

Title: How are humans animals? The human as a subject of behavioral ecology textbooks.

Abstract: This article examines the presentation of the human as a subject of ecological and behavioural study in academic biology textbooks and essay collections. It aims to expand a channel of enquiry into the ways in which human relationships with other species are articulated in scientific discourse during an era of anthropogenic climate change (the Anthropocene). Both humans and nonhumans are subjects of behavioural ecology because they undergo evolutionary adaptation. However, the notion that biologists can use evolutionary adaptation to explain human behaviour has been much disputed. The article uses literary analysis to argue that a range of behavioral ecology publications, which all use evolutionary adaptation to explain biological processes, find a variety of textual strategies to situate the human in relation to other species. Rather than arguing that any single approach is particularly appropriate, this variety is taken to be a sign of the complexity of contemporary human and nonhuman identities.

Keywords: Behavioural ecology, evolution, adaptation, Anthropocene, inter-species relationships

How are humans animals? This was a question debated in 1860, following the publication of *On the Origin of Species*. In June of that year, Bishop Samuel Wilberforce met Thomas Huxley at the Oxford Museum of Natural History. Wilberforce was reported to have asked Huxley, Darwin's defender, whether it was "through his grandfather or his grandmother that he claimed his descent from a monkey?".ⁱ

Today, it is widely accepted that the human organism is a product of evolution. However, this is not to say that study of the human evolutionary adaptation has become fully integrated with the study of the evolutionary adaptation of other species. The very notoriety of Wilberforce's question, which survives only as a reported quote and yet has lingered in cultural memory, suggests an ongoing fascination with trans-species ancestry. The question of how to situate the human among other species is newly relevant in the context of the recently-endorsed idea that the current geological epoch should be named the Anthropocene.ⁱⁱ The idea of the Anthropocene marks a new human awareness of humanity's effects on the biosphere. It positions the human as uniquely distinct from, but also uniquely implicated in, the lives of nonhuman species. Indeed, the use of the term Anthropocene is controversial precisely because of disputes over the extent to which it exceptionalises the human and excludes the agency of nonhuman species.ⁱⁱⁱ As Bruno Latour, Donna Haraway, Peter Sloterdijk and numerous other thinkers have pointed out, in the age of the Anthropocene, it is no longer adequate to take for granted a simple separation of human consciousness from animal matter.^{iv} In this context, it will be useful to clarify how contemporary biologists characterise the identity of the human as an animal species: research scientists, as well as theorists, are obliged now to grapple with the recognition that 'animal' is used to both distinguish and to include the human, and that its definitions can have significant global consequences. This paper explores some specific expressions of this human situation, and the implications of these expressions.

The article aims to open a channel of enquiry into the ways in which the complex situation of the contemporary human is articulated in mainstream scientific discourse – here, educational biology texts. It draws on a small sample of academic textbooks from the Behavioral Ecology shelf at York University Library. Each of these textbooks focuses primarily on investigation of nonhuman species. However, the textbooks examined here are similar in that each one also discusses human activity as a subject of behavioral ecology. The books are published by leading academic publishers (Oxford and Cambridge University Presses and Blackwell Science). The texts selected are newly published or have recently passed through new editions. The article begins with an examination of John Maynard Smith and Eörs Szathmári's 1995 *Major*

Transitions in Evolution. It explores how Smith and Szathmári's argument for human behavioral exceptionalism evolves through more recent popular undergraduate behavioral textbooks, *An Introduction to Behavioral Ecology* (Davies, Krebs and West, 1988-2012) and *An Introduction to Animal Behavior* (Manning and Dawkins, 1967-2012), before turning to a collection of essays, *Animal Communication Networks* (McGregor, 2015), which samples different forms of communication, including human language, in studies of behaviors across species.

These books are explored using techniques of close textual scrutiny that are traditionally applied to literary works – that is, it discusses the effects of literary devices such as word choice or analogy. This scrutiny is premised on the assumption that a passage of a biology textbook can be as strategic and as complex as a passage of fiction. Within the small range of books examined here, close analysis shows that the assumptions and means of expression of human-nonhuman relationships are wide ranging.

The books on animal behavior and behavioral ecology share a common tradition in Darwinian evolutionary theory, and yet they find a variety of means to situate the human in relation to other species. The phenomenon of human language is used firstly to identify adaptive processes that are common to human and nonhuman species, and secondly to articulate processes that distinguish the human from nonhuman species. Textual juxtaposition, analogical reasoning, vocabulary and case studies are used strategically to negotiate the challenge to representation that is posed by any attempt to study our own species using the terms with which we study other species. Human identification with other species comes to the fore in certain texts; human exceptionalism comes to the fore in others. The article explains this apparent contrast as offering an insight into the complexity of relationships between the human and other species. The fact that the human-nonhuman relationships are sometimes founded on similarity and sometimes on difference; on inter-species conflict *and* on interspecies collaboration, need not be seen as contradictory: the diverse relationships depicted in different texts, when seen cumulatively, create an impression of the multiple contexts in which humans co-evolve and co-exist with other species.

Behavioral ecology and evolutionary study

The study of evolutionary behavioral ecology - the study of an animal's behavior as a process of evolutionary adaptation to its environment - inherits aspects of its approach from early twentieth-century

'ethologists' such as Niko Tinbergen and Konrad Lorenz, who adopted a natural-historical method when studying species. They emphasised observation of behavior and consideration of each behavioral characteristic's evolutionary value. When Tinbergen looked back on his career in 1972, he summarised the series of questions that had come to characterise his thinking: "With regard to behavior (as with all life processes), we should ask the question 'what's the use of what the animal does? Does it contribute to the animal's success?', as well as the question 'what makes it happen?'" (Tinbergen 1972, p.19). Tinbergen's work did not involve putting these questions to the human species: the human was present as an observer of, and sometime experimenter on, other animals. However, Tinbergen points out that "observation is always much more than a passive taking in of the outside events; as many authors have pointed out, all observation is selective, and this selectiveness is determined from within" (Tinbergen p.20).

Here, Tinbergen recognises and addresses certain compromises that are inherent to the process of cross-species observation. The human investigation of other species is not passive, and it is determined "from within" the human. Nonetheless, the situation within this framework is stable: the human "we" is "author" or "observer", and clearly distinct from the subject of ethological study. While following Darwin's theory that humanity shares a common ancestry with other species, pioneer ethologists tended to demur from the study of humans using the practices which they used to understand other species.

Even as Tinbergen was looking back on his career in the early 1970s, there was an emphatic move to integrate and indeed intensify the examination of the human as a branch of natural scientific study. A debate around whether and how to apply Tinbergen's questions to the human species was ignited by the 1975 publication of E. O. Wilson's *Sociobiology*. *Sociobiology* uses evolutionary and genetic theory to explain, inter alia, the behavioral traits of the human. The first and final chapters concern the human, and intervening chapters concern other species. The aspect of *Sociobiology* that was so divisive was its strictly evolutionary and biological treatment of human behavior - the analysis of human society in accordance with contemporary zoological behavioral paradigms. For example, the book opens with an unorthodox approach to the writing of Albert Camus: "Camus said that the only serious philosophical question is suicide. This is wrong even in the strict sense intended. In a Darwinian sense the organism does not live for itself" (Wilson 2000, p.3). Here, Wilson rigorously applies Darwin's terms to integrate cultural and intellectual aspects of human life into an evolutionary explanation: he applies Tinbergen's questions to the human species. This approach was seen by some to be reductive of human behavior. Wilson examines human nature as something that is

“rooted in our genes”, a consequence of adaptation and natural selection, and this is also problematic in that it assumes that human nature is determined (partly if not exclusively) by morally indifferent forces (p.vi). As Wilson writes in an introduction to a twenty-fifth anniversary edition, two “grievous flaws” were identified by his antagonists: “inappropriate reductionism, in this case the proposal that human social behavior is ultimately reducible to biology”, and “genetic determinism”. His critics, he writes, “disliked” the idea “that human nature could have any genetic basis at all” (p.vi).

Like Desmond Morris’ *The Naked Ape*, which was serialised in 1967 in the *Daily Mirror* and was described in a BBC broadcast as “raising quite a few eyebrows in the scientific and non-scientific world” (BBC News, 12 October 2016), and Richard Dawkins’ *The Selfish Gene*, which was published in 1976 and was a “best-seller” as well as a “game-changer” (Ridley 2016, p.462), Wilson’s approach to the human as an evolutionary subject was one which caused controversy within and beyond academia. Wilson describes the debate as “the most tumultuous academic controversy of the 1970s, one that spiralled out of biology into the social sciences and humanities” (2000, p.vi). At stake was not just the character of a single discipline, but the question of how disciplines could accommodate an evolutionary understanding of the human. In recent years, the term “sociobiology” has largely fallen out of use in favour of the term “evolutionary psychology” – the two terms are cognate in that they suggest a drawing-together of the natural and the social sciences, and both approaches assert the prerogative of biologists to study the human. At the same time, the rapid expansion of the social sciences within universities provided new space for the study of the human as distinct from the scientific study of other species.^vThis disciplinary diversification meant that study of human evolutionary adaptation was streamed through a number of different intellectual traditions.

These many very different academic approaches to study of the human species all hold in common the fact that they cite Darwinian evolutionary theory as their intellectual foundation. Studies that draw on evolutionary theory to explain human behavior cover the span of ethics, philosophy and socio-cultural studies as well as the biological sciences. A significant body of literature considers human morality as a product of evolution: Perhaps counterintuitively, a number of ethical sociobiology or “evolutionary psychology” studies which were published in the second half of the twentieth century positioned themselves within the philosophical tradition of considering morality, with titles like *Man and Aggression* (Montagu 1973); *Science, Man and Morals* (Thorpe 1965); or *The Egalitarians: Human and Chimpanzee* (Power 1991).^{vi}

Other publications review studies of nonhuman animal social behavior with the teleological purpose of explaining human social behavior. For example, Robert Sussmann and Audrey Chapman's essay collection, *The Origins and Nature of Sociality*, describes "patterns of sociality among nonhuman primates that may shed light on human social behavior" (2004, back cover). While positioning their work in relation to *Sociobiology* and scientific study of the human as a means of "shedding new light" on humanity (Sussman & Chapman p.3), the editors question whether an evolutionary biological approach "strips away the potential for genuine moral and social development" (p.5).^{vii} Other authors use evolutionary concepts to investigate human social theories and phenomena. For example, Frank Salter's *Risky Transactions: Trust, Kinship and Ethnicity* (2002), studies kinship and ethnicity in relation to organized crime.^{viii} Meanwhile, in popular science books, the human is often presented as an exceptional species whose particular evolutionary history sets it apart from other creatures.^{ix} These intellectually diverse books all refer to Darwin's theory as the origin of their approach.

The science of behavioral ecology, as a study of how animals adapt to their environments, affords an insight into the human as a creature with its own unique ecology and abilities, but also into how those unique aspects of the human relate to the specific behaviors and adaptive mechanisms of other organisms. The human shares an identity with other species in that the dominant rationale of ecological behaviorism is that of a common process: evolutionary adaptation. In this respect, the human exists within what the Oxford Journal *Behavioral Ecology* calls "the whole range of behaving organisms" which includes "plants, invertebrates, vertebrates, and humans" (2016, flyleaf). However, the human is unique in that it is the only species which is individually named in this list and it is the only species which is both observer and observed.

In this respect, behavioral ecologists situate themselves in a new field of inquiry. They inherit Tinbergen's questions: what's the use of what the animal does? How does it contribute to the animal's success? However, behavioral ecologists also inherit the moral controversy surrounding the human as an evolutionary biological subject. Within the tradition of evolutionary biology, humans appear both as an exceptional species and also as an unexceptional animal that is a subject of evolution, as all 'behaving organisms' are, equally. Close examination of behavioral literature can reveal how this dual identity finds expression - or more accurately expressions. This article finds the expressions to be surprisingly diverse - surprising, because the books cite a common intellectual heritage. Researchers deploy textual strategies for

the presentation of human identity as that of a behaving animal, while also exploring specific differences between humans and other species.

Humans as a “behaving” species

How is a human an animal? If the human is an entity that is distinct from other species, what biological determinants are involved in that distinction? For an evolutionary biologist, the question is not whether humans are crucially different from other species, but whether any crucial difference can be substantiated in biological terms. This was a question that was addressed by John Maynard Smith and Eörs Szathmári in their 1995 book, *The Major Transitions in Evolution*. The book has chapters on significant evolutionary leaps, moving from the development of RNA and DNA, replication, the cell, symbiosis, sexual reproduction, towards devolved complex organisms and societies. Each transition involves a physical or external process until the last: the final chapter is on human language, and is centrally concerned with its biological basis:

Chomsky once said that, although we do have a “language organ”, to speculate about its origins is as futile as to do the same thing about any organ - for example, the heart. This is baffling to an evolutionary biologist, who would make a 180-degree turn, and argue that one should contemplate the origin of any organ, including our language device.

(Smith & Szathmári 1995, p.290)

Again, the question here is not whether language is what sets humans apart, but whether that separation can be established on evolutionary biological terms. The authors consider the thesis that linguistic competence, “like any other complex and adapted organ, has evolved by natural selection”. They address this contention by asking how the capacity for language relates to tool use, genetic disorders, brain damage and general anatomy, commenting somewhat comically, for example, that “the descent of the larynx in humans has increased the range of sounds we can make, at the cost of increasing the chance of choking when we eat and drink” (pp.300-1). They also discuss what they call ‘protolanguage’ in other species:

Consider the following utterances, from two different sources:

Big train; Red book

Adam checker; Mommy lunch

Walk street; Go store .

Adam put; Eve read.

Put book; Hit ball

Drink red; Comb black.

Clothes Mrs G; You hat .

Go in; Look out.

Roger ticket; You drink.

Ticket Washoe; Open blanket.

Although remarkably similar, the first is from children at the two-word stage, and the other is from the chimpanzee Washoe. [...] The two sets are formally identical. ^x

(p.281)

The linguistic analogy, wherein the simple phrases are similar because they use the same parts of speech connected in the same ways, is used to suggest that there is a similarity between the chimpanzee's linguistic abilities and those of an immature human. At the end of the chapter, the authors conclude that the emergence of human language "required changes in anatomy, in motor control, in sound perception and in grammatical competence" (pp.308-9). They argue that these changes, and the consequent development of written language, constitute the latest major evolutionary transition. "The invention of writing made possible the emergence of modern, large-scale societies, and the change from societies dominated by magic and ritual to this in which science and reason play an increasing role" (p.309).

Smith and Szathmári's model makes an argument that human language is a product of evolution just like any other living phenomenon. They use this argument as the premise for the conclusion that the development of language is unique and a major evolutionary transition. The two parts of their argument have different implications for the study of the human as an evolutionary subject. While human language is a

subject of evolution and therefore can be approached on the terms with which other species are approached, it is also a unique product of evolution that has surpassed the evolution of every other living phenomenon - and therefore is approached, in a separate chapter, as distinct from other species.

Smith & Szathmári's terms are picked up in a Blackwell Science textbook, *An Introduction to Behavioral Ecology*. The authors Nicholas Davies, John Krebs and Stuart West define ecology at the beginning of their book as “the ‘stage’” - in inverted commas - on which individuals play out their “behavioral strategies” (2012, p.1). The stage metaphor implies human analogy, the inverted commas keep that analogy at a distance.

The first chapter, ‘Natural Selection, Ecology and Behavior’, uses a coolly objective or Darwinian vocabulary to discuss organisms, population, genes, behavior, sensory systems, neural activity, selfish individuals and group advantage. These terms, intrinsically, include the human animal, but when the authors reference “animals” in general, it is not clear whether they include humans within that group. Case studies are drawn from the nonhuman world (for example, lions, starlings or fruit flies) (Davies et al, pp.1-23). A reference to “the lightness or darkness of skin, hair or feathers” (p.8) implies certain common forces at work across species, however, the text struggles to find a consistent situation for the only creature that is the author as well as the subject of research. “Not so long ago”, the authors write, “many people thought that animals behaved for the good of the group, or of the species” (p.11). On one page, the human could be the possessor of skin pigmentation as an evolutionary subject. A few pages later, “people” are the thinkers that sit outside the “group” of “animals”, and analyse.

This implicit identity and differentiation is clearly seen when looking at sections which might have some bearing on humans. For example, a passage on “mammalian mating systems” leads to a description of individual males who “aggregate around hotspots” to pick up females, and also around “attractive ‘hotshot males’”, again, “in order to attract females” (Davies et al, pp.257-60). There are obvious reasons why the authors do not refer the phenomenon of the “hotshot” male to the human species, or examine the possibility of a correlation between attractiveness and popularity in humans as a simple and singularly biological event (“in order to attract”). It would sound comically reductive to use the objectified language of behaviorist observation in relation to the processes through which human individuals attract to one another. Instead, species cited in the chapter include ungulates and small primates. It is possible that the somewhat simplified behavioral explanations are inherently appropriate to these species, but not to the human. However, it is also

likely that a human observer will have some bias in favour of perceiving agency and complexity in the mating practices of his or her own species. Meanwhile, the terminology used – the idea of a hotspot or a hotshot – involve a human referent if their meaning is to be established in the context of the nonhuman subject.

The first section of the book to focus exclusively on a human phenomenon is on page 416, ‘Human Language’. Even as the authors draw the human into their analysis, they dismiss it as a natural subject: “The evolution of human language was a major evolutionary transition that represents a crucial difference between humans and other animals (Maynard Smith & Szathmáry [sic], 1995)” (Davies et al 2012, p.416).

What is interesting here is the way in which the authors’ statement uses convention to certify a claim which is not really disprovable, at least in its magnified terms (“major” and “crucial” are not defined and therefore appear to be rhetorical). While *Major Transitions in Evolution*, the two-decades-old book of a theorist who was born almost a century ago, might not be considered to be the very latest in biological theory, the Smith-Szathmári theory of language as a “major evolutionary transition” is inserted uncritically into the argument of a widely-used university textbook that went through its fourth edition in 2012.

The authors of *An Introduction to Behavioral Ecology* draw attention to the fact that what they - or we - are doing is not conventional: “Most research into human language has come from the field of linguistics [...] However we can also examine language from a behavioral ecology perspective” (p.416). They then attempt a behaviorist reading of human language in its capacity to be creative or untruthful.

Considering what maintains the honesty of human language, it is possible to imagine that both social costs of lying (punishment or reputation; a form of handicap analogous to badges of status) and common interest could have played a role, possibly in different situations. For example, one individual might tell another which restaurant they are going to because they want to meet there; whereas another individual might give information about whether they have spare food because their reputation might suffer if it was later found out that they had lied.

(p.416)

The attempt to invoke an imagined human caching her “spare food” contrives a strangely abstract scenario. However these observations, broadly speaking, make sense in that they draw human behavior into the

explanatory framework that is used on other species. The authors are careful to explain this approach as one which has certain parallels with the study of other species, but should not be seen as merely a part of such study: “However”, they say, “we can also” examine language from a behavioral ecology perspective. Everything is partial or provisional: it is “possible” to say that various functions “could have” played a role; an individual “might” tell the truth for a particular, sociobiological, reason.

This careful language can be compared to the following passage, which concerns the drongo bird. The drongo is known to give “alarm calls” which alert those in earshot to an approaching threat. Sometimes the drongo's calls mimic the alarm sounds of other species, and Davies et al given an account of a study of the structure and occurrence of drongo alarm calls, finding that the birds make false alarm calls in order to distract other species such as meerkats from their food, which the drongos then steal. The authors find that the birds obtain an estimated ten per cent of their food through the use of these false alarm calls, concluding that “these results show that drongoes dishonestly signal the approach of a predator, and that meerkats are deceived by these calls” (Davies et al 2012, p.417).

When the passage on human language is compared with the subsequent passage concerning the drongo, it becomes clear that that human motivations are approached with particular caution – they are recognised to be complex, opaque or fissile. The passage on language places the human species in its own personal evolutionary category, and emphasises that an ecological behavioral approach to the human is not orthodox, but argues that the common method of approaching animal behavior can on occasion have a certain utility as an approach to even the exceptional behaviors of the human. In contrast, the findings of the study into drongo communication are passed on without equivocation: “these results show”. One consequence of the authors’ approach is that the idea of dishonesty, a human concept and one with moral ramifications, is projected more confidently onto the drongo than onto the human. We can see that the drongo food theft, quantified at ten per cent of their alarm calls, and interpreted as a singularly biological event, is a real product of observation, while the human who is disclosing her spare food cache is not only subject to alternative explanations - she is also not actually real. The student who uses *An Introduction to Behavioral Ecology* is introduced to a carefully delineated range of approaches, wherein exploration of human biological phenomena is possible, but should not be undertaken without broaching the problem of simplification. The human’s unique status is held in tension with its animal nature. Consistently, the authors

appear to shy away from an evolutionary approach to complex human phenomena such as mating or dishonesty, and yet the nonhuman animal is interpreted through reference to the human.

The third textbook, Cambridge's *An Introduction to Animal Behavior* approaches human language as exceptional in a different way. A chapter on animal memory is largely concerned with nonhuman primates. The authors Aubrey Manning and Marian Stamp Dawkins use research into human memory as a means of understanding the memory of other animals. They say that humans are useful animals for memory research, because they can talk to the human researchers. The language makes apparent the distinction between "us" and "them": "we can get detailed evidence from humans who, unlike other animals, can tell you verbally what they can or cannot recall" (2012, p.303).

Another chapter uses a similar principle when reviewing research into how birds learn their songs. The authors discuss the fact that birdsong is developed in different ways, with some species inheriting and others learning their particular patterns. The authors argue that this "developmental variability" reflects the range of functions served by song. One aspect of birdsong has "important implications for all behavioral development" (Manning & Dawkins 2012, p.112):

some birds begin singing for the first time using a wider repertoire of elements than they will ever use again once their song has crystallized. Human infants when they begin babbling are said to incorporate all the utterances used in every human language across the earth, but they persist only with those that are employed by the language(s) used by the adults around them.

(p.112)

Concluding remarks concern swamp sparrows, passerine birds - nothing about the human (p.112).

In this passage, humans are not seen as an exceptional species in the way that Smith and Szathmári have described them, but they are not integrated into the text as studied animals. Rather, knowledge about human behavior is used as a mainly illustrative example which has certain specific points of convergence with the nonhuman subject. Birdsong is compared to human language because there are similarities between the processes through which the young of both species learn. The authors are interested in birdsong, not language. However, Manning and Dawkins draw on existing knowledge from the field of developmental

linguistics – a field of research into humans – to expand on their explanation of song development in birds. In this textbook, then, human phenomena appear in a different light to that of Davies et al. *An Introduction to Animal Behavior* uses humans as behaving animals without arguing that the human species is a unique species and should therefore be approached, in the context of animal behavior, with intellectual caution. Human behavior is shown, through illustrative examples, to be functionally similar to that of other species. However, Manning and Dawkins do not draw any conclusions about human behavior per se – the human as a behaving animal is used to gain access to others, both through analogical reasoning and through direct communication (what human subjects can “tell you verbally”).

Animal Communication Networks is an essay collection published by Cambridge University Press. The third section of the book is divided into essays on different species, for example hermit crabs, marine mammals and birds. Editor Peter McGregor explains the thinking behind its structure: “While communication networks may be more or less ubiquitous, features of different taxa [...] can have a major effect on the details of communication networks and provide insight into the topic as a whole” (2005, p.5).

In their essay on songbird networks, John Burt and Sandra Vehrencamp assess explanations of the dawn chorus.^{xi} They describe it rather procedurally at the beginning of the essay:

In a typical chorusing songbird species, all territorial males in a neighbourhood synchronously start singing thirty to ninety minutes before sunrise. During the ensuing chorus period, song rate, singing diversity and song complexity reach maximal levels [...] Then, as the light level increases around sunrise, this mode of singing usually abruptly ends.

(Burt & Vehrencamp, in McGregor, Ed., p.320)

The authors identify structures of singing, listening and eavesdropping, signals of warning and attraction, and the idea of “quality assessment”. Then they use these concepts to analyse the components of a soundtrack playing a small network of banded wrens that had been recorded singing at dawn using arrayed microphones in a forest in Costa Rica. Burt and Vehrencamp make geographical and aural maps of song pattern and frequency, territorial boundaries, individual movement, confrontation, co-ordination and sexual interactions (pp.326-32). They emphasise that it is a challenge, if not impossible, to understand these networks as a whole

- both for the researcher and for the wren: the “unique ‘song environment’ poses a challenge to singers” (p.338). The authors, then, give a specific account of the ecology of four male banded wrens singing one morning in Costa Rica. They describe this ecological niche as unique and complex; no single hypothesis will fully cover it, and they conclude by calling for similar research to be conducted on other species (p.340).

In the same section of the book there are chapters on echolocation networks among marine mammals, deceptive signals among land mammals, and an article on the human species. The author of the latter essay, John Locke, is interested, specifically, not in our language but in the other part of our communication - the side that is often seen as passive, listening.^{xii} Just as Burt and Vehrencamp gave a procedural account of the dawn chorus, Locke gives a typology of human eavesdropping.

When in a restaurant or waiting room, for example, we tend to accomplish our perceptual business in a number of optical stabs, interrupted by bogus glances at other features of the physical or social landscape. If the subject suddenly looks up, the invasion may be disguised by a slow and smooth deflection, as though a continuous sweep was in progress when the “interruption” occurred.

(Locke, in McGregor, ed., 2005, p.427)

This description of human covert behavior feels slightly strange because it is familiar, however, it is also a process of simple observation which recalls the early twentieth-century ethological approach involving close observation of species’ habitual behavior. Locke proceeds, like Tinbergen, to speculate about this behavior. What is the use of this human behavior? Does it contribute to the human’s success? Locke considers whether and why humans “snoop”, discussing the potential for social advantage. He says that his work is “necessarily” “historical, discursive and speculative”, because “there is little in the way of relevant research” (p.422). In fact, he uses research on other primates and their habits of watching and being watched, to make assumptions about aspects human behavior which have not yet been examined (pp.422-3). Locke argues that further interdisciplinary research needs to be conducted into human networks, using specifically human evidence - he mentions church and court prosecutions for eavesdropping on the one hand, and on the other, a fascination with eavesdropping as is evidenced in art and writing. (For example, the writing of Nathaniel Hawthorne or paintings of Nicholas Maes [p.427]). In conclusion, Locke argues that human behavioral habits of secrecy and surveillance have evolved in relationship with social control:

In the daily parade of public selves, people in search of honest signals have been forced to invade private spaces, thereby accessing the intimate experience that occurs there, finally finding themselves in possession of knowledge of the kind that leads to social control.

(p.429)

Locke's approach to humans is not the same as that of the songbird bioacousticians, whether Burt and Vehrencamp in the same collection of essays, or Manning and Dawkins in *Introduction to Animal Behavior*. Locke's approach is historical and speculative, as he says, and draws on autobiographical experience rather than multi-microphone recordings. Where Burt and Vehrencamp use recorded evidence to draw evidence-based conclusions about banded wrens, Locke draws on autobiographical experience to draw speculative conclusions concerning the human. Where Manning and Dawkins use things we know about humans to understand songbird phenomena, Locke uses research-based knowledge of other species (notably primates) in order to draw conclusions on human behavior.

However, when Locke's study is seen in the sequence of the essay collection, it appears in a different context, one that emphasises similarities between his study and that of Burt and Vehrencamp. Each chapter of this section of *Animal Communication Networks* examines specific species on specific terms. Across the collection, these terms become a comparative study which brings, for example, a study of the specifics of banded wren communication networks, into relationship with study of the specifics of human communication networks. McGregor says in his introduction that the collection is structured in this way in order to "provide insight" into the topic of communication "as a whole" (p.5). The authors emphasise the fact that our understanding of communication, both within and between species, is limited. However, by compiling species-specific research, readers can begin to acquire a comparative understanding. The assumptions about the nature of human-nonhuman relationships in *Animal Communication Networks* are very different to those of *An Introduction to Animal Behavior* and *An Introduction to Behavioral Ecology*. Each book has its own structure, its own means of relating or distinguishing human and nonhuman species. However, in each book, comparative understanding of the behavioral ecology of the human and of other species begins to crystallize - both through similarities and through differentiation.

Conclusions

Striking variations are apparent in the four sample texts. Smith and Szathmari create a special case in which human language is a unique evolutionary product. Krebs et al deploy a discourse of, for example, “hotshots”, “deception” and “dishonesty” which draws on human culture in order to describe and explain the behavior of animals. Manning and Dawkins refer directly to human language acquisition in order to explain the learning processes of other species. McGregor provides a horizontal model wherein forms of animal communication are examined in different chapters, with no species, apparently, offering any privileged “insight into the topic as a whole”.

The examination of these texts shows that human analogy is ineradicably implicit in the study of animal behavior. Understanding animal behavior involves invoking human behavior: in order to understand what a “hotshot” dungfly might be, the reader must necessarily think of what a human hotshot might be. This thought process is not limited to explicitly human terms like “hotshot”, but can be applied more broadly when discussing the full range of terms used to describe animal behavior. For example, terms like “learn” or “communicate” have semantic, contextual and etymological bases in human behavior. In this broad sense, when we talk about animal behavior we are always talking about ourselves.

More specifically, however, it is possible in these textbooks to see something of the variety of contemporary interpretations and applications of Darwinian theory. The article has attempted a preliminary examination of how contemporary science research practitioners (as opposed to theorists of the human/animal relationship) present humans as a subject or source of animal behaviorism. As discussed in the introduction, the predicament of the Anthropocene is a predicament which presses the question of human exceptionalism. The rights and relative agencies of nonhuman species are much disputed, as is the question of how, and how much, human privilege can be exercised. While Cartesian dualism is still often invoked as a context for the discussion of the human/animal relationship, this article aims to open some investigations into our contemporary conversations: to shed light on how and where the separations and affiliations of human knowledge and animal matter are located right now. The findings of this article indicate that there is no simple consensus surround the study of human and animal behavior, even within mainstream introductory literature, and that further study of contemporary scientific conversations could help to clarify and specify these relationships, across disciplines and in the wider world.

Endnotes

ⁱ The quotation was recorded by Isabella Sidgwick, who was present at the debate, and published in 1898 within Sidgwick's memoir in *Macmillan's Magazine*, as discussed by J.R. Lucas in his account of the debate's afterlife (1979, pp.313 and ff.). There were few contemporary accounts of the debate, and those that exist "do not agree on the details" (Lucas p.315). Although "undoubtedly Wilberforce made some reference to apes, yet what he and Huxley actually said on that subject was not, in the opinion of a journalist actually reporting that debate, of sufficient interest to bear repetition" (p.315).

ⁱⁱ The designation 'Anthropocene' has yet to be officially endorsed by any major international geological body, however, the International Commission of Stratigraphy's Subcommission on Quaternary Stratigraphy's 'Working Group on the Anthropocene' (WGA) formally recommended the new designation to the International Geological Congress in 2016. See Zalasiewicz et al (2016) for the WGA resources and findings.

ⁱⁱⁱ In *The Shock of the Anthropocene*, Christophe Bonneuil and Jean-Baptiste Fressoz approach the subject on these terms, criticizing the idea of an Anthropocene era on the basis that it abets a conception of other earthly creatures as "sharing the same 'physicality' as we humans while having an interiority that is radically different from our own, thus placing us at a vantage-point in relation to nature" (2016, pp.62-3). For a conception of the earth as a non-anthropocentric ecosystem (or set of ecosystems) comprised of multi-species biogeographical processes, see proponents of James Lovelock's 'Gaia theory' and its variants (Lovelock 1979). The central idea, in biologist Lynn Margulis' iteration, is that the earth is "one continuous enormous ecosystem composed of many component ecosystems"; it is "a biological idea, but it's not human-centered". See Margulis, "Gaia Is A Tough Bitch", in Brockman, J. (1996) pp.129-51.

^{iv} See for example Latour's *We have never been modern* (English translation, 1993); Haraway's *Anthropocene, Capitalocene, Plantationocene, Chthulucene: making kin* (2015) or Sloterdijk's *Terror from the air* (2009).

^v See Backhouse and Fontaine, eds (2010), p.149 for how the social sciences "flourished" in new universities in the 1960s and 1970s (Kuper, A., 'Social Anthropology' pp.136-54), and p.196, how graduates of social science degrees "effectively tripled" during the 1960s and 1970s (Backhouse and Fontaine, 'Towards a History of the Social Sciences', pp.184-134).

^{vi} In *The Shaping of Man*, Roger Trigg echoes Tinbergen, asking, "why does man behave as he does? Do humans in fact share basic similarities merely in virtue of their membership of the human

race? Some (biologists) would trace similarities between societies back to the common biological base while others would be even bolder and suggest that cultural differences can be explained by the interaction of genes with environments” (1982, pp.6-7).

^{vii} Sussman and Chapman’s work proceeds through a more cautious examination of how analogies between species might work. Chapters tend to imply a certain teleology leading towards the human, with contributors considering topics including “Mammalian and Primate Roots of Human Sociality” (by Zihlman, A. and Bolter, D., in Sussman and Chapman 2004, pp.23-52), or whether “the study of mammalian social play can help us learn more about the evolution of social morality in humans and other animals” (Sussman & Chapman, p.12).

^{viii} Salter’s approach uses Darwin’s concepts of kin altruism and more recent sociobiological and observational extensions of the theory to examine what is called “homosexual risk-taking” in relation to AIDS incidence rates among different ethnic groups in the USA (pp.175-89) and family affiliation under totalitarian social control in communist Romania in the early 1990s (pp.145-51). Despite this human focus, Salter situates his study in a context of the interpretation of the ecology and behavior of other species. For example, he uses a study of insect communities while discussing genes coding for risk-taking for kin in humans (Salter p.4)

^{ix} For example, Yuval Noah Harari’s *Sapiens* implies that the human is a subject of Darwinian evolution: “When Charles Darwin indicated that Homo Sapiens was just another kind of animal, people were outraged. Even today many refuse to believe it” (2015, p.20). On the next page, however, Harari himself argues that the human is the “unique” species that “conquered the world”; language and collaboration are given as reasons that “Sapiens rule the world, whereas ants eat our leftovers and chimps are locked up in zoos and research laboratories” (p.21). Thomas Thwaites’ *Goat Man* (2016), in which the author attempts, through a range of philosophical and technical approaches, to live as a goat, argues that humans are an exceptional species in that they are the only creatures who are capable of conceptualizing the future (2016, p.13), and that to be a nonhuman animal would be to escape “complexities” and live only with the “bare necessities”: “Absorbed in your immediate surroundings, eating a bit of grass, sleeping on the ground, and that’s it” (p.15). Both Harari and Thwaites imply that the human organism has distinctive features which allow it uniquely to exceed the limits of biology.

^x The authors describe the linguistic function of each phrase in the elided passage.

^{xi} Burt, J. and Vehrencamp, S. (2005), ‘Dawn chorus as an interactive communication network’, in McGregor, Ed., 320 – 343

^{xii} Locke, J. (2005) ‘Looking for, looking at: Social control, honest signals and intimate experience in human evolution and history’, in McGregor, Ed., 416-41

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