takes place. It takes the following form:

E: x is F at t-1 and x is G at t-3. H happens to x at t-2 (Danto, 1965, p.236). For a story to count as an explanation, H must be the kind of event which can produce a change of the kind F—G in the subject x (Danto, 1965, p.238).

Historical narratives (including natural historical ones) organize the past into temporal wholes (Danto, 1965, p.248). The end of the narrative determines what we select as the beginning. The chief task in narration is to set the stage for the action which leads to that end (Danto, 1965, p.248). The acceptance of the narrative as explanatory requires, at least implicitly, the use of general laws supplemented by rules

which allow us to identify the things that happen as instances of a more general category of things (Hempel, 1965, p.203). Narrative explanations do not, however, account for counterfactual conditionals.

"Even if we know in a general way what must have been the kind of cause which was responsible for the change…there is a considerable distance between the establishment of this connection and the identification of the specific event which falls under the general description. In history there is an endless variety of instances which fall under roughly the same general description" (Danto, 1965, p.243). Identifying the general class an occurrence belongs to doesn't tell us why a particular event falling within that class occurred rather than one of the many possible other events which belong to the same class (Danto, 1965, p.229).

Darwin's *The Origin of the Species and The Descent of Man* (1871) is a natural historical account of how species, including homo sapiens, come into being and change. Species possess both variable and invariable traits. At least some of these traits, including the variable ones, are inheritable. Species live in an environment in which they engage in "a struggle for existence" which puts each individual within each species in competition for scare but necessary resources. Species sharing the same environment are in competition for these resources. If, and this is certainly not always the case, the randomly variable and inherited traits give those members of a species which possess them a competitive advantage over those who lack these traits (and by advantage here Darwin meant only an increased likelihood of survival and reproduction) then these variable traits will, over time, become the invariable and defining characteristics of a new species.

Central to the power of the evolutionary narrative is its elegance and its simplicity. On the basis of a very simple plot it provides an explanation of the growth and development of life on earth from its beginnings. In the beginning there were random variations within life forms and a struggle for existence between and amongst life forms. In the middle is the struggle for existence, natural selection and fitness. The end is modification through descent resulting in the emergence of new life forms.

Though the evolutionary narrative is one the most powerful and influential stories of modern times, it is still a story and like all stories, it leaves a lot out. Survival and reproduction, adaptation and selection, cannot completely explain what organisms are about or how they develop and change (Varela, Thompson & Rosch, 1993, p.194). They don't explain why organisms develop the particular traits they do rather than other possible traits which might have made them equally fit.

"Why, when vertebrates evolved wings, did they have to give up their front legs to do it? After all, insects can have two pairs of wings and six legs, so there cannot be any deep general biological constraint on development. Why don't birds that live in trees make a living by eating the leaves as countless forms of insects do instead of spending so much of their energy looking for seeds or worms" (Lewontin, 2010)?

Darwin himself was quick to point out that natural selection was not responsible for all species modification, though he clearly thought that it was the main factor. Contemporary biologists agree that natural selection is involved in evolution. Many argue, however, that other endogenous factors play a far greater role than Darwin and Neo- Darwinists grant. Thus the debate amongst evolutionary biologists isn't over whether or not natural selection is a factor in evolution. It is over how significant a factor it is and what other factors are involved as well.

Those who question the neo-Darwinian accounts of evolution point out that exogenous selection hardly ever operates on mutually independent traits. Through a process known as "free-riding" some traits which are not adoptive get selected because they are linked to traits which are. Endogamous and epigenetic factors like genomic imprinting (Peters & Robson. 2008), multilevel genetic regulations, and developmental noise play a role in evolution as well (Lewontin, 2000).

Before any phenotype can be offered to selection by the environment a host of internal constraints have to be satisfied and interactions at many levels stabilized. "…selection discards what is not compatible with survival and reproduction… but these limitations allow for a variety of organisms and populations"

(Varela *et al*., 1993, p.195). As a result some biologists argue that fitness and adaptation are proscriptive not prescriptive. Selection is an ongoing process of satisficing that triggers (but does not specify) change in the form of viable trajectories (Varela *et al*., 1993, p.195).

It is, of course, true that organisms live in an environment. However the adaptation of organisms to their environment is at best half the story. Environment and organisms aren't completely separate entities which interact with each other in determinate ways. Organisms and environment mutually specify each other (Varela *et al*., p.198).

"…Organisms and environment are mutually enfolded in multiple ways, and so what constitutes the world of a given organism is enacted by that organism's history of structural coupling…such histories of coupling proceed not through optimal adaptation but rather through evolution as natural drift" (Varela *et al.*, 1993, p.202).

To say that organisms live in an environment or an "ecological niche," into which they must fit or die says nothing about the limitless number of ways they might fit or what makes some particular parts of the external world an "ecological niche." The only way to tell what constitutes an organism's "ecological niche" is if some organism manages to survive and reproduce itself within it. But just as there is no organism without a niche, there is no niche without an organism (Lewontin, 2010).

Many terrestrial organisms help manufacture the environment in which they live. Plants, putting down roots, change the physical structure of the soil in which they are growing. They extrude into the soil chemicals that encourage the growth of certain fungi. These molds form intimate connections with the roots that are a pathway for substances that promote plant growth (Odling-Smee, Laland, & Feldman, 2003). Thus an organism's ecological niche is in constant flux as the organism behaves and metabolizes. Organisms don't just "fit into" niches, they help construct them. (Odling-Smee *et al*., 2003).

In sum many biologists argue that an evolutionary narrative built solely around natural selection and environmental fitness is far too restrictive. They argue that natural selection should be seen as a prescriptive rather proscriptive process. Selection shouldn't be seen as a 'what is not allowed is forbidden' process but rather as a 'what is not forbidden is allowed' process. Organisms vary and natural selection discards those varieties which are not compatible with the strictures of survival and reproduction. However these strictures allow for the constant generation of an enormous diversity of organisms that both shape and are shaped by their environment (Varela *et al*., 1993, p.195). This may not be as coherent a plot line as that provided by the Darwinian narrative but it may provide a more comprehensive account of how evolution happens.

3. The Descent of Man

When looked at from the perspective of its denouncement, the story of human evolution can be seen as a long march toward the acquisition of a large vertebrate frame, sexual reproduction, immature birth, an upright posture, a flexible thumb, a digestive system capable of utilizing a varied diet and, of course, a large brain. Each of these traits can be seen as optimally advantageous adaptations to environmental pressures. Of course had any of these traits put the species that had them at a distinct disadvantage in the struggle to survive and reproduce we wouldn't be here to tell the tale. It is easy to look at ourselves as possessing traits which have allowed us to dominate the earth because we have. Everything is inevitable once it happens.

What needs to be kept in mind is the extreme improbability of this developmental sequence occurring. "… [N]one of this makes sense except as part of a sequence, one of many sequences that were possible" (Wilson, 2012, p.50). We are, in Wilson's terms, the improbable result of lucky turns in the evolutionary maze.

The "descent of man" was an iffy, haphazard process, one possibility of many left open by the proscriptive strictures of survival and reproduction. The evolutionary pathways taken by what turned out to be our prehuman mammalian forbearers were mazelike, consisting of a variety of directions and outcomes of which our species was but one and anything but ordained. In sum, "there is no evidence in living species that some inevitable progressive trend leads to us" (Deacon, 1997, p.30).

Hominid primates existed at least two million years before humans. They existed in diverse forms. Except in hindsight it is difficult to see these forms as stepping stones to Homo sapiens, each one better adopted than its historical predecessor (Hoffecker, 2009; Hublin, 2009; Reich *et al*., 2010).

"The origin of modern humanity was a stroke of luck… and a near thing at that" (Wilson, 2012, p.50). The existence of hominid creatures was precarious. Their populations were sparse. In the harsh environment of the Neocene period during which hominid primates emerged smaller mammals were better able to protect themselves from extreme environmental changes than hominids. They employed burrowing and hibernation to protect them from larger predators. Hominids did not. Extinction rates for all large social mammals including hominids during this period were very high (Wilson, 2012, p.35).

Weather during this period didn't make things easier. Continental glaciers advanced south across Eurasia. Africa, covered by grasslands and desert, suffered a period of prolonged drought and cooling. "In these times of stress the death of a few thousand individuals, possibly just a few hundred, could have snapped the line to homo sapiens altogether" (Wilson, 2012, p.35). "Our prehuman ancestors were not chosen, nor were they great. They were just lucky" (Wilson, 2012, p.22).

4. Thinking about Thinking

The chapter in the evolutionary narrative of most interest to students in the social sciences and the humanities is the emergence of human properties of mind. Compared to our mental properties "the rest of our biology is almost incidental" (Deacon, 1997, p.21). Tracing the evolutionary history of cognition is notoriously difficult because thinking leaves no fossil record. The size and shape of skulls may provide some indication of brain size, but there appears to be no clear correlation between brain size and levels of cognition (Deacon, 1997, p.153).

If we want to get an idea of how human mental capacities evolved the indirect way is to compare human cognition and communication with that of other animals. Such a comparison reveals a number of things. First, we share many of the features involved in our cognition and communication with other animals. Second, the use which other animals make of these features is more limited than or own. Third, humans have cognitive capacities which are unique.

Other animals besides humans are capable of categorical perception, employ signs for communication, use abstract concepts, have large memories, recognize kin and hierarchy. Some may even have a "theory of mind" and a limited sense of self.

Chinchillas, macaques and some birds are capable of categorical perception (Kuhl & Miller, 1975). Vervet monkeys have a sophisticated calling system which they employ to warn one another of the presence of predators using different sounds to indicate the presence of different predators (Seyfarth, Cheney & Marler, 1980). Recent studies indicate that macaques, Diana monkeys, meerkats, prairie dogs, chickens use similar call systems (Hauser, Chomsky, & Fitch, 2002). Many species show an impressive ability to both discriminate between and generalize human speech sounds (Kuhl & Miller, 1975). These data provide evidence not only of categorical perception, but also of the ability to discriminate among different phonemes (Kluender, Lotto, Holt, & Bloedel, 1998). Even in the absence of training, nonhuman primates can discriminate sentences from two different languages.

Animals other than humans use a wide range of abstract concepts, including tool, color, geometric relationships, and number (Tomasello & Call, 1997; Shettleworth, 1998; Seyfarth *et al.,* 1980). Animals

can be taught to understand the meaning of number words or Arabic numeral symbols. Boysen and Matsuzawa trained chimpanzees to map the number of objects onto a single Arabic numeral, to correctly order such numerals in either an ascending or descending list and to indicate the sums of two numerals (Kawai & Matsuzawa, 2001).

Some studies indicate that chimpanzees have a rudimentary theory of mind including the ability to represent the beliefs and desires of other group members. These studies suggest that they recognize the perceptual act of seeing as a proxy for the mental state of knowing (Premack & Premack, 2002; Hare, Call, Agnetta, & Tomasello, 2000).

A number of species besides humans appear to have extensive memories. Experiments with pigeons have shown them capable of remembering up to 1200 pictures. Clark's nutcrackers, when tested in captivity, remembered the location of twenty five acorns for 285 days. Baboons can remember 5,000 items for up to three years (Fagot & Cook, 2006).

While a number of species have impressive perceptual, cognitive and communicative abilities as well as large memory capacity, the uses to which they put these abilities is limited. They utter distinct signals only in functionally important contexts in present time. The number of signals they can make is small. They don't create new sounds for new situations.

While chimpanzees can be taught to understand and use numbers, the training requires thousands of trials over a number of years. Even then they are unable to count beyond the number nine. By contrast a human child who has acquired the numbers 1, 2, and 3 (and sometimes 4) goes on to acquire all the others; he or she grasps the idea that the integer list is constructed on the basis of the successor function. Chimpanzees do not (Wynn, 1992).

There is an odd mismatch between the conceptual knowledge of non-human primates and their ability to communicate this knowledge. Although a wide variety of nonhuman primates have access to a rich knowledge of who is related to whom, as well as who is dominant and who is subordinate, their ability to express this knowledge is very limited (Shettleworth, 1998; Hauser, 2000).

The evidence on chimpanzee's theory of mind is equivocal. In some tests they were unable to differentiate between ignorant and knowledgeable individuals with respect to intentional communication. It is not possible at present to derive any firm conclusions about the presence or absence of mental state attribution in chimps. (Penn & Povinelli, 2007).

While the use of signs is ubiquitous throughout animal kingdom, the relationship between animal signs and their referent appear to hold only as long as they coexist in time and place. When this correlation between time and place breaks down the relationship is forgotten (Deacon, 1997, p.82). Moreover, non-human forms of communication "tend to occur as isolated signals, in fixed sequences, or in relatively unorganized combinations…their correspondence with events and behavioral outcomes tend to be one-to-one correlations" (Deacon, 1997, p.33).

In human language, by contrast, there is typically no straightforward word-thing relationship. Most of the words of human language are not associated with specific functions (e.g., warning cries, food announcements) and can be linked to virtually any concept that humans can entertain. Such usages are often highly intricate and detached from the here and now.

When humans employ symbols the symbolic relationship between a sign and its reference remains even when the sign and what it signifies don't occupy the same time and place. "The symbolic remains stable nearly independent of any such correlation. In fact the physical association between an appropriate object of reference can be quite rare, or even an impossibility, as with angels, unicorns and quarks" (Deacon, 1997, p.70).

What gives linguistic symbols the capacity to maintain the relationship to their referent even in the absence or even the possibility of their co-occurrence in time and place is the placement of symbols within

a symbolic system. Linguistic symbols indirectly refer to the things in the world only by virtue of their reference to other symbols. Words don't just represent things in the world, they also represent each other. The meaning or sense (as opposed to reference) of a linguistic symbol is based on the determinate position it occupies in the system of symbols. The comprehension of the meaning of linguistic symbols and the production of meaningful statements involves combinatorial analysis. The structure of the linguistic system as a whole determines the ways symbols modify each other's referential functions in different combinations (Deacon, 1997, p.99).

"This referential relationship between the words…forms a system of higher order relationships that allow words to be about indexical relationships, and not just indexes in themselves. To perform this function linguistic symbols, words, need to be in context with other words, in phrases and sentences, in order to have any determinate reference. Symbolic reference derives from combinatorial possibilities and impossibilities, and we therefore depend on combinations both to discover it (during learning) and to make use of it (during communication)" (Deacon, 1997, p.83). No species other than humans has the capacity to recombine meaningful units into an unlimited variety of larger structures, each differing systematically in meaning.

Humans like other species employ iconic and indexical signs to communicate but when indexical and iconic signs are incorporated into human language they are transformed. Indexicality is incorporated into what Jakobson (1956, 1971) called the metonymic pole of language: "words with very different (complementary) referential functions tend to be adjacent to one another in sentences" (Deacon, 1997, p.83). Iconography is incorporated into the metaphoric pole of language: "Words that carry similar referential function are more often used alternatively and not together …" The iconic (metaphoric) and indexical (metonymic) poles of language work together within the system of language. The metonymic aspect of language is constructed "…from a set of relationship between icons'" and the metaphoric interpretation is achieved "by bringing this assembly of iconic relationships to bear on the assembly of new stimuli" (Deacon, 1997, p.77).

Symbolic systems like language and mathematics are recursive in nature. The combination of symbolic elements in the system is done on the basis of rules which can be applied over and over again. The recursive nature of rules is what allows us to transform a sentence like "This is the house that Jack built" into sentences like "This is the cat that killed the rat that ate the malt that lived in the house that Jack built."

The recursive nature of linguistic rules gives human language its capacity for discrete infinity (Chomsky 2000). Put simply, it is what allows us with a limited number of words and a limited number of rules to construct an unlimited number of sentences.

While other animals have large memory capacities, human memory is at different level of complexity. Our ability to recall episodes from our past is dependent on the existence of a more basic form of semantic memory.

"Semantic memory is the memory necessary for the use of language. It is a mental thesaurus, organized knowledge a person possesses about words and other symbols, their meaning and referents, about relations among them, and about rules, formulas, and algorithms for the manipulation of those symbols, concepts and relations" (Tulving, 2002).

Episodic memory combines with aspects of semantic memory to make up what is known as autobiographical memory and "…as biography switches to autobiography, may even herald the concept of self" (Corballis, 2011, p.83).

Humans employ their recall of previous experiences, represented in memories, to extrapolate possible future events. We use these extrapolations to construct in thought alternative hypothetical behavior patterns and prepare alternative behavioral responses to them (Ingvar, 1979, p. 21). Our complex memory and language systems give us the ability to project ourselves back in time or imagine future time and to

plan and revise our future behavior based on these projections and imaginings (Corballis, 2011, p.84-85; Tulving, 1983). We are able to employ our capacity for recursive thinking and speaking to develop a theory of other minds. "The ability to understand, or at least surmise, what is happening in the minds of others…is recursive in the sense that in involves the insertion of what you believe to be someone else's state of mind into your own" (Corballis, 2011, p.133).

While chimpanzees may have a rudimentary theory of mind and sense of self, the unique properties of human memory and language (recursivity and the resulting capacity to generate discretely infinite number of thoughts) give humans the ability to engage in much more advanced forms of social thought and action.

Suddendorf and Corballis dubbed the ability to recall previous episodes and project possible future ones mental time travel. They argue that this ability is unique to humans (Suddendorf & Corballis, 1997). Mental time travel involves not just a conscious acting out of episodes, whether past or future, but a recursive embedding of episodes into one another (Corballis, 2011, p.106).

This kind of recursive thinking is what allows us to ascribe different levels of intentionality to ourselves and others. Imagined scenarios like "Jack thinks that I want him to build a house" can be transformed into "Jack thinks that I think there is a rat in the house that he built" and "I want Jack to think that I want him to destroy the malt so that it won't attract rats into his new house." It also makes possible the perpetuation of deceptions like "I don't want Jack to know that what I really want is for him to get rid of the malt in his house because I think he will use it make beer and invite his friends over to drink."

As with the classic version of the evolutionary narrative and that of the evolution of humans as a species it is tempting to conceive of the evolution of human mental properties as the inevitable outcome of a gradually unfolding series of stages leading to ourselves, "the only species capable of reflection" (Deacon, 1997, p.28).

Once again it doesn't appear to be that simple. Just as evolutionary biology is rife with controversy so are the cognitive sciences. There are different positions on the nature and origins of human language; on whether language developed gradually or emerged all at once; on which properties of language are universal and which vary amongst natural languages; on whether language is a property of mind or a reflection of properties of mind of which it is but one product (Chomsky, 2000; Hauser *et al*., 2002; Corballis, 2011; Varela *et al*., 1993; Tomasello, 1999; Oller & Griebel, 2004).

Some the features important to human language and cognition we share with other primates. That is what we would expect if language and advanced cognition was the product of natural selection and natural selection was a gradual, step-by step process of development. Others key features, however, we share with avian species. If, as all biologists seems to agree, evolution is a matter of modification through descent than this process must be much more complex than the classic Darwinian narrative would suggest.

Regardless of how we acquired them the features of human cognition which are unique to us (mastery of symbolic systems, acquisition of a complex and incredibly large memory system containing both semantic and episodic features) allows us to think and speak recursively. This recursivity is responsible for our ability to generate a discretely infinite number of thoughts and utterances. This ability has in turn led to time travel and a theory of mind. These abilities have given us the capacity for strategic and counter strategic thinking and actions. All these abilities have provided us with the biological basis to construct a large number of forms of sociality and culture. These forms of sociality and culture have allowed us to conquer the earth. Whether we will have the wisdom not to destroy what we have conquered only time, future not past time, will tell.

5. Conclusion

This is a cautionary tale about evolutionary narratives. It isn't an attack on evolution; a denial of the biological components of human cognition; or a statement of opposition to the integration of biology into

the study of human culture and social action. I think that we have a nature rooted in biology and that the universal properties of which that nature consists should be the foundation of a serious study of human culture and social action.

If we are to integrate cognitive studies and biology into the study of human culture and cognition we should be careful how we do so. "The theory of evolution" particularly when it is presented in narrative form is really an explanatory sketch. Natural selection is not law-like because it must be linked to massive context sensitivity. It can tell us in general way what must have been the kind of event which was responsible for the evolution of one species from another. "There is a considerable distance between the establishment of this connection and the identification of the specific event which falls under this general description…for there are an endless variety of instances which fall under roughly the same general description" (Danto, 1965, p.243).

At their worst evolutionary explanations can border on tautology or on an affirmation of the consequent. Because a certain trait exists, is wide spread and has had a long life, we cannot assume it is an evolutionary adaptation and then speculate on how it might have contributed to a species' fitness.

Cautions heeded there is much to be gained by integrating evolutionary and developmental biology into the social sciences and the humanities. Locating ourselves in evolutionary time is revelatory and humbling. As a species we are less than two hundred thousand years old, babes in the evolutionary woods. Until fifteen thousand years ago we were just one species amongst many, getting by in good times and on the edge of extinction in bad.

Approximately fifteen to ten thousand years ago we used our unique cognitive architecture to develop a series of inventions which changed us and life on the planet. Agriculture, the domestication and breeding of plants and animals, the development of new tools and weapons pretty much necessitated our living in long-term settlements. Because this "Neolithic revolution" occurred more or less simultaneously in at least six different locales it would seem that by then the cognitive architecture that made this revolution possible was already species wide (Wilson, 2012, p.97-105).

These inventions meant that we were able to transcend the Malthusian dilemma upon which the Darwinian struggle for existence was based. From then onwards when the human population outstripped the available food supply we were no longer at the mercy of fitness enhancing genetic mutations to survive. We could produce our way out of resource shortages. We've been doing it ever sense. Whether the planet's ecology can continue to let us do it, is another very important question.

The massive alterations in human existence which have occurred over the last ten or fifteen thousand years have been far too swift to have been caused by evolutionary changes in human biology. They almost certainly were, however, made possible by our biological capacities particularly the unique cognitive architecture which is part of our nature.

This unique cognitive architecture has enabled us to conceive of and construct a wide variety of social and cultural forms and to engage in social action and interaction which is virtually unlimited and in many ways unpredictable. This cognitive architecture was no doubt formed through a long evolutionary process of modification through descent though the precise nature of that process is anything but certain.

The challenge this poses for the social sciences and the humanities is not to trace back the wide variety of social and cultural forms we have developed to their biological origins. It is precisely the reverse. It is to understand and describe how these universal cognitive properties allowed us to produce such a wide diversity of social and cultural forms. We need to create a conception of social action which is simultaneously biological, cultural/social and situational. At the biological level innate properties of mind provide the prerequisites for the self, self-consciousness and meaningful interaction. The social and cultural level provides the occasion within which these mental properties are activated. However innate capacities and social and cultural forms don't act and interact, people do. In the end it is people who employ their innate capacities, shaped within particular social and cultural forms, to live their everyday

lives, to fall in and out of love, to make and break promises, to aid and deceive one another, and, yes, to tell each other stories. Accounts of human life are never complete unless an account of the everyday life of ordinary people is included in it.

References

[1] Boyd, B. (2009). *On the origin of stories: Evolution, cognition, and fiction*. Cambridge, MA: Harvard University Press.

[2] Chomsky, N. (2000). *New horizons in the study of language and mind*. Cambridge, UK.: Cambridge University Press.

[3] Corballis, M. C. (2011). *The recursive mind: The origins of human language, thought and civilization*. Princeton: Princeton University Press.

[4] Danto, A. C. (1965). *Analytic philosophy of history*. Cambridge: Cambridge University Press.

[5] Darwin, C. (1871). *The origin of species and the descent of man*. New York: Modern Library.

[6] Dawkins, R. (1976). *The selfish gene*. New York: Oxford University Press.

[7] Dawkins, R. (1982). *The extended phenotype: The long reach of the gene*. New York: Oxford University Press.

[8] Dawkins, R. (1989). *The extended phenotype: The long reach of the gene*. New York: Oxford University Press.

[9] Deacon, T. W. (1997). *The symbolic species: The co-evolution of language and the brain*. New York: W. W. Norton & Company.

[10] Dray, W. (1959). 'Explaining what' in history. In P. L. Gardiner (Ed.), *Theories of history: Readings from classical and contemporary sources* (pp.405-408). New York: Free Press.

[11] Gardiner, P. L. (Ed.). (1959). *Theories of history: Readings from classical and contemporary sources*. New York: The Free Press.

[12] Gintis, H. (2012). Clash of the Titans. *BioScience,* 62(11), 987-991.

[13] Gottschall, J., & Wilson, D. S. (Eds.). (2005). *The literary animal: Evolution and the nature of narrative*. Evanston: Northwestern University Press.

[14] Hamilton, W. D. (1964). The genetic evolution of social behavior I & II. *Journal of Theoretical Biology, 7*(1), 1-52.

[15] Hare, B., Call, J., Agnetta, B., & Tomasello, M. (2000). Chimpanzees know what conspecifics do and do not see. *Animal Behavior, 59*(4), 771-785.

[16] Hauser, M. D., Chomsky, N., & Fitch, W. T. (2002). The faculty of language: What is it, who has it, and how did it evolve?. *Science, 298*(5598), 1569-1579.

[17] Hauser, M. D. (2000). *Wild minds: What animals really think*. New York: Henry Holt and Co.

[18] Hempel, C. G. (1965). *Aspects of scientific explanation: And other essays in the philosophy of science*. New York: Collier-Macmillan Company.

[19] Hoffecker, J. F. (2009). The Spread of Modern humans in Europe. *Proceedings of the National Academy of Sciences of the United States of America, 106*(38), 16040-16045.

[20] Hublin, J. J. (2009). The origin of Neanderthals. *Proceedings of the National Academy of Sciences of the United States of America, 106*(38), 16022-16027.

[21] Ingvar, D. H. (1979). "Hyperfrontal" distribution of the cerebral grey matter flow in resting wakefulness: On the functional anatomy of the conscious state. *Acta Neurologica Scandinavica, 60*(1), 12-25.

[22] Jakobson, R. (1956). Two aspects of language and two types of aphasic disturbances. In R. Jakobson & M. Halle. *Fundamentals of language* (pp.53-76). New York: De Gruyter Mouton.

[23] Jakobson, R. (1971). Two aspects of language and two types of aphasic disturbances. In R. Jakobson & M. Halle, *Fundamentals of language* (pp.67-96). New York: De Gruyter Mouton.

[24] Kawai, N., & Matsuzawa, T. (2001). "Magical number 5" in a chimpanzee. *Behavioral and Brain Sciences, 24*(1), 127-128.

[25] Oller, K. D., & Griebel, U. (Eds.). (2004). *Evolution of communication systems: A comparative approach*. Cambridge MA: MIT Press.

[26] Kluender, K. R., Lotto, A. J., Holt, L. L., & Bloedel, S. L. (1998). Role of experience for language-specific functional mappings of vowel sounds. *Journal of the Acoustical Journal of Acoustical Society of America, 104*, 3568-3582.

[27] Kuhl, P.K., & Miller, J. D. (1975). Speech perception by the chinchilla: Voiced-voiceless distinction in alveolar plosive consonants. *Science, 190*(4209), 69-72.

[28] Lewontin, R. C. (2000). *The triple helix: Gene, organism and environment*. Cambridge, MA: Harvard University Press.

[29] Lewontin, R. C. (2010, May 27). Not so natural selection—A review of "what darwin got wrong" by J. Fodor & M. Piattlli-Palmarinini. *The New York Review of Books*. Retrieved from http://www.nybooks.com/articles/archives/2010/may/27/not-so-natural-selection/.

[30] Locke, J. (1689). *An essay concerning human understanding*. London, England: Penguin Books.

[31] Lloyd, E. A. (2001). Units and levels of selection: An anatomy of the units of selection debates. In R. S. Singh, C. B. Krimbas, D. B. Paul, & J. Beatty (Eds.), *Thinking about evolution: Historical, philosophical, and political perspectives* (pp. 267–291). Cambridge: Cambridge University Press.

[32] Nagel, E. (1961). *The structure of science: Problems in the logic of scientific explanation*. New York: Harcourt, Brace & World, Inc.

[33] Peters, J., & Robson, J. E. (2008). Imprinted noncoding RNAs. *Mammalian Genome, 19*(7-8), 493-502.

[34] Odling-Smee, F. J., Laland, K. N., & Feldman, M. W. (2003). *Niche construction: The neglected process in evolution (MPB-37)*. Princeton: Princeton University Press.

[35] Pinker, S. (2002). *The blank slate: The modern denial of human nature*. New York: Viking.

[36] Penn, D. C., & Povinelli, D. J. (2007). On the lack of evidence that non-human animals possess anything remotely resembling a 'theory of mind'. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *362*(1480), 731-744.

[37] Premack, D., & Premack, A. (2002). *Original intelligence: The architecture of the human mind*. New York: McGraw-Hill.

[38] Okasha, S. (2006). *Evolution and the levels of selection*. Oxford, UK: Oxford University Press.

[39] Reich, D., Green, R. E., Kircher, M., Krause, J., Patterson, N., Durand, E. Y., . . . Pääbo, S. (2010). Genetic history of an archaic hominin group from Denisova cave in Siberia. *Nature, 468*(7327), 1053-1060.

[40] Shettleworth, S. (1998). *Cognition, evolution and behavior*. New York: Oxford University Press.

[41] Scriven, M. (1959a). Truisms as the grounds for historical explanations. In P. L. Gardiner (Ed.), *Theories of history: Readings from classical and contemporary sources* (pp. 443-475). New York: Oxford University Press.

[42] Scriven, M. (1959b). Explanation and prediction in evolutionary theory. *Science*, *130*(3374), 477-482.

[43] Seyfarth, R. M., Cheney, D. L., & Marler, P. (1980). Monkey responses to three different alarm calls: Evidence of predator classification and semantic communication. *Science, 210*(4471), 801-803.

[44] Suddendorf, T., & Corballis, M. C. (1997). Mental time travel and the evolution of the human mind. *Genetic, Social, and General Psychological Monographs, 123*(2), 133-167.

[45] Sugiyama, M. S. (2005). Reverse engineering narrative: Evidence of special design. In J. Gottschall & D. S. Wilson, (Eds.), *The literary animal: Evolution and the nature of narrative* (pp.177-198). Evanston: Northwestern University Press.

[46] Tomasello, M. (1999). *The cultural origins of human cognition*. Cambridge MA: Harvard University Press.

[47] Tomasello, M., & Call, J. (1997). *Primate cognition*. New York: Oxford University Press.

[48] Tulving, E. (1983). *Elements of episodic memory*. New York: Oxford University Press.

[49] Tulving, E. (2002). Episodic memory: From mind to brain. *Annual Review of Psychology, 53*, 1-25.

[50] Varela, F. J., Thompson, E., & Rosch, E. (1993). *The embodied mind: Cognitive science and human experience* (New ed.). Cambridge, Mass.: MIT Press.

[51] Wilson, E. O. (2008). One giant leap: How insects achieved altruism and colonial life. *BioScience, 58* (1), 17-25.

[52] Wilson, E. O. (2012). *The social conquest of earth*. New York: Liveright and Company.

[53] Wynn, K. (1992). Children's acquisition of the number words and the counting system. *Cognitive Psychology, 24*(2), 220-251.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal. This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution 4.0 International License.