

Curious Parallels

**An examination of terms and concepts shared between biology and linguistics,
and their relevance to the study of languages.**

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Abstract

The linguistic world contains an array of terms and concepts which, in their literal sense at least, appear to belong primarily to the modern discipline of biology. We speak, for example, of the *evolution* of languages, of *living* languages, of *dead* or *extinct* languages, of *genetically related* languages and of the *ecology* of languages, to name but a few. Many of these terms are, of course, used as metaphors in numerous other walks of life as well.

In the case of languages, however, we are dealing with a much closer analogy, if not indeed direct equivalence. *Vulnerable*, *critically endangered* and *extinct* are used by international bodies to classify the status of biological organisms and languages alike. Languages have been analogously compared to species, not to mention literally described as living organisms, words have been compared to cells, and so on. The aim of this dissertation is to examine where research currently stands on the parallels between living organisms and languages, the processes which might link them, and the reasons why such parallels have persisted over such a long period. It is subsequently hoped that some possible gaps may be addressed.

1. Introduction

The formation of different languages and of distinct species, and the proofs that both have been developed through a gradual process, are curiously parallel.

So said Charles Darwin in his 1871 book *The Descent of Man, and Selection in Relation to Sex*, (p. 89). The quote is paraphrased in the title of this dissertation, which is concerned with the parallel processes shared between languages and species. As will be seen, this is not the first time that the above quote has struck a chord. Indeed, this essay will include references to other works inspired by the very same point.

As the scope of both biology and linguistics is extremely broad, this work will primarily concentrate on those processes which are analogous between living things and languages, and any other links which may join the two together. A small amount of this will focus on the complex hierarchical structures that pertain to both. The bulk, however, will concentrate on the two aspects which allow for the greatest number of analogies, namely, the linked and interconnected fields of evolution and ecology. This will involve examining the relationship between evolutionary biology and historical linguistics, as well as biological and linguistic ecology, and how these terms are defined.

In addition, considerable attention will be paid to the role of culture as both a possible bridge and a potential barrier between language and life. Given that culture is often used in binary opposition to nature on the one hand, and in a rather vague alliance with language in the term “language and culture” on the other, defining precisely what culture is, and its relationship to biology and language alike, will be a major objective, as will examining the concept of dualism, which is felt to be central to the entire enterprise.

The parallels in question, then, include the evolution of both species and individual languages from common ancestors, the interactions of these with their respective environments, and their subsequent survival or extinction. In order to compare them, however, a brief overview of both is necessary.

1.1 A brief overview of language

Language is the primary means of communication of the human species. Any investigation into it, however, would find, not one, but a wide variety of different examples of this phenomenon. The philosophical position which argues that there are no such things as languages, only one single human capacity for language subsequently expressed in various forms, is correct to the extent that the world's languages are clearly different versions of the same thing. However, this approach would be of little comfort to, say, a monoglot speaker of German when confronted with a monoglot speaker of Swahili. In the absence of an interpreter, these would be reduced to the likes of pointing, mimicking or gesturing in order to communicate. Put another way, people without a *common* language are effectively without language altogether, and any given language only fulfils its function when used with others who share it. Therefore, the stance taken in this work is that individual languages do exist. This is nevertheless fascinating in itself, as the language barrier provides us with an indication of how severely limited human communication would otherwise be, and arguably much closer to the condition in which other animal species find themselves. Our unfamiliarity with such a situation is due to our usually being surrounded by speakers of the same language. Indeed, this is invariably how we come to speak the languages we do, as there can be no doubt that the languages we speak are not inherited vertically through the genes of our parents, but rather horizontally through learning, either from them, or anyone else within regular earshot.

Language is produced by combining arbitrary phonic or visual symbols into larger units for the purposes of communication. Their meaning must therefore be understood by the receiver. In the main, people are more than capable of distinguishing “language” from “not-language” such as coughs, sighs and grunts, and similarly able to distinguish it from “body language”

such as shaking fists. It should be noted that body language is not the same as sign language, varieties of which have their own lexis and grammar.

Estimates for the number of languages found across the world are usually in the range of between 6,000 and 7,000 (including at least 130 sign languages). The biocultural diversity questionnaire used later in this dissertation has used 6,500 as an approximation, based on UNESCO figures. It should also be noted that languages will here be treated as synonymous with “natural languages”, understood to mean languages which have evolved through repetitive use and replication, either spoken or signed, and *without conscious planning*.

Written languages, on the other hand, will be considered a form of technology used to convey a natural language in writing, “an optional accessory” as described by Pinker (1994, 16).

There are no written languages which exist in their own right independent of a natural language, though their characteristics may resemble a dialect used for specific purposes only. They are thus a secondary and dependent form, being simultaneously much younger and much more conservative than their oral or signed counterparts, and often standardised by imposition.

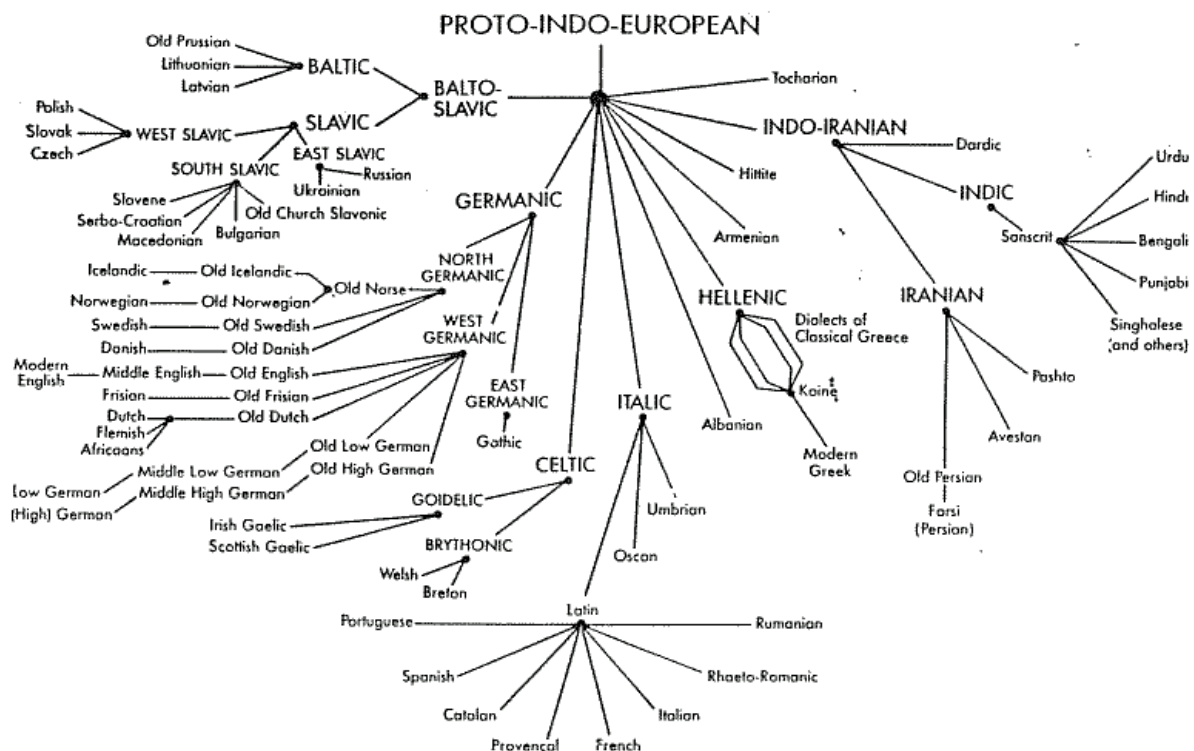
There are no human communities without language, and individuals without it are so rare as to cause a sensation, with a possible upper percentage of less than 0.01% of the world’s population (Downey, 2010). The equivalent figure for people without literacy skills, on the other hand, currently stands at roughly 1,000 times that number, at approximately 750 million people, or 10% of the world’s population. These though, at least have the benefit of belonging to a speech community (UNESCO, 2017).

Ironically, information on the languages of the past, with the exception of those able to be recorded by audio devices in the last century or so, is entirely dependent on the written word. This will no doubt give us a partial and compartmentalised view of the languages of bygone eras.

It is not known when humans first used speech, and estimates vary from about 50,000 to two million years ago, with 200,000 years an apparent compromise (List et al, 2016, p.2). One thing is certain however, namely that the spoken word is much older than the written, which is little more than 5,000 years old (Schmandt-Besserat, 2014).

The languages of the world are divided into some 140 or so families based on supposed common ancestry. These families are themselves often divided into branches, which are in turn divided into groups in the manner of a family tree. Here we see perhaps the original parallel between languages and living things which so fascinated Darwin, although the use of taxonomic levels with languages is currently less precise than in biological taxonomy. Indo-European is the most widely studied family, and a simplified sketch of its branches can be seen in Figure 1:

Figure 1: A simplified tree of the Indo-European family of languages



There are several ways in which languages can be considered independently of individual speakers. For example, if the number of speakers of every language across the world were totalled, the resulting figure would be considerably greater than the total number of people. This, of course, is because more than half of the world's population is at least bilingual. In addition, no speaker, not even a lexicographer, ever succeeds in using all the words of a particular language, and so the full corpus of a language may be considered to be the sum total of all the utterances of all its speakers, but far in excess of the reach of any one of them. Languages are bounded and can be identified, even if the ties that bind them may be a little loose. Dialect continua, for example, may blur the distinction between one language and another, but difficulties such as these are also present in biology when identifying subspecies from species. Nevertheless, languages and species will both be treated as valid categories in this essay, with lack of mutual intelligibility, and the lack of the ability to produce fertile offspring, representing the language barrier and the species barrier respectively.

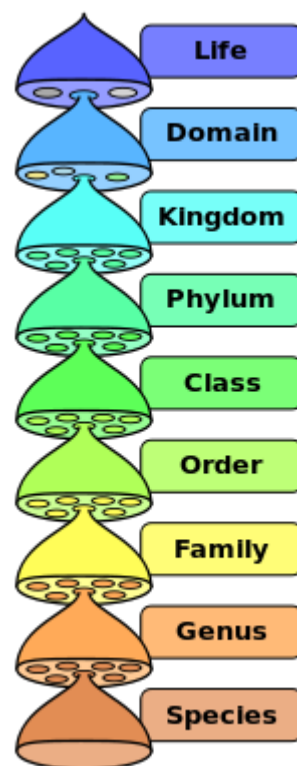
1.2 A brief history of life

As with languages, no investigation of life on Earth would ever find a “thing” called life, but instead, an enormous variety of individual living organisms, from bacteria to fungi to plants and animals, which share the defining characteristics of life. When examining analogies between biological species and languages, it is worth noting at the outset that there are far more of the former than the latter.

The three-domain system of classifying biological organisms uses the *domains* of Archaea, Bacteria and Eukaryota as the highest levels of eight major taxonomic ranks. In the case of the first two, both of which are *prokaryotic* (i.e. organisms whose cells lack a nucleus and which are also overwhelmingly unicellular), it is notoriously difficult to estimate numbers, not only because of their (small) size and (large) number, but also because their methods of

asexual reproduction make “species” identification difficult, if not inappropriate. Prokaryotes nevertheless have other useful analogies with languages which will be examined later. The remaining *eukaryotic* domain includes the animal, plant, fungi and protist *kingdoms*. The eight main taxonomic levels can be seen in Figure 2:

Figure 2: Major taxonomic ranks of biological classification



All of the above life forms will communicate in some way, including, for example, through chemical exchange, physical movement towards or away from another organism, olfactory messages, or complex auditory or visual symbols. Nevertheless, there can be little doubt that human language is unique amongst these communication systems. That said, it is not unique in being unique. There is no equivalent anywhere in the animal kingdom, for instance, to the honeybee waggle dance (Trask, 2004, p.10), the identification of which was sufficient to earn its discoverer a Nobel prize. This point is worthy of consideration as a counterbalance to

claims of human uniqueness, given that many other species also have their own unique characteristics. Humans, for example, lack the echolocation and magnetic orientation abilities of various species, the ability to change colour to blend with their environment and so on. As well as being far more numerous than languages, biological organisms have also existed for much longer. The history of life on Earth began some 3.8 billion years ago, and if, for convenience, we round that figure down slightly to 3.65 billion years, then we can track our own story of life on Earth through the different taxonomic levels in the form of a calendar year, with each day representing ten million years (Attenborough, 1979, p. 20). The earliest *life* forms were unicellular prokaryotes, and these dominate the first two thirds of our year until the end of August. Protists make an appearance in September (ibid, p.24), and the “Cambrian explosion” which saw most modern *phyla* enter the fossil record for the first time some 540 million years ago, would have taken place in early November. The *class* Mammalia is absent until the middle of December, with the *order* primates arriving for Christmas. Our *genus*, *Homo* turns up at about dinner time on New Year’s Eve (Boyd & Silk, 2009, p.35) and our *species*, *Homo sapiens* not until about 23.30, just in time to sing *Auld Lang Syne* (ibid, p. 343). From all of this diversity, only this last species can claim to possess language, as opposed to some other system of communication.

2. On the origin of analogies: a literature review

It was not unusual for scholars and philosophers in the eighteenth and nineteenth centuries to take an interest in both natural history and philology, given that languages were in any case regarded as natural phenomena. Nevertheless, this state of affairs was not to continue, as the division of academic labour became increasingly split for virtually all of the twentieth century. There is a gap of a full one hundred years, for example, between Darwin's evolutionary parallels in his *The Descent of Man* (1871) and Einar Haugen's ecological parallels in *The Ecology of Language* (1971). The last quarter of the twentieth century then saw a rise in the concept of cultural evolution, and, as references to language are common in such works, they will be paid due attention. That century ends with a plea for *Consilience* (Wilson, 1998), following which a new millennium of research was born.

2.1 Historical parallels from a Darwinian perspective

Although the curious parallels reference comes from *The Descent of Man*, Charles Darwin is known to have reflected on the nature of language as early as 1837 following his return from the voyage on the *Beagle*, where he noted that “all speculations on the origins of language must presume it originates slowly” and that “we cannot doubt that language is an altering element” (Richards, 2002, p. 2). Any review of relevant literature must therefore also include his *On the Origin of Species*, first published in 1859. After all, were it not for this book, there would be no evolutionary theory with which to compare species and languages in the first place. It is also worth noting that he chooses relationships between languages as an illustration to show that “the natural system is genealogical in its arrangement” (Darwin, 1859, p. 422)

He was clearly influenced by the works of others. *The Geological Evidences of the Antiquity of Man* was written in 1863 by his friend Charles Lyell, who devotes all of chapter xxiii to a very relevant topic, namely the “Origin and Development of Languages and Species Compared”. Lyell notes that “we may compare the persistency of languages, or the tendency of each generation to adopt without change the vocabulary of its predecessor, to the force of inheritance in the organic world” (p. 467). Living languages, like organic life, are derived from extinct ones (p. 461), they are part of a “struggle for existence” reminiscent of the struggle for life in the title of Darwin’s *Origin*, and subject to “powerful causes of selection” (p. 463) which see one dialect triumph over another. All of this takes place without speakers being necessarily aware of it (ibid). Finally, languages are subject to a slow and gradual extinction, and, once extinct “can never be revived, since the same assemblage of conditions can never be restored” (pp. 466-467).

Lyell clearly believed that languages changed by some kind of natural force which was beyond the control of their speakers. Even one venerated by its users would be “incapable of permanently maintaining its ground” (p. 464). His respect for languages as natural phenomena, though, pales when compared to August Schleicher, a German linguist who took an interest in Darwin’s theory. He is known to have produced family trees (*Stammbäume*) illustrating the relationship between different languages as early as 1853, prior to Darwin’s *Origin*. Indeed, he is frequently acknowledged as “the first linguist to portray language development using the figure of a tree” (Richards, 2002, p. 23). In 1863 he wrote *Die Darwinsche Theorie und die Sprachwissenschaft*. His work was translated into English in 1869 under the title *Darwinism tested by the science of language*, and according to Richards (p. 37), “Schleicher’s greatest and lasting contribution to evolutionary understanding may simply be his use of a *Stammbaum* to illustrate the descent of languages”, which, it is worth remembering, preceded its equivalent use for biological species.

There was therefore a period in the nineteenth century when evolutionary concepts were openly shared between what would now be called linguistics and biology. This state of affairs, however, was not destined to last. The *Société de Linguistique de Paris* famously went so far as to ban papers on the evolution of language in 1866 and, during the course of the late nineteenth and early twentieth centuries, Ferdinand de Saussure shifted the emphasis in linguistics from the diachronic to the synchronic, thereby “killing the field that had borne him” (Aranoff, 2017, p. 450). Within the social sciences in general, evolution became discredited, accused of Social Darwinism, and largely shunned. Einar Haugen’s 1971 paper *The Ecology of Language*, which stated that language ecology may be defined as the study of interactions between any given language and its environment, hails the beginning of a new ecological metaphor and another parallel between linguistics and biology. As will be seen, however, this metaphor has run into trouble.

A significant development of the latter decades of the twentieth century was the growth of the concept of cultural evolution, and it is worth noting that it was brought to prominence by those who specialised in evolution, rather than those who specialised in culture. In 1975, evolutionary biologist Edward O. Wilson produced his *Sociobiology: The New Synthesis*, on social behaviour in animals. Much of its content was safely confined within ethology and animal communication. This was not always the case, though, as on occasion, comparisons with humans were made, including the characteristics of both language and culture. All aspects of culture, according to Wilson, were separated from animal tradition by a matter of degree only, with one exception, namely language, “which is truly unique” (p. 87).

Wilson received criticism from scholars within his own discipline as well as outside of it. Some of the anger directed at him, however, was no doubt down to his daring to invade the turf of other academic disciplines (and also pass judgement on them), by imagining a

macroscopic examination of those academic subjects which study all of our planet's social animals, and arriving at a conclusion whereby:

the humanities and social sciences shrink to specialized branches of biology; history, biography, and fiction are the protocols of human ethology; and anthropology and sociology together constitute the sociobiology of a single primate species. (p. 271)

Seeing their disciplines shrunk to “specialized branches of biology” was always likely to irk some of those who had devoted their working lives to them. There is no specific reference to linguistics in the above quote, but its practitioners were not to escape lightly either. On the question of the existence of a universal grammar, Wilson maintains that this is a difficult question to answer because “most attempts to generalize the rules of deep grammar have been based on the semantic content of one particular language” (p. 283). A fair cop, some might argue. However, even more annoying than using one language to try and establish universals was the attitude employed by them while so doing:

Students of the subject seldom confront the problem as if it were genuinely scientific, in a way that would reveal how concrete and soluble it might be. In fact, natural scientists are easily frustrated by the diffuse, oblique quality of much of the psycholinguistic literature, which often seems unconcerned with the usual canons of proposition and evidence...Clearly, this discipline, one of the most important in all of science, is ripe for the application of rigorous theory and properly meshed experimental investigation. (ibid)

Rather than undermining the importance of the science of language, though, this quote seems to be expressing genuine frustration at a perceived lack of progress in it. *Sociobiology* was not primarily concerned with the study of language or even human culture more broadly, however, it did reawaken the so-called nature/nurture debate and let the Darwinian genie out of its bottle after an absence of almost a century which had seen blank slates and purely synchronic studies prevail. It is this which marks its significance. Darwinism had reached out to the social sciences rather than the reverse, and this process would continue.

The following year saw the publication of Richard Dawkins' *The Selfish Gene*. This book promoted the idea of a gene-centred view of evolution, as opposed to an emphasis on organisms or group behaviour. Largely concerned with evolutionary biology in general, its last chapter was, however, entitled *Memes: the new replicators*. Here he turns his attention towards man, noting that "most of what is unusual about man can be summed up in one word: 'culture'." (Dawkins, 1976, p. 189). The first examples of culture deal with language, but the author quickly explains that "language is only one example out of many" (ibid, p. 190). Further examples include "fashions in dress and diet, ceremonies and customs, art and architecture, engineering and technology, all evolve in historical time in a way that looks like highly speeded up genetic evolution, but has really nothing to do with genetic evolution". (ibid).

Dawkins was certainly not the first to see the analogy between these (and admits so) but his book did provide a catalyst for propelling it into the mainstream. He then goes so far as to say that "we must begin by throwing out the gene as the sole basis for our ideas on evolution." (p. 191) and adds to it the concept of the *meme*, a cultural replicator of ideas analogous to the gene. We now see the basis for the birth of a new academic discipline called memetics, which in turn would develop into variations of the same theme known as gene-culture coevolution or dual-inheritance theory. Significantly, these theories are held to be in keeping with, and indeed part of, a Darwinian approach.

In 1982, Dawkins wrote his sequel to *The Selfish Gene* entitled *The Extended Phenotype*, and in the preface lists "humanists interested in evolutionary science" as part of his target audience. Here, Dawkins expands upon his gene-centred theory to include aspects external to the organism itself, noting that "the phenotypic effects of a gene are the tools by which it levers itself into the next generation, and these tools may 'extend' far outside the body in which the gene sits". Examples of this include spiders' webs, beavers' dams, termite mounds

and so on. This of course has implications for the study of human culture, in particular cultural artefacts of all kinds. Critically, Dawkins in this book defines a *replicator* as “anything in the universe of which copies are made” (p. 83) “.... purposely defined in a general way, so that it does not even have to refer to DNA” (p. 87). Dawkins adds that he is “indeed, quite sympathetic towards the idea that human culture provides a new milieu in which an entirely different kind of replicator selection can go on” (ibid). The time was now right, so it seemed, for an innovative analysis of human culture within its own evolutionary framework.

The third book in the Dawkins trilogy is his 1986 publication, *The Blind Watchmaker*. The title is based upon a quote from William Paley’s 1802 book *Natural Theology* where the author imagines himself happening upon a watch and concluding that “there must have existed, at some time, and at some place or other, an artificer or artificers, who formed the watch for the purpose which we find it actually to answer; who comprehended its construction, and designed its use.”

This is of course an analogy for the existence of a designer, a creator of complex things in the form of God. Dawkins’ book aims to prove conclusively that a complicated design does not require a complicated designer, that Darwinian natural selection is sufficient to explain the complexity of the living world without the need to invoke a creator. In keeping with his thesis in *The Extended Phenotype*, Dawkins treats “man-made artefacts like computers and cars...firmly...as biological objects” (Dawkins, 1986, p.1) because they are clearly the product of biological objects, and an indication of the presence of life. As far as the creation of artefacts is concerned, then, he is obviously in agreement with Paley. They part company, however when it comes, not to the artefact itself, but to the artefact’s designer, as illustrated in the following:

Natural selection, the blind, unconscious, automatic process which Darwin discovered, and which we now know is the explanation for the existence and apparently purposeful form of all life, has no purpose in mind. It has no mind and no mind's eye. It does not plan for the future. It has no vision, no foresight, no sight at all. If it can be said to play the role of watchmaker in nature, it is the blind watchmaker. (Dawkins, 1986, p. 5)

Where, though, do languages fit into all of this? Steven Pinker and Paul Bloom in their 1990 article “Natural language and natural selection” maintain that language evolved “by a conventional neo-Darwinian process” (p. 707) in line with natural selection. They make the point that languages show “no notable correlation with technological progress” (ibid) and they present a list of facts which suggest that “the ability to use a natural language belongs more to the study of human biology than human culture; it is a topic like echolocation in bats or stereopsis in monkeys, not like writing or the wheel” (ibid). Contrary, then, to Dawkins’ assumption that language is one of many elements of culture, Pinker and Bloom here make the case for language being rather different, and Pinker subsequently goes on to dispense with culture altogether, asserting that language is an “instinct”. The essence of his thesis is worth quoting in full:

Language is not a cultural artifact that we learn the way we learn to tell time or how the federal government works. Instead it is a distinct piece of the biological makeup of our brains. Language is a complex, specialized skill, which develops in the child spontaneously, without conscious effort or formal instruction, is deployed without awareness of its underlying logic, is qualitatively the same in every individual, and is distinct from the more general abilities to process information or behave intelligently. (p. 18)

There are some bold claims here, which, as we shall see, have not gone unchallenged. Pinker then goes on to compare the human language faculty with spiders’ ability to spin webs, and asserts that “language is no more a cultural invention than is upright posture” nor is it “a manifestation of a general capacity to use symbols:” (ibid).

In 1998, Edward O. Wilson returns with his *Consilience: The Unity of Knowledge*. Whilst pleading for convergence, he bemoans the lack of progress in the social sciences, and their attempts at proceeding “largely without linkage to the natural sciences” (p. 200). The chapter

From Genes to Culture offers an account of dual-inheritance theory, giving a nod towards both Pinker's language instinct and Dawkins' meme along the way, in the search for the basic unit of culture which corresponds to the gene. Gene-culture coevolution, is, for Wilson, "the conceptual keystone of the bridge between science and the humanities" (p. 150). Regardless of individual differences which may have existed between them, therefore, the last quarter of the twentieth century saw a consolidated movement by self-confessed advocates of Darwinism towards explanations of phenomena which had traditionally been considered to be solely in the cultural realm.

2.2 Themed parallels for a new millennium

The new millennium saw evolutionary approaches to language continue full steam ahead. From the outset, new publications addressed issues such as language change from an evolutionary perspective. Advancements in animal communication gave a greater insight into intraspecies transmission and parallels with human language, while work on cultural evolution often used language to illustrate this phenomenon in action. Given the increase in academic specialisation that had taken place by the end of the twentieth century, these different aspects are shown below by theme.

2.2.1 Cultural evolution

In 2005, the book *Not by Genes Alone: How Culture Transformed Human Evolution* by Peter Richerson and Robert Boyd was published. This was the culmination of work started as far back as 1985 with their *Culture and the Evolutionary Process* and is a major work on gene-culture coevolutionary theory. The authors themselves note the two main points that they wish to make in the book, namely that;

- culture is crucial for understanding human behaviour
- culture is part of biology

In keeping with several other authors mentioned above they bemoan the scant attention paid to evolutionary theory by many social scientists, believing that:

the most fundamental questions of how humans came to be the kind of animal we are can *only* be answered by a theory in which culture has its proper role *and* in which it is intimately intertwined with other aspects of human biology (p. 4).

They then offer the following definition of culture:

“Culture is information capable of affecting individuals' behavior that they acquire from other members of their species through teaching, imitation and other forms of social transmission” (p. 5)

This book is a serious attempt at bridging the gap between the natural and social sciences, and is a worthwhile venture for that reason alone. However, some essential questions remain regarding the above definition, such as, for example, why information acquired from *other* species, or from independent *deduction* via the non-human environment should be excluded? Within the book, language is clearly included under the umbrella term “culture” and is used on occasion to support their hypothesis (e.g. pp. 90-92).

Another champion of cultural evolution is Alex Mesoudi, who, in 2011, published a book entitled *Cultural Evolution: How Darwinian Theory Can Explain Human Culture and Synthesize the Social Sciences* (Mesoudi, 2011). In it, Dawkins' memetics is described as one of a number of “recent fads” (loc. 611) and the author notes the importance of defining “exactly what is meant by a theory of cultural evolution” (loc. 612). Variation, competition and inheritance are seen as essential components, as without all three “evolution simply does not happen” (loc. 634). The point of the book is to show that culture contains all the

necessary elements for evolution to take place. Variation in culture is plain for all to see through the different sets of skills and beliefs in evidence across the world. The “struggle for life” (loc. 721) by the words and grammatical forms of languages is used as an example of competition, with the gradual accumulation of knowledge and technological advancement proving the existence of inheritance. In summary, it proposes that human culture evolves in a Darwinian manner (but not a neo-Darwinian one as per Dawkins). The following quote, however, appears on the face of it to be something of a contradiction:

We can also observe cultural adaptations that are exquisitely designed for a particular purpose or for use in a particular environment but that are the result of cultural rather than biological evolution. An example might be the bow and arrow, which features multiple working parts all interacting with one another in a precise manner. (loc. 805-808)

Exquisite designs for particular purposes are not the product of a “blind watchmaker”, but rather of a designer. Those arguing the case for cultural evolution, however, seem to be unfazed by this point. Indeed, it is clearly made in the book: “cultural evolution appears to be guided by the intentional actions of people who possess at least some degree of foresight, potentially increasing the likelihood of adaptive cultural mutations” (loc.1016-1018).

Perhaps of more direct relevance, however, is the extent to which guided intentional actions reflect the ways in which languages change. In 2013, the chapter “Cultural Evolution of Language” was co-written by Dan Dediu and ten other eminent linguists. Contrary to the stance taken by Pinker, Chomsky and others, this piece argues against treating language as an “instinct” and is critical of “the misconception of language particularism” (p. 304), which treats language as if it were different from other kinds of human culture. Many of these misconceptions about language are soundly rebutted, although it is not apparent why any of the rebuttals in themselves mean that language should not be treated separately from other kinds of culture. Language itself is seen as a form of “coordinative technology” (p. 310) where speakers “agree” (ibid) on a joint code. “Agree” implies conscious consent, and is at

odds with the authors' own conclusion that languages "offer us elaborate design without any designer, showing us the "blind watchmaker" of evolutionary processes hard at work." (p. 332). This last statement, perhaps unintentionally, conjures up an image of language evolution which contradicts Mesoudi's "intentional actions" and also the article's own criticism of "language particularism".

The arguments made for cultural evolution as a whole can easily come across as attempts at trying to fit a square peg into a round hole, with proponents eager to find a mechanism which will synthesise the social sciences. Language taken separately, on the other hand, has no problem passing Mesoudi's three tests with flying colours. This does not necessarily mean that there is a conflict between the two, however, as it may be that the different components of culture all evolve, but, as is the case with biological reproduction for example, do not do so in the same way.

In his 2018 article, "What is cultural evolution like?", for example, Daniel Nettle opines that "the real problem for the hope of a unified Darwinian "cultural evolutionary theory" is that different cultural cases are very different from one another, and hence approximate the genetic situation to different degrees" (p. 62). He goes on to question a vision of culture which largely sees people as passive recipients of it, stating that he, in the main, has "interests and biases that go beyond the mere desire for my behaviour to be the same as everyone else's" (p. 74), and argues for a unity of the social sciences which places "human action, or more generally human cognition, rather than cultural selection, at the heart of that enterprise" (p. 75).

2.2.2 Animal communication

Given that language is the primary intraspecific communication system of humanity as an animal species, it follows that animal communication may be able to offer some comparisons. Numerous recent studies have discovered that various species, including wolves, orcas, sperm whales and cod have regional “accents” or “dialects”. There can be little doubt, however, that the closest parallels in the animal kingdom to human language are to be found in birdsong.

Recent work undertaken by Robert Lachlan and Stephen Nowicki has shed new light on this, and in their article “Context-dependent categorical perception in a songbird” (Lachlan and Nowicki, 2015) they claim that their study “demonstrates that the phonology and perception of swamp sparrow songs share even more features with human phonology and speech perception than previously suspected” (p, 1896). This is because phoneme categorisations in the notes of swamp sparrow songs “suggest for the first time that this central characteristic of human phonology is also found in a nonhuman communication system” (p, 1892). Despite not being relevant to all aspects of human language such as syntax, the phonological parallels are nevertheless highly significant, as “although speakers and listeners are generally unaware of the fact, many phonemic categories in speech vary in their structure and in how they are perceived, depending on linguistic context.” (ibid). Phonological changes of course also drive language change, and one of the authors’ conclusions is that, the mechanisms underpinning complex phonology, due to their presence in both human speech and swamp sparrow song, may have evolved before syntax and semantics, which only exist in human speech, and therefore “may have their origins in the logic of assessment signals that govern much of animal communication” (p, 1896).

The same authors, this time in conjunction with Oliver Ratmann, went on to produce the paper “Cultural conformity generates extremely stable traditions in bird song” (Lachlan,

Ratmann and Nowicki, 2018). This time, birdsong was extended into the field of cultural evolution. The article deals primarily with conformist bias, and the authors assert that their “results demonstrate conformist bias in natural animal behaviour and show that this, along with moderately precise learning, may support traditions whose stability rivals those of humans.” (p. 1). The subject matter was again phonological, with a simulated model based on recordings of 615 swamp swallow song repertoires being used to estimate the stability of syllable types. The paper notes that, according to the parameters of their model, “the average age of the oldest syllable type in each population was 1537 years, and 8.6% of syllable types (and 26.5% of all syllables) were older than 500 years” (p.5). These time frames are quite staggering, and can be compared in length to periods of human languages (for example Old, Middle and Modern English). Indeed, the authors’ most striking claim is that their findings “suggest that the ability to transmit traditions with precision can no longer be considered a fundamental difference between how human and non-human cultures evolve” (p. 6).

2.2.3 Evolutionary biology and historical linguistics

The year 2000 saw the publication of William Croft’s innovative *Explaining Language Change: An Evolutionary Approach*. The author’s preface notes that the book “presents a framework for understanding language change as a fundamentally evolutionary phenomenon” and that a speaker’s knowledge of grammar cannot be disentangled “from the act of using language” (xiii). These factors form the backbone to the central thesis, namely that “the proper linguistic equivalent to the genome was not a speaker’s grammar but the utterance” (xiv). Influenced by David Hull’s generalised theory of selection for the evolution of concepts as well as organisms, Croft goes on the hunt for the unit of specifically linguistic selection to sit alongside physiological genes and cultural memes, and subsequently

introduces us to the *lingueme*. As far as comparisons between languages and species are concerned, he criticises the tendency towards zoo-centric thinking so often in evidence and asserts that “a language system is more like a plant than an animal” (p. 230). His was the first attempt at steering evolutionary thinking about languages away from the assumption that parallels mean parallels with animal evolution. It is a ground-breaking and influential work.

In 2005, a paper by Quentin D. Atkinson and Russell D. Gray entitled ‘Curious Parallels and Curious Connections—Phylogenetic Thinking in Biology and Historical Linguistics’ was published in *Systematic Biology*. It reviews parallels between biological and linguistic evolution and the development of phylogenetic methods in both evolutionary biology and historical linguistics. Its Table 1 lists twelve fundamental features of biological and linguistic evolution which are “demonstrably analogous” (p. 513), as follows:

Table 1 (after Atkinson and Gray 2005):

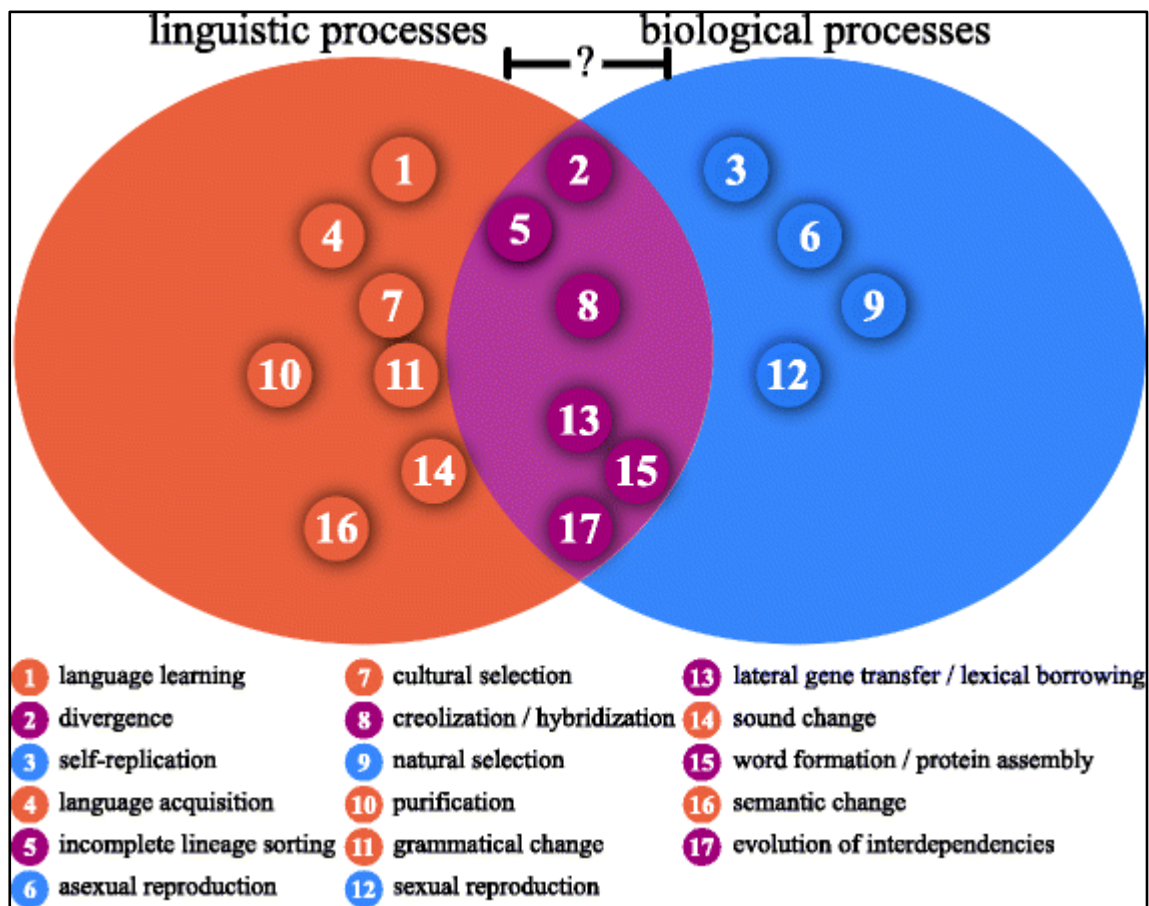
Biological evolution	Linguistic evolution
Discrete characters	Lexicon, syntax, and phonology
Homologies	Cognates
Mutation	Innovation
Drift	Drift
Natural selection	Social selection
Cladogenesis	Lineage splits
Horizontal gene transfer	Borrowing
Plant hybrids	Language Creoles
Correlated genotypes/phenotypes	Correlated cultural terms
Geographic clines	Dialects/dialect chains
Fossils	Ancient texts
Extinction	Language death

A central feature of the article is that due to analogous processes between languages and living things, both linguists and biologists need to ask similar questions, and the authors find it likely that biology and linguistics will remain curiously and productively connected (p. 524).

Eleven years later, the article ‘Unity and disunity in evolutionary sciences: process-based analogies open common research avenues for biology and linguistics’ by Johann-Mattis List et al was published in *Biology Direct* (2016, 11:39). This deals with much the same phenomena as Atkinson and Gray, and the abstract of the article refers to the “surprising similarities between the evolution of life forms and languages” (p. 1). Evolutionary biology and historical linguistics are noted as the academic disciplines which specialise in these two fields (p. 2). Nevertheless, the research objects of the two disciplines differ greatly, evolutionary biology examining substantial objects with a concrete physical manifestation, whereas historical linguistics deals with “intellectual objects” which, quoting Popper, are “products of the human mind” (ibid). This reflects a dualist, or indeed pluralist, position if Popper’s “three worlds” are accepted.

A critique of object-based analogies, such as comparing words to cells, languages to species and so on, leads to the “USP” of this article, namely that process-based rather than object-based analogies provide more beneficial results via a unifying explanatory framework of evolutionary processes, as “general evolution cannot be studied from within one discipline alone” (p. 10). Figure 2 of their article (shown below as Figure 3 of this essay) consists of seventeen processes in three categories selected by the authors, viz, seven specifically linguistic, four specifically biological, and six analogous processes, as opposed to the twelve features proposed by Atkinson and Gray.

Figure 3: After List et al in the article ‘Unity and disunity in evolutionary sciences: process-based analogies open common research avenues for biology and linguistics’



One analogous process which is prominent in both List et al and Atkinson and Gray is the borrowing of words and horizontal (or lateral) gene transfer. In 2014, the lead author of the above article, Johann-Mattis List, produced another on that very topic entitled ‘Networks of lexical borrowing and lateral gene transfer in language and genome evolution’. It rightly notes that “borrowing is a constitutive part of language history” (p. 143) which can lead to difficulties for historical linguists trying to reconstruct the correct relationships between language branches on a linguistic family tree. There are still parallels with biological organisms though, as “language history bears a close resemblance to prokaryote evolution” (p. 144).

To the above efforts can be added the work of Nathalie Gontier and her Applied Evolutionary Epistemology (AEE) framework, first mooted in 2012. In 2017, she produced two papers on language evolution specifically. The first: ‘What are the Units of Language Evolution?’ (2017a) includes a definition of applied evolutionary epistemology as “the phenomena where *units evolve at levels of an ontological hierarchy by mechanisms*” (p.235), and the task is to identify these mechanisms. Subsequently, Gontier produced a “sequel” to this paper entitled ‘What are the levels and mechanisms/processes of language evolution?’ (2017b). The article again offers its own definition within an AEE framework. Importantly, it stresses that evolution is not synonymous with, or restricted to, that which evolves by natural selection. Evolution occurs when units change at levels of an ontological hierarchy by mechanisms (p. 14) and can be extended to include not only the cultural, but also the inorganic (p. 13). Put another way, there are different kinds of evolution (p. 18).and according to Gontier, accepting an evolutionary worldview implies that “there cannot exist anything in this world that did not evolve” (p. 23), including inorganic matter. In conclusion, the author notes that “gene-culture coevolutionary theorists have long been engaged in finding mechanisms peculiar to cultural evolution, and it is highly likely that language evolution will prove to have some peculiar mechanisms too” (p. 40).

2.2.4 ` Language ecology and biocultural diversity

Salikoko Mufwene’s *The Ecology of Language Evolution* was published in 2001. Despite asserting that “by evolution, I mean nothing more than the long-term changes undergone by a language (variety) over a period of time” (loc. 304), the author nevertheless invites us to think of languages as analogous to species rather than organisms, makes constant references to speciation, and also submits that “a language is more of the parasitic symbiotic kind of

species than of the animal kind” (loc. 2313). In this scenario, speakers are seen as “hosts”, but it represents another, albeit different, attempt at emphasising that biological evolution does not apply to animals only, there are other forms of life which may provide more appropriate analogies for languages. The book makes the important point that language change can take place without contact with other languages (internal ecology) and that this “contact as an ecological factor is everywhere in our day-to-day interactions. It nurtures the invisible hand that executes change.” (loc. 400) This invisibility serves to reinforce the point that evolution “has no purpose or defined goals. It should not be interpreted as progress.” (loc. 2238).

In the midst of all these biological and linguistic analogies, a new term was coined, namely *biocultural diversity*, and a book edited by Luisa Maffi, entitled *On Biocultural Diversity: Linking Language, Knowledge, and the Environment* was released, also in 2001. It contains a series of articles highlighting various aspects of biological, cultural and linguistic diversity, along with perceived interconnections and threats to them all. Maffi, who co-founded the *Terralingua* organisation, has defined biocultural diversity as: “the diversity of life in all its manifestations: biological, cultural, and linguistic — which are interrelated (and possibly coevolved) within a complex socio-ecological adaptive system” (Pretty, J et al, p.269).

It is worth noting here that “cultural” and “linguistic” are noted separately. Indeed, the *Terralingua* publication *Biocultural Diversity Toolkit: An Introduction to Biocultural Diversity*, contains a section on the *three* manifestations of biocultural diversity. Biodiversity and linguistic diversity are represented by species and languages respectively, but cultural diversity is described as “the variety of worldviews, lifeways, knowledge and value systems, practices and forms of expression displayed by different human societies.” (p. 8). This would appear to be a reasonable enough approximation of a definition; however, the following point is also made:

How many different cultures there are in the world is difficult to quantify, because cultural boundaries are permeable, and many cultural traits overlap across multiple social groups. Due to these complexities, commonly the number of different languages is used as a proxy for the diversity of cultures (ibid).

This can immediately be seen as a contradiction. If languages are sufficiently close to cultures to serve as a proxy, then there are only two manifestations of biocultural diversity. Conversely, if they are not close enough for that purpose, then languages should not be used as a proxy for cultures in the first place. The fundamental point behind biocultural diversity, however, is that the “three realms” (p.2) of the web of life are interwoven and interdependent, as illustrated in the figure below:

Figure 4: Plant diversity versus language diversity

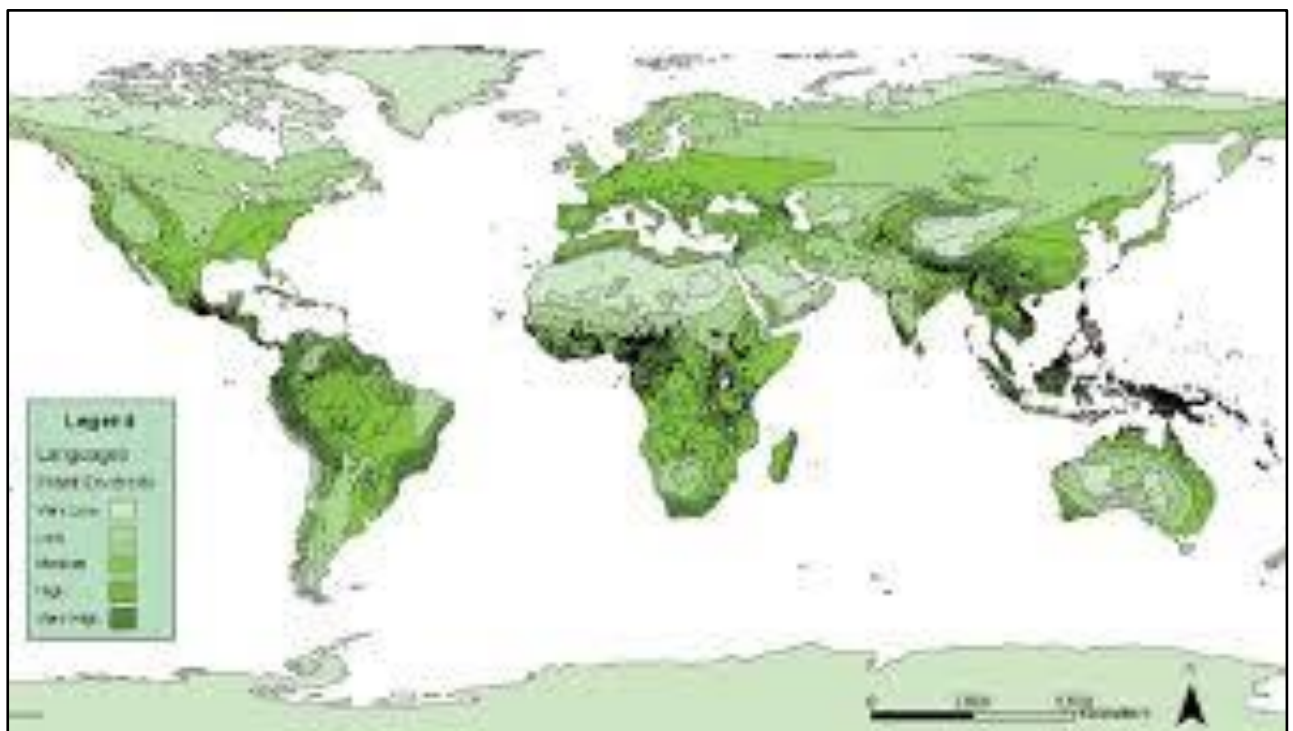


Figure 4 shows the *Terralingua* map of plant diversity (shades of green) and language diversity (black dots). The darker the shade of green, the greater the diversity of plants, and the more numerous the black dots, the greater the diversity of languages (*Biocultural Diversity Toolkit: An Introduction to Biocultural Diversity*, p.11).

This, then, offers another parallel between biological species and languages in an ecological context, often utilised by those on all sides. For instance, the International Union for Conservation of Nature (IUCN), the body which produces the Red List of Threatened Species, made this statement about biocultural diversity, where, once again, we see language being used as standard bearer for cultural diversity, as if the one represented the other:

It is no coincidence that areas of linguistic and ethnic diversity are also areas rich in biodiversity. Most of the world's languages are spoken by indigenous and other tribal peoples in countries that harbour great biodiversity. When a language dies, we also stand to lose the local ecological knowledge and wisdom that reposes in that language (IUCN, 2018).

In 2015, linguist Stig Eliasson, presented a paper in *Language Sciences* entitled 'The birth of language ecology: interdisciplinary influence in Einar Haugen's 'The ecology of language'.' In addition to Haugen's own definition of language ecology as "the study of interactions between any given language and its environment" (p. 78) he references some of the more fundamental elements of Haugen's concept such as that "the true environment of a language is the society that uses it" (p. 79) and that "language exists only in the minds of its users" (ibid). Eliasson, for his part, states his intention to "outline some of its conceptual and theoretical problems" (ibid). He notes that the term ecology (in any context) is not attested until the second half of the nineteenth century. In a specifically linguistic context, he distinguishes between, on the one hand, Haugen's linguistic or *language ecology*, and, on the other, a field which has labelled itself *ecolinguistics*. There are significant differences between these, with the former representing language interaction and contact, and the latter defining itself thus:

Ecolinguistics explores the role of language in the life-sustaining interactions of humans, other species and the physical environment. The first aim is to develop linguistic theories which see humans not only as part of society, but also as part of the larger ecosystems that life depends on. The second aim is to show how linguistics can be used to address key ecological issues, from climate change and biodiversity loss to environmental justice (IEA, 2019).

Haugen is on record as stating in 1987 that “there were many parallels in the current concerns about plant and animal species to the linguists’ concerns about the life and death of languages” (p. 83). Eliasson notes that in Haugen’s (admittedly limited) ecological analogy, the three “central elements” (p. 86) of his framework are, organism, environment and interaction. According to him, “the difficulty that lies in the translation of biological and social conditions into linguistic ones, leads to a shifting focus in his definitions of language ecology, and its object of study is not well defined.” (p. 90)

In similar fashion, A.V. Kravchenko’s 2016 paper ‘Two views on language ecology and ecolinguistics’ criticises, not only Haugen’s core concept, here described as including “contradictory or mutually excluding theoretical approaches” but also linguistics more generally. Its treatment of language as a “tool” and languages as “codes” is referred to as “the language myth” (p. 108). With frustration reminiscent of Edward O. Wilson some forty years earlier he claims that:

Biologically, a human is a linguistic organism.... Failure to realize that language is a biological phenomenon is, probably, one of the reasons why the millennia-long study of language has not produced any remarkable effects on human life compared to the achievements in physics, chemistry, biology, or computer science (p. 102).

To add to the disciplinary confusion, unlike the distinction referred to above, Kravchenko treats language ecology and ecolinguistics as basically interchangeable. There are therefore numerous conceptual and definitional difficulties associated with this field.

3. The two cultures and dualism

3.1: The Woolly Mammoth

Enormous and extremely woolly, such is the use of the word “culture” today in both general and academic discourse. In 2012, Helen Spencer-Oatey of the University of Warwick compiled a collection of quotations on the topic in her publication *What is culture?* It begins by acknowledging that “culture is a notoriously difficult term to define” (p. 1) with 164 different definitions recorded in the 1950s. Quoting Apte, it adds that “despite a century of efforts to define culture adequately, there was in the early 1990s no agreement among anthropologists regarding its nature”. This would appear to be a rather alarming admission given that culture is anthropology’s unifying concept, until one remembers, given the subject matter of this essay, that both “language” and “life” are struggling in this department also. One advantage that linguists and biologists have over anthropologists, however, is that individual living things and languages can be identified in a more direct manner than cultures. We can point at elephants or written French in a way that we cannot, for example, with the belief system of the Sami. The IUCN has a list of endangered species, and UNESCO has a list of endangered languages, but it has no equivalent list of “endangered cultures”. Instead, it has a list of (physical) World Heritage sites and another list of “intangible cultural heritage” which includes traditions, rituals and practices, many of which may not leave physical remains. In the case of both World Heritage and intangible cultural heritage, items are added only after receiving approval from the relevant UNESCO Committee. This marks a distinct difference to both languages and species, which simply have to exist to be included on their respective lists. There are of course criteria which must be met, such as whether the said organism or tongue is a subspecies as opposed to a species, or dialect rather than language. Nevertheless, there are no subsequent value judgements determining whether or

not the candidate in question is worthy of inclusion. A definition of intangible cultural heritage can be found on the UNESCO website (UNESCO, 2018).

Spencer-Oatey then goes on to quote Edward Tylor's famous 1870 definition from his book *Primitive Culture*, which defines culture as: "that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society" (p. 1). She notes that "the greatest legacy of Tylor's definition lay in his "complex whole" formulation" (Spencer-Oatey, 2012, p. 1) taken to mean that "cultures were wholes – integrated systems" (ibid).

One of the definitions on offer is her own, shown here:

Culture is a fuzzy set of basic assumptions and values, orientations to life, beliefs, policies, procedures and behavioural conventions that are shared by a group of people, and that influence (but do not determine) each member's behaviour and his/her interpretations of the 'meaning' of other people's behaviour (Spencer-Oatey, 2012, p.2).

The shared aspect of culture is again considered essential, however, it is acknowledged that members of different cultures can be subdivided according to numerous variables such as nation, region, religion, ethnicity, language, gender, age, social class and many more specific factors such as corporate culture. Given these, it seems fair to ask why all of these elements may not in fact ultimately be reduceable to the level of the individual, and a quote by Avruch at least accepts this possibility, noting that "culture is a derivative of individual experience, something learned or created by individuals themselves" (p. 9).

Culture, then, is indeed a "fuzzy" concept, and it is difficult to see why defining it quite simply as *that which is learned* (as opposed to that which is genetically inherited) is insufficient, although this would no doubt rob the term of much of its "mystique". Moreover, human beings, like other animal species, have evolved to learn, we are *built* to learn as we progress through our life cycles. We are *animal* because we are *animate*, and learning is therefore not a process divorced from the physiological, but rather an essential requirement of

independent mobility. Were we to be fixed to one spot throughout our lives, we would have little need to learn, as illustrated by the sea squirts which are motile as larvae but thereafter settle in one location, at which point they subsequently “eat their brains” as they have no further use for them.

As far as culture’s relationship to both language and life is concerned, Dawkins and countless others assert that language is part of culture, while Richerson and Boyd subsequently assert that culture is a part of biology. However, it is not the concept of culture (singular) which complicates these interrelationships, but the concept of cultures (plural), and in particular the belief that: “cultures should be thought of as integrated wholes – that is, cultures are coherent and logical systems, the parts of which to a degree are interrelated... its components are more than a random assortment of customs” (Spencer-Oatey, 2012, pp. 14-15), therefore, “it follows logically that a change in one part of the system is likely to produce concomitant changes in other parts of the system” (p. 15).

It is undeniable that the world is full of diverse beliefs, traditions, conventions, technologies and languages. It is an altogether different matter to assume that these are interrelated like the interconnected components of an organism. Belief systems do not necessarily change because technologies or languages do, or vice versa. Even anthropology, which claims culture as its core concept, distinguishes between biological, cultural and linguistic anthropology, reflecting, rather interestingly, the exact same “three realms” noted above as constituent elements of biocultural diversity.

3.2 Dichotomies true and false

How do definitions of culture influence the curious parallels between species and languages? In 1959, C.P. Snow gave a talk for the annual Rede Lecture at the University of Cambridge entitled *The Two Cultures*. Snow was, in his own words, “by training...a scientist; by

vocation...a writer” (p. 1) and therefore ideally placed to comment on the topic under discussion, namely the academic split between the sciences and the humanities. Members of these two groups had, according to Snow, “almost ceased to communicate at all” (ibid) to such an extent that “the intellectual life of the whole of western society is increasingly being split into two polar groups” (p. 2) labelled by him as literary intellectuals and scientists. In Snow’s opinion, it is the former, traditional group, “remarkably little diminished by the emergence of the scientific one, which manages the western world” (p. 6). He bemoans a “fanatical belief in educational specialisation” (p. 9) particularly in the UK, and asserts that the gap between scientists and non-scientists “is much less bridgeable among the young than it was even thirty years ago” (ibid). Perhaps the most damning claim is that “intellectuals, in particular literary intellectuals, are natural Luddites.” (p. 12).

The Two Cultures was presented during the Cold War Era, and it is tempting to compare the divisions in question with the political Western and Eastern Blocs of the time, with individual disciplines within them playing the role of nation-states laying claim to academic “sovereignty”. What the two cultures reflect more closely, however, is a much older dichotomy which distinguishes the physical from the non-physical, namely “dualism”.

Although belief in the non-physical, such as for example, a soul or a spirit, has existed for many millennia, the seventeenth century Cartesian version of dualism is the one which still holds sway today. Despite also being an outstanding mathematician, it is René Descartes’ philosophical work which most directly affects the categorisation of academic disciplines. He believed, amongst other things, that the mind and body were separate, and that humans had souls but (other) animals did not, seeing them instead as machines incapable of feeling pain. Edward Slingerland (2012) reinforces the opinion that “the humanities-science divide, then, is fundamentally based upon mind-body dualism,” (p. 76), with defenders of such dualism arguing that the workings of the mind require interpretation, as opposed to the physical or

mechanistic explanations of science (p. 74). Putting aside for one moment this rather simplistic view of science, those of the dualist persuasion also have an ace up their sleeve in that they have God on their side! Put perhaps less facetiously, they have the backing of a presumed innate human disposition to believe in a soul separate from the body, because “such dualism appears not only to be a universal feature of human folk cognition, but also to play a foundational role in subserving religious and moral cognition” (p. 76).

Although physicalism (a belief in only the physical) has a long history (Slingerland asserts that it was proposed by Lucretius in the first century BCE) it does not have a very successful one. It appears to face “an insurmountable hurdle” (ibid) as a result of its being counterintuitive. Science, however, often progresses despite human intuition, not because of it, and Slingerland adds that dualist intuition has been undermined in recent years by developments in cognitive science which have illustrated “how mindlike powers could arise from a purely physical body-brain system, and how this embodied mind can be seen as much a product of evolution as the spleen.” (p. 78) The “mind” should therefore be seen as a product of evolution, and *part of* the human body rather than the ghost in the machine. Like both C.P. Snow and Edward O. Wilson before him, Slingerland makes a plea for consilience, so that scholars from both the sciences and the humanities can talk to each other, a plea which has “for the most part, been met with hostility among humanists” (p. 81). It would be unfair to lay all the blame at their door, however, as the philosophy of science is “studied almost exclusively in the humanities” (p. 82). Human beings, the obvious subject matter of the humanities, are instinctively repulsed by any account of humanity which sees us as “in essence, very complicated *things*” (p. 83), and those aspects of life which reflect our humanity “ - beauty, honor, love, freedom - strike us as pertaining to an ontological realm entirely distinct from the blind, deterministic workings of the physical world” (p. 85). Even the denial of dualism does not exempt us from using the physical brain as a substitute for the

soul, and apportioning to it the same mysterious properties. Jasanoff (2018) therefore finds it necessary to remind us that “our minds are biologically based, rooted in banal physiological processes, and subject to all the laws of nature. By mythologizing the brain, we divorce it from the body and the environment, and we lose sight of the interdependent nature of our world.” (p. 3)

We humans can be a very “centric” species, more than willing to place ourselves at the centre of everything. We have at various times been geocentric, thinking our earth was at the centre of the universe; anthropocentric, believing ourselves to be the only species made in the image of God; and ethnocentric, holding our own cultural attributes to be superior to those of all others. Lest we get too carried away, therefore, Jasanoff again informs us that “animals have had brains or brain-like structures for nearly five hundred million years; over 80 percent of that time, the ancestors of sheep were also our ancestors, and their brains were one and the same” (p. 12). It was undoubtedly not that shared 80 percent of time, however, that saw the development of human language, and so with specific regard to that faculty, Kravchenko argues that:

from the point of view of cognition understood as a biological function, it should be apparent that there is no such thing as ‘the mind’ in the operation of the nervous system, and that ‘the mind’ is nothing but an explanatory notion....the issue of the nature and function of language, and its relationship to mind, cannot be resolved within the Cartesian paradigm (p. 103).

Contrast this to Louis-Jean Calvet’s provocative suggestion that “languages do not exist” (2006, p. 241) or Einar Haugen’s rather less extreme claim that “language exists only in the minds of its users” (quoted in Eliasson 2015, p. 79). However, if we instead assert that languages exist in the *bodies* of their speakers, an altogether different picture emerges. Language now becomes a product of human physiology; of brain, nose, teeth, tongue, lips, throat, lungs and, in the case of sign language, eyes and arms. Dediu and Christiansen (2016) note that the famous “language gene” FOXP2 “is not only involved in brain development and

the functioning of specific brain areas (presumably mediating its effects on speech, language, and cognition), but also in the development of lung and esophagus” (p. 362). Although not a solid object, language is still able to be recorded by the senses and measured by the laws of physics just as surely as the wind or radiation. In what way, then, do the countless physical utterances of people across the world every day not exist? Do birdsongs, whale songs, the howls of wolves and the roars of lions similarly not exist? It takes a strange reversal of logic to deny that which can be measured and proven to exist, whilst accepting the reality of something as abstract as the mind. Consequently, dualism, and various attitudes towards it, has a very important part to play in examining the parallels between species and languages.

4. Research Methodology

Internet searches were carried out to look for publications, in the form of published books, articles in academic journals and web pages, which dealt with the above topics. However, it was decided not to conduct research into all of these areas in the same way. As far as definitions and scope of the word “culture” were concerned, it was deemed sufficient to rely solely on available materials in academic works. That said, the relationship between culture and both biology and language would be frequently raised in some way in the questionnaires on the other topics.

With regard to animal communication, historical linguistics and linguistic ecology, it became apparent at an early stage that these were very specialised fields which could only be researched efficiently by asking the experts in person. To that end, three distinct, but similarly themed questionnaires were produced, each containing a mixture of multiple-choice and open questions, some of which were common to all three. The questionnaire on animal communication contained 14 questions, the language change one contained 12, as did the one on linguistic ecology. The main results of these questionnaires can be seen in the relevant chapters below, and the unabridged originals are available in the appendices.

Searches were carried out for authors who had published in these three areas. As many of these were leading academics in their given disciplines, it was envisaged that they would be extremely busy people who may well not be able to respond to a questionnaire from a research student. Consequently, a total of 60 emails, 20 in each of the three fields, were sent personally to one recipient at a time in the hope that perhaps 20 responses overall would be returned. In line with expectations, just under one in three of the recipients completed the questionnaire, four from animal communication, six from historical linguistics and nine from linguistic ecology.

All recipients had been asked in the initial questionnaire whether or not they would be willing to participate further in a semi-structured interview, and of the 19 respondents, six went on to undertake this second part of the process, three in historical linguistics and three in linguistic ecology. Unfortunately, no-one from the animal communication side was available to proceed to this stage. A summary of the figures can be seen in the table below:

Table 2: Specialist questionnaires

Questionnaire type	Invitations	Responses	Interviews
Animal communication	20	4	0
Historical linguistics	20	6	3
Linguistic ecology	20	9	3
Totals	60	19	6

Responses to the first generic questionnaire were anonymous, and, for most contributors, their participation ended at this point. The semi-structured interviews, on the other hand, contained bespoke questions based on the individual respondents' replies to the first questionnaire, and also on their published work. Consequently, before moving from the first to the second stage, and given that identification of the individuals concerned would be virtually inevitable under these circumstances in any event, respondents were asked for permission to include their names. The content of these interviews can be seen in the relevant chapters of the dissertation, alongside further background information on those who contributed.

Biocultural diversity was dealt with in a different manner. As this is a topic which regularly receives considerable media attention, at least in the case of biodiversity, a questionnaire was prepared which could be sent to members of the general public to assess not only their factual

knowledge of different biocultural categories, but also their attitudes towards them. For practical reasons, this was subsequently distributed to students and staff of one of the Faculties at the University of Wales Trinity Saint David, as there was no reason to assume that this group would be any more knowledgeable than any other non-specialist group. The aim was to receive 100 responses, and a total of 105 were completed, this time via an online survey platform rather than individual emails. An analysis of the responses is included in the chapter on biocultural diversity, and the full results can be seen in the appendices. A total of 16 questions were asked, and care was taken to spread the questions on biodiversity, linguistic diversity and cultural diversity at random intervals. One reason for doing this was to assess whether knowledge of, or attitudes towards, biodiversity would be any stronger than the others.

5. The language of the birds and the bees

Unfortunately, only four responses were received in the field of animal communication. All will remain anonymous as none went on to complete a semi-structured interview. That said, every respondent was a leading expert in this line of work, regularly publishing the results of research in scientific journals. This alone has made their responses of great use.

5.1 Analysis of animal communication questionnaire results

The responses to Question 1, regarding whether participants felt animal communication was a branch of other disciplines, were both interesting and varied. The results are shown below in order of decreasing number of responses:

Table 3: Animal Communication is a branch of:

Discipline:	No:
Biology	4
Ethology	4
Zoology	3
Cognitive Science	3
Behavioural Science	2
Ecology	1
Psychology	1
Linguistics	1

In response to Question 2, again listed below in order of decreasing number of responses, participants stated what they felt themselves personally to be:

Table 4: What respondents considered themselves to be:

Discipline:	No:
Ethologist	3
Biologist	2
Zoologist	2
Behavioural Scientist	2
Psychologist	2
Ecologist	1
Cognitive Scientist	1
Linguist	0

It is significant, then, that of all the choices offered, linguist was the only option which received no responses at all. When combining the results of these first two questions, it can be seen that ethology/ethologist is at the top of the league, with linguistics/linguist at the bottom. Ironically, the responses given to Question 3, on personal research, would grace many a linguistics department.

Responses to Question 4 on methodology do not suggest a strong set of distinct methods specific to animal communication, with interdisciplinarity and overlap with other disciplines seemingly inevitable. Three of the four respondents felt that, in principle, the study of human language should fall within the scope of animal communication (Q.5), albeit with the proviso that language would still require a discipline of its own. The fourth respondent saw human language more as a “sister” discipline. None saw it as a distraction. Collaborative research (Q.6) was felt to be essential by three of the four respondents, and desirable by the fourth. None considered it unnecessary.

The occasional use of methods from linguistics in the respondents' personal research (Q.7) was acknowledged, although this was most evident in those areas which were related to the evolution of language. Personal collaboration with linguists at some point (Q.8) was noted by all four, despite this not being seen as a feature of animal communication in general (Q.9). Linguists returning the compliment (Q. 10) and using findings from research in animal communication was, however, not thought to be a regular occurrence, with one respondent making an additional comment which deserves to be quoted in its entirety:

I think biologists interested in animal communication are more likely to make use of findings from linguistics than are linguists interested in human language likely to make use of findings from those studying animal communication. Further (and perhaps unfortunately), I think linguists who do draw on findings from studies of animal communication sometimes "cherry pick" ideas and results and therefore draw on those studies in a shallow fashion (QAC1).

Two of the four respondents felt that the division of academic disciplines into natural and social sciences inhibited collaboration between animal communication and linguistics (Q. 11). The other two contributors were neutral on this matter, and so none felt it facilitated collaboration. With regard to similarities in communication systems across different animal species (Q. 12), there was no simple answer, as all of the options offered might apply, depending on the species in question. Similarly, with Question 13, on intraspecific dialect or accents, all of the proposed options could apply in different circumstances. In hindsight, these questions were no doubt insufficiently precise. One extremely useful response which did arise from them, however, is that differences in birdsong dialects are primarily thought to be learned (as opposed to innate). This has obvious implications for language learning in humans. In the case of the final question (Q. 14) it ultimately proved impossible to arrange a mutually convenient time to hold an interview. The responses received to the questionnaire were nevertheless extremely informative.

6. Natural languages and natural selection

A total of six questionnaires were completed on the links between evolutionary biology and historical linguistics.

6.1 Analysis of historical linguistics questionnaires

In response to Question 1, two participants felt that the use of the same terms to categorise threats to both biological species and languages was of no consequence as they were easily understood and separated (Option A), while four were of the opinion that the use of these same terms was of use and of some significance, indicating the similar dangers facing both biodiversity and linguistic diversity (Option B). No-one felt that it was unhelpful and misleading.

With regard to the use of “biological” terms such as “living” and “genetically related” to describe languages, two participants (the same two who made this choice with the first question incidentally) once again saw this as being of no consequence. Three respondents thought that this was of some use and significance, and the remaining one described it as unhelpful and misleading, albeit with the proviso that this choice was “perhaps too strong” (QBLE3). Question 3, concerning the apparently shared threats to biological, linguistic and cultural diversity, met with a far greater variety of responses, including selecting more than one option or none at all, and a greater incidence of additional comments, ranging from “I am agnostic with respect to this question” (QBLE1) to the subtly put “I think these are consequences of complex phenomena that cannot be captured by the choices here provided” (QBLE4). It might simply be, therefore, that this question was too simplistic and not sufficiently thought through. Of the three respondents who did select from the choices provided, the “environmentally determined” option was picked by all three, implying that relatively difficult terrain is at least partially responsible for protecting diversity.

The suggestion that binomial nomenclature could be applied to languages (Q. 4) was not well received and considered to be of no practical purpose by five of the six respondents, the remaining one believing that it might be a useful way of distinguishing languages from one another.

On the question of the importance of collaborative research between evolutionary biology and historical linguistics (Q.5), four respondents expressed the opinion that it was desirable, with two claiming that it was essential, although one highlighted both these options with the further comment that:

What is most essential, in my opinion, is recognizing that there is an abstract theory of evolutionary change (change by replication) that subsumes biological evolution, cultural evolution and language change. There are differences in how it is instantiated in these domains, and these differences can cause (and have caused) misinterpretations and mis-adaptations of ideas. There has to be some recognition of these facts on the part of both the biologists and the linguists who are collaborating, for it to be productive (QBLE3).

The remaining respondent stated that it was “potentially useful (depending on the questions being asked, and on the degree to which collaboration is really interested in understanding each other’s discipline)” (QBLE1). The message here then appears to be that collaborative research is desirable but should not be undertaken for its own sake, and that recognition of the differences between these disciplines is every bit as important as recognition of their parallels and similarities.

On the use of methods from both evolutionary biology and historical linguistics in their personal research (Q. 6), all respondents scored highly, with three noting that they did this regularly, two often and one sometimes. It would appear, however, that the use of such interdisciplinary methods by respondents to this questionnaire is greater than the norm for historical linguists as a whole. When asked if historical linguists in general made use of findings from evolutionary biology (Q. 7), five participants noted that they “sometimes” did, with one opting for “only in very specific cases”. No-one chose “regularly” or “often”.

One respondent additionally commented that the influence of bioinformatics on linguistics was “exaggerated” (QBLE1), while another stated that the main use of findings from evolutionary biology was in the “phylogenetic classification of languages” (QBLE3), suggesting more of a conceptual parallel once more. It should be added, however, that respondents to this questionnaire, despite its name, may not consider themselves to be historical linguists per se. Although this branch of linguistics is often associated with evolutionary biology, much of the research comparing biological and linguistic processes is conducted within the wider category of language change more generally.

Travel in the opposite direction, where practitioners of evolutionary biology would make use of findings from historical linguistics (Q. 8), was considered to be even less likely. Four were of the opinion that this “rarely” happened, with the other two holding that it occurred “only in very specific cases”. Perhaps this question was best summed up by the following additional comment: “I am not aware of much if any influence in the direction from historical linguistics to evolutionary biology” (QBLE3).

Three of the respondents felt that the “positively misleading” (QBLE6) division of academic subjects into natural and social sciences inhibited collaboration between evolutionary biology and historical linguistics (Q. 9) while one felt that it neither facilitated nor inhibited it. The remaining two responses noted additional comments under the “other” option. One of these thought that merging natural and social sciences would cause problems of its own and that “changing the academic reward system to genuinely encourage interdisciplinary collaboration would be more helpful” (QBLE3). The other added that this academic division was “making collaboration more difficult, as biologists rarely feel obliged to learn about linguistics, while linguists often learn at least something about biology” (QBLE1). This should perhaps be compared to the comment made above by a biologist in response to Question 10 of the animal communication questionnaire, which says more or less the exact opposite.

One of the staples of phylogenetic relationships, whether biological or linguistic, is the family tree model, famously used by Darwin for his “tree of life” diagram and also used in philology to explain relationships between languages. When asked if this model was an adequate one (Q. 10) the tree question clearly turned out to be a thorny issue. Two respondents felt that the family tree model was adequate for all biological species and languages. Another two felt that the reverse was true, albeit with one proviso that it was “an OK approximation most of the time” (QBLE2), and the remaining two offered combinations of both adequate and inadequate, one stressing that it was “much more appropriate for biology” (QBLE6) and the other claiming that “in both biology and language, some patterns of diversification are tree-like but some aren't” (QBLE3).

The question of whether or not the evolution of languages was an independent phenomenon or part of a wider cultural or biological evolution (Q. 11) also received mixed responses. No respondents felt that “the evolution of languages is part of an exclusive process which applies to languages alone”. Although its exact relationship with cultural and biological evolution was not determined, most respondents saw aspects of both. One claimed that “the question seems ill-stated” (QBLE1).

6.2 Semi-structured interviews on language change

Of the six respondents who took part in the generic questionnaire, three went on to complete a semi-structured interview (Q. 12). These interviews were a combination of some questions based on the questionnaire responses, and others based on published work by the respondent which was felt to be relevant to the topic under discussion. They are shown below:

6.2.1 Semi-structured interview with Johann-Mattis List

At the time of interview, Johann-Mattis List was Senior Scientist in the Department of Linguistic and Cultural Evolution at the Max Planck Institute for the Science of Human History in Jena, having previously worked as Research Fellow at the Centre de Recherches Linguistiques sur l'Asie Orientale in Paris, France, and as Post-Doctoral Researcher at Philipps University in Marburg, Germany

Doctor List has written extensively, either alone or in conjunction with other scholars, on the parallels between evolutionary biology and historical linguistics, and his main relevant works are referred to either in the following interview or in the bibliography. He was lead author of 'Unity and disunity in evolutionary sciences: process-based analogies open common research avenues for biology and linguistics' which was considered an essential article for this dissertation's literature review. This interview follows on from the responses given to the questionnaire QBLE1.

Semi-Structured Interview Questions

SSIQ1JL:

In your response to Question 5 you note that collaborative research between evolutionary biology and historical linguistics is "potentially useful (depending on the questions being asked, and on the degree to which collaboration is really interested in understanding each other discipline)". You have personally contributed to numerous collaborative ventures leading to academic papers such as 'Networks of lexical borrowing and lateral gene transfer in language and genome evolution' (2014) and 'Unity and disunity in evolutionary sciences: process-based analogies open common research avenues for biology and linguistics' (2016).

Could you elaborate on any examples of interdisciplinary progress which have taken place as a result of your collaboration in work of this kind?

SSIQ1JL Response:

My work on sequence comparison in historical linguistics (List 2014: 'Sequence comparison in historical linguistics') can be seen as an example of research that starts from biology, where sequence comparison methods have long since been used, and then successively adjusts these methods to the realm of linguistics. A more recent example is work on the tree model and metaphors. While we already mentioned incomplete lineages sorting as an important concept useful for linguistics in the 'unity' paper, a follow-up paper on trees in linguistics (to appear: Jacques and List, 'Save the trees'), elaborates more in

this, and the response of the authors we challenged with this paper (Kalyan and François to appear) suggests that this “hit a nerve”, given that they fully acknowledge ILS as an important aspect of linguistics data (or processes), so I would say: this is a good example for biology providing useful insights into linguistics. But note also that we took great care in identifying the potential analogies and that we do not say that the same processes lead to ILS in linguistics as in biology.

SSIQ2JL:

In your response to Question 7 you note that “it is often exaggerated, to which degree bioinformatics would have an influence on our methodology in linguistics. In some areas, we adapt methods, in others, we have our own techniques.” This agrees with the following quote from your article ‘Beyond cognacy: historical relations between words and their implication for phylogenetic reconstruction’ (2016):

“Scholars justify the use of bioinformatics software in linguistics by drawing analogies between historical relations in the two disciplines. Unfortunately, these analogies often ignore the peculiarities of biological evolution and language history. Instead, they offer a simplified mapping between terms in both disciplines and disregard the underlying processes.” (p. 120)

In your opinion, have the process-based analogies which you and your co-authors recommended in ‘Unity and Disunity’ had a positive influence in reducing simplified mapping of this kind?

SSIQ2JL Response:

Yes and no. For the yes, see my answer on ILS above. For the no, I have to admit that we still have a hard time to find a good way to take inspiration of evolutionary biology. By now, I would say that I am sceptical whether it is only the “processes” that help to draw our analogies. I would critically say that our paper lists some potentially interesting aspects, but that we have not fully explored the possibilities, so I would be careful in saying that it is only processes that should drive our analogies, while I would still insist that analogies should be in some way “different” from the type of mainstream analogies that are most prominently discussed in the research in historical linguistics and evolutionary biology. I would love to find an easy solution, but my current opinion is: concentrating on processes was productive in our paper from 2016, but I am less sure now that it would be the only way.

SSIQ3JL:

In your response to Question 9 you note that “biologists rarely feel obliged to learn about linguistics, while linguists often learn at least something about biology.”

Does this imply that as far as collaboration in the evolutionary sciences is concerned, biology is of more use to linguistics than linguistics is to biology?

SSIQ3JL Response:

Yes and no. Biology guarantees practically our funding by now, as it allows us now to give our field a more scientific scent. It also gives us inspiration, as my research probably shows, but we probably profit even more from media outreach than from the concrete benefits we receive from work that seriously tried to get inspiration from biological algorithms. I expect that biology could at some point also profit from linguistics, but we are not there yet, and may never be there, since there are many more biologists doing

research than linguists. But the current situation is that linguists make a lot of use of algorithms proposed first for biology, and there is no precedence of which I knew – apart from approaches in NLP being used for protein domains (as you can see in our ‘unity’ paper), where methods developed for studying languages would have been useful for biology. Note also that these examples of proteins do not touch language evolution: they are based on highly sophisticated methods used to study languages from an engineering perspective, which is not what the traditional historical/evolutionary linguist would take into account. So the transfer is not from linguistics to biology, but from statistical language engineering to biology, which I consider two different kinds of shoes.

SSIQ4JL:

In your response to Question 10 you note that the “family tree” model of indicating evolutionary relationships is an adequate model for all biological species and all languages, and that “all relations can be handled by a tree”. However, in the article ‘Do languages grow on trees? The tree metaphor in the history of linguistics’ (2013) you note that:

- “the family tree is not sufficient to model language history in all its complexity” (p. 122) and
- “given the complexity of language history, combined networks of horizontal and vertical language relations seem to offer a promising alternative to both trees and waves in historical linguistics.” (ibid)

Could you summarise your current position with regard to the use of trees and/or networks?

SSIQ4JL Response:

I think, the answer is best given in our forthcoming paper by Jacques and List ‘Save the trees’, where we emphasize both the importance of the tree, and the fact that it is in part insufficient.

SSIQ5JL:

The article ‘Networks of lexical borrowing and lateral gene transfer in language and genome evolution’ makes the following claim:

“....it seems obvious that language history shows a much closer resemblance to prokaryotic evolution than to eukaryotic evolution.” (p. 145)

The article then goes on to conclude that:

“Applying network approaches in historical linguistics can provide new insights into both the vertical and the lateral components of language history, and help to bring traditional and more quantitative research closer together.” (p. 148)

Given the significance of lateral transfer to both linguistic and prokaryotic evolution, have the methods promoted in this article proven to be beneficial in the time since this article was written?

SSIQ5JL Response:

No, unfortunately, we see this much differently now! In an article by Jäger and List (2018), we can see that the methods we used then are outperformed by Maximum Likelihood approaches, but that even these methods do not really provide a promising analysis of language history. My conviction now is that biological aspects of LGT and linguistic aspects are far too different to allow for a direct comparison. I would even say that the current approaches in biology suffer heavily from the fact that scholars just don’t know

what is transferred and what is inherited. We can do better in linguistics, but we'll need to embrace our own, classical methods, and try to operationalize them more, in order to get a better picture on the degree to which lateral transfer can counteract inheritance. Biology might in the end learn from that, but linguists need to do their homework first (see my draft paper on borrowing detection on this topic, List 2018, preprint).

SSIQ6JL:

In the article 'Do languages grow on trees? The tree metaphor in the history of linguistics' you note that:

"Among biologist as well as linguists, it is now widely accepted that there are many striking parallels between the evolution of life forms and the history of languages." (p. 111)

Are you aware of any other disciplines which share as many "curious parallels" with biological evolution as language change?

SSIQ6JL Response:

One might think of manuscript evolution (stemmatics), but the processes are even more different here. So in general: no.

SSIQ7JL:

The influence of Karl Popper's "three worlds" can be seen both in the article 'Do languages grow on trees? The tree metaphor in the history of linguistics' and again in 'Unity and disunity in evolutionary sciences: process-based analogies open common research avenues for biology and linguistics.'

In these, you note that biological organisms belong to World 1, part of "the world that consists of physical bodies" whereas languages belong to World 3, "the world of the products of the human mind", as "intellectual objects" which are realized physically when spoken or written down.

On the assumption that these different worlds do in fact exist, do you think it conceivable that the direction of travel is from World 1 (the physical world of speech) to World 3 (the human mind) rather than the other way around?

SSIQ7JL Response:

Popper seems (if I remember this properly) to try to make the point that World 3 can also influence World 1. Think of humans resurrecting dinosaurs in Jurassic park, or humans leading to the extinction of species, based on stupid beliefs in some books, etc. I would have to think about this more closely, and I may just fail to see it correctly, so do not take me seriously here, but while one would think that in general the way goes from 1 to 3, as far as I understand Popper, he'd specifically think that at least in part it can also go from 3 to 1 (which is also why he would think that 3 is a part of reality, as, for example, things written down in books could change World 1, if enough people believe them and act accordingly).

SSIQ8JL:

In the article 'Unity and disunity in evolutionary sciences: process-based analogies open common research avenues for biology and linguistics' you note that "general evolution cannot be studied from within one discipline alone." (p. 10)

As far as the subject matter of this dissertation is concerned, attempts at obtaining “a full picture of evolution” (p.1) covering not only biological evolution but also linguistic and cultural evolution in general, are of central importance.

Following the ground-breaking work carried out by yourself, and the likes of Mesoudi, Mufwene, Croft, Richerson and Boyd amongst others, do you believe that we have now reached a stage where a full picture of evolution does, or soon will, exist?

SSIQ8JL Response:

I am myself skeptical, but I am sure many colleagues would subscribe to this. I have lots of discussions with colleagues from CultEvo, specifically, who believe they are working in unifying frameworks, but I feel that they often ignore the specifics of evolution in the different fields, specifically linguistic phenomena like regular sound change, which could be summarized as part of a general pattern of evolution, but where I find it strikingly interesting that colleagues have a hard time to actually find parallels in other evolving systems than language. So I would say: we’re not there yet. And I would also say that the wish to unify everything is at times leading to annoyingly simplifying accounts.

SSIQ9JL:

The ability to quantify species and languages (even if only by a rough approximation) implies that they can be counted and therefore, by extension, identified. On the other hand, there seem to be few attempts at identifying how many “cultures” there are in the world that do not use the number of languages as a proxy. However, “languages” and “cultures” are not synonymous.

Why, in your opinion, are we unable to quantify how many “cultures” exist in the world?

SSIQ9JL Response:

I honestly do not know, and I never asked myself the question, probably also, because of the long tail of debates that accompanies this question, given that this may look like we want to favor one culture above another.

SSIQ10JL:

In their book *Not by Genes Alone*, Richerson and Boyd make the claim that “culture is part of biology”.

Do you agree with this assertion, and if so, do you think it possible that, rather than being *analogous* to biological evolution, language evolution is actually *part and parcel of it* (albeit a small part)?

SSIQ10JL Response:

Depends on the perspective. I prefer to keep things distinct, especially for practical purposes. If there’s one unifying process underlying all evolution, fine, but this would also mean that not all evolution is biological, but that this process is overarching both biological and linguistic evolution.

6.2.2 Semi-structured interview with William Croft

At the time of interview, William Croft was Professor in the Department of Linguistics at the University of New Mexico, Albuquerque, a position he has held since 2006. Prior to this, he worked as Professor and Assistant Professor at the Universities of Manchester and Michigan respectively. Professor Croft has been a prolific author for some forty years, however, it is his framework for language evolution in *Explaining language change: an evolutionary approach* which, as noted in the above literature review, is of particular importance to this essay.

Consequently, the first half of the following interview concerns itself with the responses to the questionnaire QBLE3, while the second deals almost exclusively with questions based on Professor Croft's 2013 updated version of Chapter 2 of this book.

Semi-structured Interview Questions

SSIQ1WC:

Could you expand a little on why you chose Option C in response to Question 2 (which emphasises differences between languages and biological organisms) but Option B in response to Questions 1 and 3 (which emphasise similarities between languages and biological organisms)?

SSIQ1WC Response:

One reason is that I argue in my work that a language is a population, that is, a population of utterances, like a species is a population of organisms. A population is a set of entities defined by the way they interact with each other, and do not interact with entities outside of the population (most of the time). The relevant interaction is interbreeding for organisms, and conversation for languages. (Well more precisely, there are multiple related populations: organisms, their genomes and the gene pool for biological entities, and speakers, their utterances and the lingueme pool for languages. See my book, in particular the revised chapter 2 on my website.)

So terms like "living" and "dead" are used for individual organisms in biology, but the population of utterances in linguistics -- but they are not analogous. (Sometimes the terms are loosely used for species in biology, but 'extant' and particularly 'extinct' are more accurate terms.)

The story behind "genetically related" is different, but I explained that in my initial answer to Question 2.

So back to SSIQ1: the reason my answer is different for 2 vs. 1 and 3 is that I believe there is a common evolutionary model behind both biological and linguistic entities, but one must be careful as to the parallel instantiations of the elements of the common evolutionary model (Hull's General Analysis of Selection). Question 2 presupposes what I considered to be a wrong parallelism between the two domains.

SSIQ2WC:

In your response to Question 5, you state that “there is an abstract theory of evolutionary change (change by replication) that subsumes biological evolution, cultural evolution and language change.” Here, you have included culture and language separately. Was this done because they were separate in the original question (which as you will know comes from a quote by Luisa Maffi) or are you of the opinion that language change has its own specific characteristics which distinguish it from cultural evolution more generally?

SSIQ2WC Response:

I consider language change to be a type of cultural transmission. This does not preclude the possibility that there are aspects of language that make linguistic transmission different from transmission of other cultural traits. See the comparison of music and language in the revised chapter 2 on my website. But they are similar in that the interactors are persons qua social beings, and that they have artifact and behavior replicators.

SSIQ3WC:

The ability to quantify species and languages (even if only by a rough approximation) implies that they can be counted and therefore, by extension, identified. On the other hand, there seem to be few attempts at identifying how many “cultures” there are in the world that do not use the number of languages as a proxy. However, “languages” and “cultures” are not synonymous. Why, in your opinion, are we unable to quantify how many “cultures” exist in the world?

SSIQ3WC Response:

I think that the critical factor is that the population of interactors -- the community -- determines the population of replicators -- “language” or “culture”. And in particular a particular population of interactors are never completely socially isolated from other populations. So it is always going to be difficult to quantify languages and cultures. It is possible that the population that defines the divergence of one cultural trait (say, language) is different from the population that defines the divergence of another cultural trait (say, religion). One problem is that “culture” is quite a bit vaguer than “language”. What set of transmissible human social traits constitutes “culture”? Does “culture” include technology, e.g. hunting or farming technology? Does “culture” include “language”? (If so, then using language as a proxy is not unreasonable.) Some of the difficulty in quantifying “cultures” is due to the difficulty of defining the set of traits that constitutes a “culture”. Even so, the number of cultures has been quantified, for better or worse (e.g. the Murdock classification and its revisions).

SSIQ4WC:

In your response to Question 9, you note that “natural sciences and social sciences/humanities are different, although they are not as different as some think.” Do you think this view can be reconciled with your above response to Question 5 that “there is an abstract theory of evolutionary change (change by replication) that subsumes biological evolution, cultural evolution and language change.”? For example, is it feasible that the natural science of evolutionary biology has just as much in common with the social science of historical linguistics as it does with, say, the natural science of astrophysics? It would be worth knowing here if you have an opinion as to what marks the line of demarcation between the one group and the other.

SSIQ4WC Response:

There are similarities and differences between all domains of scientific inquiry. What matters of course is which similarities and differences you think are more important. So there are commonalities between evolutionary biology and historical linguistics which are valuable at least to practitioners of the latter (although as I noted in my initial answer, one must be careful), and I am not aware of valuable commonalities between astrophysics and linguistics.

The usual distinguishing feature between natural sciences and social sciences and humanities is that the latter has as its domain of inquiry human social interaction and its products (language, music, political institutions, etc.), and the former does not. I think that is also a useful distinguishing feature. But there are cross-cutting similarities like those between evolutionary biology and historical linguistics that are also useful.

SSIQ5WC:

Are you aware of any other phenomena which share as many ‘curious parallels’ with biological evolution as language change?

SSIQ5WC Response:

Pretty much all of the social sciences/humanities share as many “curious parallels” with biological evolution. This is because they all involve human interactors that replicate social/cultural traits and form populations. That's not all there is to the social sciences/humanities (including linguistics), but it's a very important aspect of all of those domains.

The remaining questions are all based on your revised Chapter 2: ‘An evolutionary model of language change and language structure’ (Draft, February 2013, PDF) from *Explaining language change: an evolutionary approach* located at <http://www.unm.edu/~wcroft/WACpubs.html>. Given that this chapter is considerably more recent than the one in the original book, and also particularly relevant to the topic under discussion in the dissertation, it seemed appropriate to concentrate on the specifics of this chapter. Even so, it was difficult to restrict the questions to a reasonable number.

SSIQ6WC:

In 2.2 you note that “linguistic diversity is so great that it is impossible to establish any but the most general exceptionless, unrestricted universals of language”. Is this not also the case (if not even more so) with biodiversity?

SSIQ6WC Response:

Yes. David Hull said to me, and maybe also said it in print, that what you find in nature in terms of bizarre organism structure and behavior exceeds what fantasists have imagined. Others have told me that what we know of biology is so dependent on a handful of species, such as fruit flies, nematodes and *E. coli*, that there is so much we don't know. As a typologist, I would say the same: much of what we know about language is dependent on European languages and the major East Asian languages. There is so much we need to

learn (or have learned through language documentation and typological research based on it, but needs to be disseminated to a wider audience of students and theoreticians).

SSIQ7WC:

Still in 2.2, you note that evolutionary theory when applied to language “provides a model of change that is not the result of the intentional behaviour of individual persons.” This seems to fit well with an “evolutionary” model. However, the examples of “cultural replicators” given later (2.3.1), namely “artefacts” (e.g. stiletto heels) “behaviours” (pots) and “concepts” (Jewish religious laws) appear to be possible only with prior planning and intent (or perhaps more controversially, an act of ‘creation’). In your opinion, is lack of intent a prerequisite for evolution?

SSIQ7WC Response:

I think that in the first edition of the book, I distinguish different types of intentional behavior in the process of replication, following a remark by Ohala. It depends on what you're intending to achieve with the (altered, or for that matter unaltered) replication. Intentions related to communicative success in interpersonal interaction are OK; intentions based on making the linguistic system "simpler" or more "elegant" are not.

SSIQ8WC:

This next question may be the result of misinterpretation on my part, but some of the different aspects of defining what makes something a species (or language) seem difficult to reconcile (2.4.2). For example, if “only actual interbreeding ultimately matters for the definition of a species/language” rather than the “absence of the potential to interbreed” then would two individuals with the potential to interbreed, but which were highly unlikely to do so, such as a male puma from British Columbia and a female puma from Patagonia, both be considered part of the same population? Given that “not every organism interbreeds with every other organism in the species, and not every speaker talks to every other speaker in a speech community” then what are the common factors that bind them together as “species” or “speech communities” in the first place if not the *potential* to interbreed or hold an intelligible conversation?

SSIQ8WC Response:

I think this is an issue in the definition of a population in biology as well. You have chains of biological populations just like you have dialect chains, which makes it hard to draw lines distinguishing populations. But what matters is presence of interbreeding vs. absence of interbreeding. The result is a network. It is not a fully connected network, of course. So the question is, how weak do the links need to be before we decide that there are two separate populations? Also problematic are the cases of individuals who for whatever reason do not end up successfully interbreeding, but otherwise live with and interact behaviorally with its neighboring conspecifics. They would be fully isolated nodes, but we wouldn't call each node a population, since there is no interaction.

SSIQ9WC:

“Each speaker will have a slightly different grammar” (2.5) - is this the same thing as an idiolect?

SSIQ9WC Response:

Yes and no. Structuralist linguistics, where the idiolect concept was developed, doesn't really accommodate variation. A lot of interindividual variation involves variation in

frequency and range of use of the same forms. More important, 'idiolect' tends to imply a grammar, but for me a grammar is a property of the utterance pool produced by a population of speakers, not individual speakers. I should probably be more careful in distinguishing knowledge about their language of an individual, and the language itself. I say 'knowledge about their language' to emphasize that an individual's knowledge is not a self-contained system, as implied by the term 'idiolect', but fragmentary knowledge of the community's behavior based on the part of the population of utterances the speaker is exposed to. So I generally avoid the term 'idiolect'.

SSIQ10WC:

The correspondence of variant linguemes to alleles is clear to see as a concept. However, the claim that “this parallelism is probably not an accident” (2.5) is particularly relevant in this case. Could you expand on any specific parallel in this context that could be considered “not an accident”?

SSIQ10WC Response:

It follows from the basic properties of the replication process. Replication preserves most of the structure of the replicator, but not necessarily all of it. So variation is generated. Replication is also an iterative process. So different variants may be replicated. That is what are called alleles in biology and variants in linguistics.

And finally:

SSIQ11WC:

The prospect of “a general framework for evolutionary change” (2.3) covering not only biological evolution but also linguistic and cultural evolution in general, is central to the subject matter of this dissertation. Following the ground-breaking work carried out by yourself, and the likes of Mesoudi, Mufwene, Richerson and Boyd amongst others, do you believe that we have now reached a stage where such a framework does, or soon will, exist?

SSIQ11WC Response:

I think that such a framework exists. Obviously, the scholars you refer to don't fully agree on the structure of the framework (see for example my review of one of Mufwene's books). And of course, I would defend my framework where it differs from that of the other scholars. But that is just the usual scholarly debate. Which of course is also modeled by the General Analysis of Selection -- indeed that is what Hull's book is about, namely scientific change.

6.2.3 Semi-structured interview with Nathalie Gontier

At the time of interview, Nathalie Gontier was Director of the Applied Evolutionary Epistemology Lab in the Centre for Philosophy of Science at the Faculty of Science of the University of Lisbon. She is also founder and editor-in-chief of the Springer book series on Interdisciplinary Evolution Research. Of particular interest to this dissertation is her work on the Applied Evolutionary Epistemology methodology and the following interview largely reflects that. This is a continuation of the content of questionnaire QBLE4.

Semi-structured Interview Questions

SSIQ1NG:

The dissertation of which this questionnaire forms a part will contain a section considering possible “false dichotomies” such as “human/animal” “mind/body” and “culture/nature”. Your 2017 article ‘What are the Units of Language Evolution?’ notes that: “...definitions remain based upon classic dichotomies including the innate-acquired or biological–cultural, animal–human or continuity–discontinuity, or historical diffusion–biological evolution divides.” (p. 236)

Do you think these dichotomies play a part in the division of the academic world into natural sciences and social sciences/humanities referred to in Question 9 of the earlier questionnaire?

SSIQ1NG Response:

Yes they do although note that when natural history research took flight in the 19th century, scholars saw continuity between biological and cultural or linguistic evolution. It is only with the emancipation of synchronic linguistics, social and cultural anthropology, and sociology that divides are drawn between these and evolutionary sciences (the diachronic versus synchronic divides).

Animal/human and mind/body divides are older and have religious foundations.

SSIQ2NG:

In your response to Question 9, you note that this division of academic disciplines “inhibits collaboration between evolutionary biology and historical linguistics.” Also, in your 2011 article ‘Depicting the Tree of Life: the Philosophical and Historical Roots of Evolutionary Tree Diagrams’, you refer to “the rise of different scientific methods that would eventually result in the division of the sciences in the nineteenth century” (p. 527)

Do you see any link between the concept of “academic boundaries” in established disciplines on the one hand, and “political boundaries” between nation-states on the other, i.e. do academic disciplines stake a similar claim to “sovereignty” over their own turf?

SSIQ2NG Response:

There is indeed a clash between different scientific cultures with a tendency to claim superiority over one's own field. Science politics also determines funding: the humanities in many countries are funded based upon a percentage of money acquired by scientists. Do you know about the Sokal Bricmont affair? Or read Foucault on power. Or google science wars.

In general, physics and mathematics are considered true sciences that follow hypothetical deductive reasoning. Natural or evolutionary sciences, because they are empirical, were considered lesser sciences but now, due to genetics, bioinformatics, statistics (eg Bayesian inferences etc), the subject area is becoming quantified and mathematicised.

The same is now also happening within the social and human sciences and a divide is arising between those that model and quantify social sciences, linguistics and anthropology and those that do not. Funding agencies are always on the side of quantification.

SSIQ3NG:

In your response to Question 10, you note that the family tree method is inadequate for both languages and biological species, and in your 2016 article 'Converging Evolutionary Patterns in Life and Culture' you state that "networks....enable depictions of the dispersal and diffusion of languages and the biodiversity and biogeography of life".

Do you believe networks to be a more efficient method of indicating shared relationships between languages and/or biological species, especially when considering lateral transfer and convergence?

SSIQ3NG Response:

Trees are very good at demonstrating common descent over long periods of time but they are not good in demonstrating horizontal transfer. Networks are very good at demonstrating horizontal transfer and backcrossing. Both demonstrate different aspects of evolution and it is best to try and use both models when interpreting data.

SSIQ4NG:

In your 2016 article 'Converging Evolutionary Patterns in Life and Culture' you refer to Mesoudi's assertion that "culture can demonstrate forms of "directed selection" and not all cultural behavior can be causally explained by genes" (p. 434).

Could you expand on "directed selection" and explain how this process differs in principle from "artificial selection" as used, for example, in the selective breeding of domesticated animals and plants?

SSIQ4NG Response:

For Darwin, selection is artificial if induced by humans and not the environment. That in itself when you think about it is a form of culture versus nature premise, natural selection is "natural" because the environment does the selecting.

Artificial selection such as selective breeding is a form of directed selection. But directed selection can be "natural" as well. In that case, it is synonymous with positive selection https://en.wikipedia.org/wiki/Directional_selection, the natural favouring of a trait gives a direction to the further course of evolution. It can happen at different levels of an evolutionary hierarchy.

SSIQ5NG:

Promoting "Applied Evolutionary Epistemology" is clearly an important aspect of your work, and in your 2012 article 'Applied Evolutionary Epistemology: A new methodology

to enhance interdisciplinary research between the life and human sciences' you note that: "the only alternative to something not having evolved is that it has been created. There is no natural proof of the latter, so AEE does not endorse this view." (p. 36)

Evolution has often been defined as "descent with modification" and attempts have recently been made (by, for example, Mesoudi and others) at treating technological and sociocultural changes as examples of descent with modification (as implied in the previous question).

In your opinion, are complex items of human technology which have clearly been intentionally produced for a specific purpose (such as, to use a familiar example, a watch) the result of evolution or creation?

SSIQ5NG Response:

The quote you give was against creationism, a movement within religious circles that denies evolution in favour of the idea that the world is created by a deity.

Of course, humans and other primates and many other species have developed technologies and they have thereby actively "(re-)created" their surroundings, either intentionally or unintentionally. These phenomena are known as niche construction. 90 percent of the oxygen in the atmosphere is made by photosynthesizing microorganisms. Beavers build dams, we construct houses, and so on. These are acts of creation or niche construction and they often require creativity, ingenuity, imagination, etc. The capacity to be all that is also the result of evolution and evolutionary theory can be applied to demonstrate the natural history and evolutionary change of artefacts. Look at the "natural history" or "evolution" of cars. They are examples of what I have called symbionts: they combine the invention of rubber (the wheels) with metal with glass, with electricity, with aerodynamics, etc. They also evolve from prototypes and today know many variations. We can apply the same mathematics and modelling techniques to track changes over time. And we can call that evolution.

For me there is no distinction between natural history and evolution. The reason ppl make the distinction is due to science politics. But there is no justification. All is the outcome of evolution. If we are able to be creative it is because we evolved these capacities. We did not evolve to make a specific car, but we evolved capacities such as memory, goal oriented behaviour, learning, etc that enables us to be creative.

So in sum, I think everything is the result of evolution, including our capacity to create technologies. And technologies are the result of biological and sociocultural evolution and they can be shown to evolve as well.

SSIQ6NG:

On page 36 of your article 'Applied Evolutionary Epistemology: A new methodology to enhance interdisciplinary research between the life and human sciences' you note that: "everything in the universe is the outcome of evolution" and that "everything evolves, and evolution occurs everywhere".

You also, on the same page, paraphrase Dobzhansky's 1973 paper, claiming that "...nothing makes sense except in light of evolution." However, the full title of Dobzhansky's article is "...nothing **in biology** makes sense except in the light of evolution" which, although comprehensive, still falls short of "everything in the universe". The above quotes imply that inorganic matter evolves. Could you give an example of the evolution of inorganic matter which is in keeping with the methodology of Applied Evolutionary Epistemology?

SSIQ6NG Response:

Yes, I think everything evolves.

Evolution traditionally associates with the science of life, biology: the logos of life.

We just saw that it can be demonstrated that languages, science, cultures, technologies etc also evolve: they undergo change, they have a natural history.

In the beginning, when evolutionary thought was introduced, ppl had problems with understanding what language/s and culture/s are. Ppl made a distinction between the capacity to have language (a biological capability or faculty) and the actual language spoken, signed and most of all learned in the community (and here is the idea of a psychic unity). But then what were those when they were proven to change or evolve over time? Is a language an organism, a species, is it similar, the same? In the beginning, and so to speak, ppl were looking for the life in these phenomena, under the assumption that if something evolves it must be alive.

Today, being alive is not necessary to be recognized to be the subject of evolution. DNA is a dead structure, it is not alive but it evolves: it undergoes changes such as mutations, over time. Viruses are in between dead and living organisms.

With the rise of micro and macroevolutionary schools, what evolves has been expanding on the micro side to include molecules, genes, etc, and on the macro-side, to include species and higher taxa.

And with the recognition that not only organisms but also their behaviour and language and culture and technologies evolve, evolution has been applied to these phenomena as well.

All of these are considered “dead” structures but they nonetheless evolve.

SSIQ7NG:

In your 2017 article ‘What are the Units of Language Evolution?’ you note that:

“...beyond the external biotic or abiotic environment, organisms also have an inner environment that is heterogeneous...., simply because organisms are compositional structures made up of different body parts. A gene, for example, may be active in the heart but not the lungs, and this implies the presence of a selection process of the unit at certain but not other levels.” (p. 239)

On the face of it, an “inner environment” seems to be a contradiction in terms. Rather than seeing compositional structures as the inner environment of an organism, should we perhaps instead consider them to be the actual (external) environment of the gene or other unit in question?

SSIQ7NG Response:

It is all about perspective taking.

For the gene, it is an external environment, for the organism it is internal.

Before, the modern synthesis only focussed on the relation between organism and environment. That organism was viewed as a homogenous entity, and focus was on the phenotype, the visible organism.

Later, Lewontin introduced the concept of “internalizing selection” and Dawkins introduced the selfish gene theory to demonstrate that external selection can target genes rather than organisms, and to demonstrate that selection can also occur inside an organism (organs can for example compete over resources such as blood flow).

Such units and levels of evolution debates raise questions on the nature of evolutionary hierarchies. An organism is inside an environment, but the organism is a composite structure where genes in one part of the body act in unity and in another they compete.

Describing and explaining inner/outer aspects of the environment depends upon the perspective taken.

SSIQ8NG:

The ability to quantify species and languages (even if only by a rough approximation) implies that they can be counted, and therefore, by extension, identified. On the other hand, there seem to be few attempts at identifying how many “cultures” there are in the world that do not use the number of languages as a proxy. However, “languages” and “cultures” are not synonymous.

Why, in your opinion, are we unable to quantify how many “cultures” exist in the world?

SSIQ8NG Response:

Because ppl do not agree upon how to define culture on the one hand, and on the other, because there are numerous variations. Basically, every kind of hobby practised with more than 2 ppl can be understood as a culture. One can be part of a cyberculture on the internet where ppl make wiki pages, of a dance culture where ppl gather to dance salsa, of a youth culture, etc.

Age, gender, location, ethnic background, social stratification, jobs, hobbies, educational background can all function as a means to differentiate cultures. Yet, these distinctions can occur in a group where everyone speaks English.

SSIQ9NG:

In your 2017 article ‘What are the levels and mechanisms/processes of language evolution?’ you note that:

“Given that evolutionary mechanisms are on the expansion, and given the complex and heterogeneous nature of language, there is no reason to at present restrict us to mere biological mechanisms of evolution. Gene-culture coevolutionary theorists have long been engaged in finding mechanisms peculiar to cultural evolution, and it is highly likely that language evolution will prove to have some peculiar mechanisms too.” (p. 40)

In the above quote (and many others by numerous authors), “*cultural evolution*” has been listed separately to “language evolution”. In your opinion, should language evolution and cultural evolution be treated as distinct?

SSIQ9NG Response:

Yes, language evolution, beyond the specific languages spoken or signed which correlate to cultures, also has to do with biological evolutions in what regards the form and function of the vocal tract, the palate, the tongue, breathing, gesturing, etc. Both depend upon the evolution of specific cognitive skills and they share many traits but they are sufficiently distinct to look into their evolution separately.

SSIQ10NG: And finally:

Are you aware of any other disciplines which share as many “curious parallels” with biological evolution as historical linguistics?

SSIQ10NG Response:

Cultural evolution and technological evolution.

7. Language in its environment

A total of nine respondents completed the questionnaire on linguistic ecology. In general, to a greater extent than was the case with the previous questionnaires, the responses were more inclined to include additional comments, sometimes as well as, and sometimes instead of, choosing from the options provided. The responses can be seen in full in the appendices, and so, for the sake of brevity and clarity, only a selection have been quoted here. One noticeable feature was that there were considerably more opinions about fundamental issues such as the nature and scope of the field. These were often contradictory or critical in nature and gave the impression that this field is divided, if it is in fact one field in the first place.

7.1 Analysis of linguistic ecology questionnaire

Question 1, in similar vein to the historical linguistics questionnaire, sought opinions on the use of analogies between the biological and the linguistic, this time with regard to the term “ecology”. Only one respondent was of the opinion that this use was of no consequence as both concepts were easily understood and separated (Option A). Three felt that the application of the term “ecology” to language was useful and of some significance (Option B) with another three being of the opposite opinion that it was unhelpful and misleading (Option C). Two “other” responses were noted. A diverse range of opinions was in evidence. The quotes below offer some indication of these. One opinion expressed was that:

the term “language ecology” is confusing to biologists, natural scientists in general and laymen informed about biology. I would have preferred a different, distinct term for the matters pursued (QEL9).

A similar objection, albeit from a different viewpoint, but with its own suggested alternative, stated that:

it is anthropocentric to use the term “ecology” in a way that excludes animals, plants, forests, rivers and trees at a time in history that we most need to focus on them. So I would much prefer it if “language ecology” was instead referred to as “language interaction” (QEL2)

Another respondent, however, emphasised the point that not only the linguistic, but also the biological use of the term “ecology” is based upon a metaphor, and that:

the question should not be whether biology and linguistics can be kept apart but whether researchers in biology and linguistics alike are aware of the metaphorical nature of the term and the consequences of using it (QEL6).

This could perhaps be considered a reminder to those who believe that “ecology” is solely a biological term. As if to reinforce this, a further respondent noted that:

the term itself seems to be applied to mean two very different things: 1) the relationship between languages within a given social/ political context, and 2) the relationship between languages and the physical environment. There is basically disagreement about what constitutes the environment – is it social/political or physical/biological? (QEL4).

This comment highlights the divisions referred to above. The killer blow, however, was the following:

so far in my reading of Ecolinguistics I have yet to come across a convincing paper on the topic, so I have yet to understand what “ecology” applied to a language could mean (QEL1).

Question 2, on the use of terms such as “vulnerable” and “extinct” to categorise shared threats to both biological species and languages, was also used in the previous questionnaire.

On this occasion, two respondents stated that the sharing of these terms was of no consequence as the separate fields were easily understood and separated. Somewhat surprisingly, six respondents agreed that the shared use of these terms was “of use and of some significance” (Option B) with a seventh adding words to that effect in the additional comments box. The difference in attitude towards the sharing of these terms, as opposed to the use of “language ecology” was significant, with two respondents themselves keen to make this point.

One of these two responses was as follows:

I view the terms “vulnerable”, “critically endangered” and “extinct” as more neutral than the term “language ecology”. The former terms do not necessarily make you think of biological organisms (QEL9).

The other displayed much the same sentiment:

These terms generally make sense and don’t imply that languages behave like species in general (in the way that “language ecology” does) (QEL2).

Some responses, however, came with an added warning:

It is of significance and also of (some) use. But there is a theory behind it, equalling some aspects of languages with some aspects of living beings. This theory makes sense from one point of view, but is terribly misleading from another (QEL6).

Also, from a rather different angle:

I think these labels are misleading because endangerment isn’t a property of a language. It’s the product of a political context – we should be rating that. Labelling languages “endangered” etc verges on victim blaming (QEL4).

This last point, although valid, is nevertheless equally true for biological species.

Endangerment is not a property of theirs either, and political policy will also determine vital aspects of their conservation such as habitat loss or (in)action on climate change.

Question 3, on the shared use of terms such as “living” and “genetically related” was also asked in the previous questionnaire. On this occasion, three responses felt that this was of some use, whereas two chose the “unhelpful and misleading” option. However, of the remaining four who opted for “other” or provided additional comments, the use of “genetically related” in particular seemed to arouse strong feeling, as indicated here:

“genetically related” may be misleading since it implies too strongly that languages behave in the same way as species, which might blind researchers to ways that they might be different (QEL2).

And even more strongly here:

Especially the term “genetically related” is gravely misleading and should be replaced. The other two terms are, however, less innocuous and so well entrenched that they will have to be kept (QEL9).

On the issue of biocultural diversity (Q. 4), five respondents were of the opinion that linguistic, cultural and biological diversity were all clearly linked. The four other responses disagreed, but did so in different ways. One disliked the use of the term “language and culture” (QEL3) in the first place, considering the former to be part of the latter. Another felt that even if they were all linked that this was “of little practical value” (QEL4) and yet another that any links between them were primarily metaphorical (QEL6). The remaining comment, however, was straight and to the point:

I think the notions “biological diversity” and “cultural and/or linguistic diversity” should be kept apart. For instance, “biological diversity” could in principle be maintained, while “linguistic diversity” totally disappears (QEL9).

Regarding whether language ecology was solely linguistic or part of a wider cultural and/or biological ecology (Q. 5), only one respondent felt that it was purely linguistic (Option A). Of the rest, three felt that it was part of cultural but not biological ecology (Option B) and a further three considered it part of cultural as well as biological ecology (Option C). Two “other” responses were submitted, although in essence they also appear to reflect the last of these three options, as expressed here:

The ecology of a language is not limited to the other languages that it coexists and may compete with. It includes a host of socioeconomic and natural ecology pressures that affect the behaviors of speakers (QEL3).

And again here:

Ecology is the interaction of humans with other humans, other species and the physical environment. Language use plays a role within ecology since it is one of the ways that humans interact with each other (QEL2).

Binomial nomenclature (Q. 6) was felt to be of no practical purpose by two respondents. Another two, however, felt that it was a useful way to distinguish languages from each other with a further one thinking that it would blur the boundaries between languages and species. The four remaining respondents chose the “other” option.

On the issue of collaboration between biological and linguistic ecologists (Q. 7) divided opinion was again in evidence. One respondent felt that any such collaboration was unnecessary for the following reason:

If a “linguistic ecologist” only considers relationships of languages with other languages without considering the biological and physical world then it would be useless – the linguist could offer nothing to the ecologist. It would be much better for ecologists to meet ecolinguists (QEL2)

This again appears to suggest a divide between one field which studies the relationships between languages, such as language shift for example, (often, but not always, termed language ecology or linguistic ecology) and another which studies languages from within a wider ecological framework (often, but not always, termed ecolinguistics) such as its role in sustaining human communities within their physical environment. Three respondents felt that collaboration was desirable and a further three were of the opinion that it was essential. The remaining two chose “other” with one adding the following warning:

if this theory sees a clear link between entity-like languages and biological entities, as it has been done so often since the 19th century, it is, I think, of no use, because there is, in my opinion, so much convincing evidence that the social and the biological do not work along the same lines (QEL6).

When asked whether or not they used methods from both biological and linguistic ecology in their personal research (Q.8), two stated that they did so “regularly”, one “often”, two “rarely”, one “only in very specific cases” and two “never”. The remaining respondent noted that:

Linguists complain that I am too biologically oriented, while some biologists like what I do. But I really don’t know whether I should say I use “methods from biological ... ecology.” (QEL3).

The motivation behind Question 9 was to establish whether or not those working in language ecology made use of findings from biological ecology. Various levels of frequency were chosen in the responses; however, the most striking aspect was the content of the additional comments, many of which were critical in some way. Two respondents, for example,

expressed uncertainty regarding the definition of a linguistic ecologist, and who might count as one. A range of different attitudes towards “ecological linguistics” were then evident in several of the added comments:

From dismissiveness:

I think that they may borrow terminology from biological ecology (e.g., semantic niche) and then (in an often forced way) try to apply it to language (QEL2).

To dislike:

I think most “ecolinguists” as they call themselves (and I hate the term *ecolinguistics*!) are much influenced by environmentalists but have expressed little interest in macroecology. So their discourse is more moralizing than it can explain what is happening from an evolutionary perspective (QEL3).

To disappointment:

I have a degree in ecology and am surprised by how little use is actually made of ecological theory in ecological linguistics. There are so many concepts that could be deployed productively (QEL4).

Looking at movement in the opposite direction (Q. 10) namely whether biological ecologists make use of findings from linguistic ecology, one respondent felt that this happened often, and another that it sometimes did. Most, however, were less convinced, with three claiming that this never happened and the remainder implying that it very rarely did.

With regard to the division of academic subjects into natural sciences on the one hand and social sciences/humanities on the other (Q.11), four respondents felt this neither facilitated nor inhibited collaboration between biological and ecological ecology, with the remaining five feeling that it inhibited it. One respondent felt very strongly about this issue as can be seen by the following comment:

This is one of the most pervasive problems within the academic institution. I have spent much of my career acting as if this division does not exist at all. This is a form of reductionistic thinking that reduces knowledge to a little box (QEL8).

7.2 Semi-structured Interviews on Language Ecology

Three of the nine respondents went on to take part in semi-structured interviews (Q. 12), the content of which can be seen below.

7.2.1 Semi-structured interview with Salikoko Mufwene

At the time of interview, Salikoko Mufwene was Frank J. McLoraine Distinguished Service Professor in the Department of Linguistics at the University of Chicago. Professor Mufwene has, either individually or collaboratively, authored and edited academic publications for over forty years, and specialises particularly in the development of creoles and language evolution. It is this aspect which is of the greatest relevance to this essay, especially as raised in his seminal 2001 work *The Ecology of Language Evolution*, which was considered in the literature review, and referred to again in the following interview, which is a continuation of questionnaire QEL3.

Semi-structured Interview Questions

SSIQ1SM: In your response to question 3 you note that “linguists have often analogized languages with either organisms or (in my work) species in biology.” Of the two, the analogy with species, where a language is seen as a collection of individual idiolects in the same way that a species is a collection of individual organisms, clearly appears to be the more appropriate analogy.

To the best of your knowledge, were you the first linguist to analogize languages with species?

SSIQ1SM Response: I thought I was, when I was writing *The Ecology of Language Evolution* (2001). Afterwards, I realized that Herman Paul (1891) had advocated comparing languages with “groups” as collective phenomena.

In your response to Question 4 you note that you do not like the phrase “language and culture”. The relationship between these two is, as it happens, of great importance to this dissertation and so the next three questions are all based upon it.

SSIQ2SM:

It is difficult, if not impossible, to disagree with your comment in response to Question 4 that “languages are themselves cultural artefacts”. That said, in your article ‘Language vitality: the weak theoretical underpinnings of what can be an exciting research area’

which appeared in *Language*: Vol 93, Issue 4 (December 2017) you make several references to the relationship between the two, such as:

- “These show that language and culture shifts do not go hand in hand, nor are they coextensive with assimilation to the economically or politically dominant population.” (p. 205)
- “other cultural artifacts such as religion and dress traditions index social identity, and the specific way in which those who have shifted languages speak the new one can also mark a particular social identity. So a population can lose their language without ipso facto losing their cultural singularity.” (p. 206)
- “...the relationship between language and culture, viz., whether language is separate from culture or is rather one of the many facets of the latter.” (p. 220)

These imply that even if language is one aspect of culture, it is one of many. Do you believe that, despite its falling under the overall category of culture, it is nevertheless possible for language to be a discrete component of it, with its own distinct characteristics?

SSIQ2SM Response:

The first quotation may be interpreted to be inconsistent with the position I advocate, but I had no simpler, idiomatic way of expressing myself. I could have said “language shift and other cases of culture shift.” My fundamental position is that languages as technologies for communication (produced by the mind co-opting/exapting the buccopharyngeal anatomy) are instances of ways of doing things. And see cultures as ways in which particular populations do things, behave, and interact with one another and with their natural environments. Cultures can thus be talked about more concretely in reference to specific practices, such as language/communication, religion, music, dancing, cooking (processing food), building dwellings, clothing, etc. The answer to your question is “yes,” though language also shares some characteristics with other cultural domains, for instance, with music in being compositional and being learnable. As a matter of fact, like for other cultural domains, the perpetuation of languages from one generation to another (albeit with modification) is enabled by learning. I should email you another paper (now in press) along with this questionnaire. If I forget, please remind me.

SSIQ3SM: In your ground-breaking book *The Ecology of Language Evolution* (CUP) you make numerous references to the ways in which language evolution proceeds (the locations shown below are taken from the Kindle edition of the book), for example:

- “Clearly, individual speakers are critical unwitting agents of language evolution.” (394).
- “...the unplanned result of producing a new language variety.” (1267-1268).
- “Linguistic evolution proceeds by natural selection from among the competing alternatives made available by the idiolects of individual speakers.” (2235-2236).
- “I should reiterate that evolution has no purpose or defined goals. It should not be interpreted as progress....” (2238).
- “Such adaptations do not necessarily improve the system and they are not necessarily conscious in the first place. Linguistic evolution is therefore not planned, at least not in the most natural form of the process.” (2241-2242).

These linguistic evolutionary processes appear to be of a completely different nature to the majority of cultural artefacts, such as, for example, clothing, tools, housing, transport

infrastructure, laws, rituals and various other aspects of social organisation, which, it could be argued, have quite clearly been intentionally designed for planned and defined goals. Do you believe that ‘design’ and ‘evolution’ are mutually exclusive?

SSIQ3SM Response:

No, not at all. If one pays attention, practitioners innovate constantly and introduce changes in architecture, in music, in dance styles, in clothing fashion, in tool making, in the implementation and stipulation of laws, etc. They are also consciously adapted to new socioeconomic ecologies. Even rituals, prayers, incantations, and the like, which are rigidly codified are adapted every now and then to respond to needs of the practitioners, especially if they relocated or are colonized. Scientific practices, which are also forms of culture, are super-adaptive. How scholars come up with new hypotheses is often accidental, although, by hindsight, one can say that a hypothesis was a natural evolution from earlier activities.

SSIQ4SM:

The ability to quantify species and languages (even if only by a rough approximation) implies that they can be counted and therefore, by extension, identified. On the other hand, there seem to be few attempts at identifying how many “cultures” there are in the world that do not use the number of languages as a proxy. However, “languages” and “cultures” are not synonymous.

Why, in your opinion, is it so difficult to quantify how many “cultures” exist in the world?

SSIQ4SM Response:

What should be quantified is not how many cultures there are but rather how many music styles there are, how many cooking/food processing styles there are, how many legal systems there are, how many religions or belief systems there are, etc. “Culture” cannot be seen as a counterpart of “language,” because it is all inclusive. Note also that two populations practicing different language may share the same non-linguistic culture (more or less) and two populations practicing the same language may practice different non-linguistic cultures. A fundamental issue with the phrase “language and culture” is that it disenfranchises language as a domain of culture too. The phrase is not like “language in society,” because cultures are shaped by and practiced in societies. How many of these one can count is a political question.

SSIQ5SM:

In *The Ecology of Language Evolution* you make several references to languages as parasitic species, for example:

- “I submit that a language is a Lamarckian species, whose genetic makeup can change several times in its lifetime. It is also a parasitic species, whose life and vitality depend on (the acts and dispositions of) its hosts, i.e., its speakers, on the society they form, and on the culture in which they live.” (363-364).
- “...the speed of language change is similar to that of evolution in the parasitic species, where generation is not an important factor, unlike in the animal species.” (378-379).
- “A language is more like a bacterial, Lamarckian species than like an organism. A subset of innovations/deviations in the communicative acts of individual speakers cumulate into the “invisible ecological hand” that produces evolution.” (3037-3038).

However, in your more recent article ‘Language Evolution: The Population Genetics Way’ the terminology has shifted somewhat from “parasitic” to “viral”, for example:

- “the biological evolution model that linguists should consider for inspiration appears to lie in virology and/or epidemiology but not in animal biology. (p. 47)

Does the change from “parasitic” to “viral” represent a change in emphasis or are viruses being used here as examples of parasites?

SSIQ5SM Response:

A colleague observed several times that “parasite” was less palatable than “virus.” It may also be that it is easier to discuss viruses dynamically than parasites. That explains the change. It also seems that a population aspect of viruses is easier to articulate than that of parasites. The basic idea is that their vitality depends on the activities of their hosts.

SSIQ6SM:

In your article ‘Language vitality: the weak theoretical underpinnings of what can be an exciting research area’ you state that:

- “Ecolinguistics as articulated by, for instance, Mühlhäusler (2003) is more an advocacy movement than something that sheds light on the dynamics that sustain or erode language vitality.” (p. 204).

Also, in your answer to Question 9 of this questionnaire you note that you “hate the term *ecolinguistics*”.

Could you expand on your reason for this hatred? Is it, for example, because you do not approve of the “advocacy movement” aspects, or do you think a different term such as “language ecology” is a more fitting label for the scope of the field?

SSIQ6SM Response:

I think that advocacy does not explain how things happen or evolve. Advocacy (as performed by, for instance, environmentalists) derives knowledge from more fundamental research about the subject matter. I have found ecolinguistics lacking in explanations while very strong in moralizing people about saving languages from endangerment and loss. Moreover the solutions proposed are not what a real language ecologist would recommend, such as restoring the “habitat” in which an endangered language can thrive. Nobody is talking about returning the Americas and Australia to Native Americans and Aborigines, for instance. Nobody is speaking about how Iberians reclaimed their cultures and their neo-Latin varieties through the Reconquista (a form of ethnic cleansing). So many dangerous things would have to be done, instead of writing grammars and compiling dictionaries, which have no bearing on the vitality of languages. Ecolinguistics is in fact myopic, because it overlooks the fact throughout the history of mankind several populations have shifted cultural practices to survive, for one reason or another. What we need the most is stopping injustices and marginalization of some groups while the world is evolving. Ecolinguists are dealing with epiphenomena. There are many people around the world who have maintained their politically and economically powerless languages and are suffering as much as some (but not all) populations whose languages are endangered or have been lost recently.

SSIQ7SM:

In *The Ecology of Language Evolution* (quoted below) and more recently, you have placed much emphasis on creoles:

- “The structural differences between creoles and their noncreole kin which have misled linguists into attributing different genetic statuses to them do not amount to differences in the evolutionary processes that produced them. Yet the evolutionary processes are what account and should matter for language speciation.” (416-418).
- “...speakers are more concerned with communicating, by any of the means available to them, than with language or dialect boundaries.” (421-422).
- “Code-mixing or, more generally, language or dialect contact, is probably more central to normal language evolution than has been recognized in historical and genetic linguistics.” (422-423).

In your opinion, is the development of creoles living evidence of language evolution in action before our very eyes (and ears)?

SSIQ7SM Response:

Definitely. Creoles are prompting us loud and clear to reopen the books about language evolution, showing what central a role contact of languages or dialects (reducible to contact of idiolects) under particular ecological conditions has played as an actuator of change and sometimes speciation.

SSIQ8SM:

Choice is often invoked by linguists as a factor in the fate of particular languages. In *The Ecology of Language Evolution*, for example, you note the following:

- “Languages do not die suddenly nor on their own; they typically die because their speakers choose to speak other languages.” (2919-2920).

That choice, however, is invariably made for us, not by us, to such an extent that, as far as mother tongues are concerned at least, none of us actually chooses the languages we come to speak.

Given this, is it perhaps time to re-evaluate the concept of choice in language acquisition?

SSIQ8SM Response:

“Choose” is a poor choice of terms, although in some cases this is true. In other work (such as an encyclopaedia article to appear soon), I have also spoken of speakers finding themselves in situations where they have fewer and fewer opportunities to speak the relevant languages.

SSIQ9SM:

Many linguists, including Einar Haugen, have referred to language as existing “in the minds of its speakers”. Indeed, in your article, ‘Language Evolution: The Population Genetics Way’ you note:

- “the real locus of language contact is the minds of individual speakers” (p. 36)

In *The Ecology of Language Evolution* however, you emphasise the following:

- “The reality of languages lies in speech, which has physical properties. The action lies there, while the abstract system, the I-language which the theoretical linguist endeavors to explain, is really the interpretation that an individual makes of speech.” (2841-2842).

In your opinion, is it possible to reconcile the physical aspects of speech with the mental?

SSIQ9SM Response:

Yes, although the question is which has precedence over which. If one thinks of languages as emergent phenomena, what I say in *The Ecology*... is accurate. However, there is a tradition in linguistics that suggests that people speak by executing internal systems. Noam Chomsky makes a distinction between I-language and E-language, which I think is the current way of speaking about competence and performance. However, if one conceives of languages as emergent and complex adaptive systems, then what I say in *The Ecology*... is really the right way. The system, as a set of emergent patterns, is an organized internalization of communicative practices.

SSIQ10SM:

In *The Ecology of Language Evolution* you stress the importance of identifying language change as an evolutionary process, while at the same time noting that this process may differ in some respects from the evolution of biological species:

- “What we need is a common approach to similar structural and evolutionary patterns in both the biological and the linguistic species, while resorting to species-specific accounts of their respective peculiarities.” (376-377)

In their book *Not by Genes Alone*, Richerson and Boyd make the claim that “culture is part of biology”.

Do you agree with this assertion, and if so, do you think it possible that, rather than being *analogous* to biological evolution, language evolution is actually *part and parcel of it* (albeit a small part)?

SSIQ10SM Response:

I don't think culture is part of biology. I think of it as a consequence of biological evolution, a topic that I also discuss in the paper I promised to email you.

7.2.2 Semi-structured interview with Cynthia Rosenfeld

At the time of interview, Cynthia (Cindy) Rosenfeld was a doctoral student at North Carolina State University. This was immediately seen as a refreshing opportunity to incorporate a different perspective into the interviews. She has published several articles in academic journals, including recently contributing two relevant articles on language and ecology which led to the initial contact in this case. The following interview refers to these, alongside other aspects of her research, and carries on from questionnaire QEL7.

Semi-structured Interview Questions

SSIQ1CR:

Could you provide some details of your academic background and experience. I have read your papers ‘The Great Divide: What Dr Moreau Tells Us About Posthumanism and the Anthropocene’ and ‘From Prometheus to Gaea: A Case for Earth-Centered Language’ and have some questions on their content below. However, I would welcome any additional information on your future plans, the specific fields that you would like to specialise in, and so on.

SSIQ1CR Response:

Thank you for asking. I am increasingly interested in the “masking” and “erasure” of the natural world from human-created environments, both from an ecolinguistic (discursive/symbolic/ideational) and a visual rhetoric (material) perspective. Although I believe that much of the human experience is mediated by language, and therefore I tend to focus on narratives and texts, I am increasingly interested in how bodies-meeting-bodies (e.g., an urban dweller encountering the nightly exodus of the bats from Bracken Cave) and digital representations (e.g., the virtual reality representation of Bracken Cave) might afford new, different, and embodied meanings.

SSIQ2CR:

In your response to Question 1 you note that “language may not be living the way a biological organism is, but language is of a biological organism”. This point is central to this dissertation with regard to “living” languages. Do you see the products of living organisms as extensions of them in much the same way as Richard Dawkins in *The Extended Phenotype*?

SSIQ2CR Response:

The short answer is “yes.”

I do not mourn the death of a word the way I would mourn the loss of a life. However, I do regret the loss of what that word made possible. Similarly, it is a common human experience to celebrate the birth of a new word that helps us to make sense of our experience.

I am amazed by the creative and destructive processes made possible by the organizing potential of language. Language, for me, is the most beautiful and dangerous of the mundane, everyday acts in which humans engage. On the one hand, we have worked together to develop a complex system for sharing ideas, feelings, and asking for help. On the other hand, we can forget that words are abstract and symbolic, and problematic situations can sometimes spiral from this amnesia. In semiotic terms, words do not have an iconic or indexical relationship to their referent, and this disconnect can cause problems. When I say language is living, I do not wish to “fix” language and to in anyway connote that words have natural, given meanings. However, I do wish to acknowledge that language is as natural and as evolving a process for humans as building bowers are for Vogelkops.

SSIQ3CR:

With reference to your response to Question 2, could you expand on the reasons why there are 165 languages registered with the Endangered Languages Project and whether biodiversity is similarly endangered in the same geographical areas?

SSIQ3CR Response:

This is a great question. Many of the 165 languages that are endangered in the United States are of indigenous peoples. For example, in the Charlotte area (a large metropolitan area), there have not been native speakers of the Catawba language since 1959. Like many places, the pressure to speak English to be able to participate in English-bound institutions and practices is high. However, there are also revitalization efforts, and the Catawba language is being taught to both children and adult learners. At the same time, Charlotte is a massive, concrete, human landscape that has displaced many creatures who would have called that land home. Yet, on the outskirts of Charlotte exists a lovely sanctuary devoted to rescuing and rehabilitating raptors.

I am not sure how often the cases of linguistic endangerment/extinction and species endangerment/extinction coincide, but I can imagine that a neoliberal value of progress often enters an area and affects both.

SSIQ4CR: In your response to Question 6 you note that you are unsure what binomial nomenclature could add. One possible use would be for linguists to base the naming of languages on solely linguistic criteria, irrespective of any political or populist agendas, such as, for example, promoting the use of the name “Moldovan” in Moldova for the language that is known in Romania (and generally in the rest of the world) as Romanian. (The linguistic nomenclature might well not choose ‘Romanian’ either of course). Do you think that such usages would be of any benefit?

SSIQ4CR Response: My primary concern about binomial nomenclature goes back to my concern about “masking.” Many general audiences tend to regard binomial nomenclature as a “higher” understanding of something’s nature, and it can obscure the abstract relationship and have a tendency to *fix* the name to that it represents. Thus, the politics of who gets to name the language and what process(es) exist for changing a binomial name if needed (as we do with living organisms) become central concerns.

My favourite recent example of the obfuscation of binomial nomenclature and the creature being represented is *Cenaspis aenigma*, or the recently discovered-by-humans “mystery dinner snake.” It is a fun name, but to whom was the snake a mystery? Surely not to the snake nor its ecological associates, such as the snake whose belly *Cenaspis aenigma* was found in. I have a concern about the colonization of languages through binomial

nomenclature and worry about reducing the polyvocal labels of selfhood to one recognized name. That being said, I can understand where giving a language a name that makes it “locatable” to everyone can serve to make it to salient, understood, recognized. In this case, I can see some benefits.

SSIQ5CR: With reference to your response to Question 11, do you have any personal experience of interdisciplinary work behind inhibited as a result of the division of academic subjects into sciences and humanities?

SSIQ5CR Response: Yes. I was in graduate school before I ever had to contend with physics. In high school, I had to take two sections of biology, one chemistry, and one “Earth science” (mainly it was geology, climatology, and meteorology). In college, as a humanities’ major, I took two sections of geography and one astronomy. The only time I encountered “quantum mechanics” was as a punchline about, “It’s not like I’m trying to explain quantum physics or anything.”

Once I started doing work in environmental communication, all of the sudden, I am reading people who use Heisenberg’s Uncertainty Principle, the particle-wave duality, quantum tunnelling, and the laws of thermodynamics in their *communication* research. I fell in love with science through communication, and I am still desperately trying to catch-up but it can be challenging. Recently, a mentor suggested I take a specific class in the veterinary school, to further my nonhuman animal studies work. I went to look at their schedule and could not view the schedule, as you had to have an approved login just to view the course listings. We have been specialized and siloed, and it can be hard to break out.

Questions on ‘The Great Divide: What Dr Moreau Tells Us About Posthumanism and the Anthropocene’.

SSIQ6CR: The dissertation of which this questionnaire forms a part will contain a section on several “false dichotomies” such as “human/animal” “mind/body” and “culture/nature”. The subject matter of your paper above is therefore very relevant to these aspects. Do you think these dichotomies play a part in the “two cultures” of the academic world (i.e. the sciences and the humanities) referred to in the earlier questionnaire?

SSIQ6CR Response:

Yes! There is a great book by John Durham Peters, “The Marvelous Clouds,” that I think does a nice job explaining how humanities came to fear nature. There have been scientific turns that have been quite harmful to living beings, for example: phrenology. And accepting something as “natural” or “given”—such as a shape and size of head being a “natural” indicator of intelligence or criminality—is dangerous.

However, we are also creatures, and we can forget that when we study the humanities or the sciences. I have to quote Roberto Marchesini here, when he describes how human exceptionalism lead to the rise of humanities, “The non-human becomes a solid and consistent category. . . .so that the human finds itself belonging to a different realm, which requires disciplines and approaches opposed to natural science” (Marchesini, 2017, *Over the Human*, p. 2).

SSIQ7CR: The article makes reference (p. 48) to language, rather than technology, as ‘*the great divide an insurmountable boundary – between humans and other animals.*’ Which, in your opinion, has caused the greater damage to nonhuman animals, human language or human technology?

SSIQ7CR Response: I think language is a human technology. I conceptualize technologies as arts and tools one uses for living. I think language is a powerful technology that begets many other technologies, which have had profound material impact. For example, I do not believe we would have cars emitting CO₂ without the organizing ability of language (to communicate needs, to order supplies, to describe plans, to problem solve design issues, etc.) as the substrate on which cars could be built.

Questions on ‘From Prometheus to Gaea: A Case for Earth-Centered Language’.

SSIQ8CR: Do you believe that adopting Earth-centered language would ultimately benefit, not only the world’s animals and plants, but also its linguistic diversity?

SSIQ8CR Response: It’s a good question. If Earth-centered language were adopted mindlessly, which I will define in a moment, it could actually hurt linguistic diversity. Now, let me define “mindlessly.” In this case, I use the word “mindlessly” to refer to an arbitrary selection of words, a move to universal certain terms as “Earth-centered” and discount/disfavour new and other words, and an impulse toward political correctness. However, when I call for Earth-centered language, I am not arguing for the generation of an approved list of words in *any* language. Rather, I am asking that we explore our words and how they make the world. For me, Earth-centered language is absolutely an invitation to explore the rich lingual diversity on this planet and learn how different words can lead to new understandings. Words that are new to us can open new possibilities, open ourselves to finding richness in the Earth we may otherwise not have noticed. It may sound silly, but it is not unlike trying a cuisine that is new to your palette.

SSIQ9CR: To the best of your knowledge, is ‘*Promethean discourse*’ solely a product of the Western Judaeo-Christian world, or does it have counterparts elsewhere amongst the world’s indigenous peoples?

SSIQ9CR Response: This is a question, I, too, want answered. I did speak with a friend of mine from Bombay who read the paper and said it invited her to think if she ever encountered a word like “dirt” (which in the United States, we use to mean both soil and filth) growing up in India. She could not think of any. I would love to speak with other scholars fluent in languages and articulate in cultures from around the world to learn how Promethean discourse (does not) exists elsewhere.

And finally:

SSIQ10CR: The labels “language ecology” or “linguistic ecology” on the one hand, and ‘ecolinguistics’ on the other, are often presented as sub-disciplines with rather different methods and objectives. How would you define these terms and do you have a personal view on their use?

SSIQ10CR Response: Personally, I like reserving “ecolinguistics” for work done that focuses on how language represents ecology and ecological philosophy. I use “language ecology” to refer to how language is impacted by the environment. Again, I do not think they should be siloed, and I think the research you are doing sounds like an important bridge to greater a better conceptualization of how these sub-disciplines work together

7.2.3 Semi-structured interview with Keith Moser

At the time of interview, Keith Moser was Professor in Classical and Modern Languages and Literature at Mississippi State University, where he has held various roles since 2007. During this time, he has written prolifically, authoring five full-length books and some sixty refereed periodical articles. His wide interests include French literature, the interdisciplinary intersection between literature and science, and ecolinguistics, the last two of which, in particular, are relevant to this essay. The following interview refers to Professor Moser's work and is a continuation of questionnaire QEL8.

Semi-structured Interview Questions:

SSIQ1KM: Based on your response to Question 11 of the original questionnaire above, could you please expand on the phenomenon-based learning methods utilised in Finland?

SSIQ1KM Response: First of all, I have to admit that I am not an expert in this area. However, it seems like the phenomenon-based learning approach is working quite well in Finland based on preliminary data. Given that this curricular framework was adopted rather recently in 2016-2017 in Finland, it will be interesting to see what kind of insights emerge from this radically different approach to pedagogy. Owing to the aforementioned insularity and overspecialization that are emblematic of much of the Western university paradigm, it is time to explore potential solutions to this quandary. On a more positive note, more American universities are starting to become serious about "interdisciplinary studies." Since we have seen the catastrophic effects of fractured thinking in Morinian terms first hand, it is vital that we continue to transcend the rhetoric of transdisciplinary finding ways to reconnect the disciplines.

Questions on: 'An Ecolinguistic, Scientific, and Serresian Interpretation of Communication: The Importance of (Re)-Conceptualizing Language From a More Ecocentric Perspective'.

SSIQ2KM: On page 1 of the above paper you note that it will '*unapologetically transcend traditional disciplinary boundaries.*' Do you see any link between the concept of "academic boundaries" in established disciplines on the one hand, and "political boundaries" between nation-states on the other, i.e. do academic disciplines stake a similar claim to 'sovereignty' over their own turf?

SSIQ2KM Response: This is an excellent question. As I mentioned earlier, some American universities are starting to make tremendous strides in terms of implementing genuine forms of transdisciplinarity. However, one of the obstacles standing in the way of more sweeping structural changes is turf wars. The curricular process through which new courses and programs are created in American institutions is more bureaucratic than it has

ever been. For instance, at many universities including my own, it often takes 2-3 years to add a course to a catalogue, or to make other curricular changes. Not only does this excessive and utterly pointless bureaucracy stifle innovation, but it also creates an ideal breeding ground for turf wars. It is sometimes difficult to create legitimate classes that correspond to one's research and teaching interests, because some colleagues defend what they consider to be their sacred, sovereign territory tooth and nail. It is deeply disquieting that many American universities are erecting more bureaucratic roadblocks instead of dismantling such systems entirely. In simple terms, the curriculum police is a big part of the problem.

SSIQ3KM: With regard to “social complexity hypothesis”, the paper goes on to note (p.5) that ‘*complexity in communication can be defined analogously to complexity in society*’. In your experience, does this imply that species which live in complex societies have greater cognitive abilities than similar species which live solitary lives (e.g. lions as opposed to tigers)?

SSIQ3KM Response: Yes, there does appear to be a correlation between social complexity and cognitive ability. From an evolutionary standpoint, this is not surprising. Organisms that live in complex communities epitomized by the incessant exchange of information and cooperation have found ways to hone their cognitive and linguistic faculties over time. The situation appears to be quite different for solitary creatures.

SSIQ4KM: Do ‘*the primordial sounds of the earth*’ (p. 10) extend to inorganic matter?

SSIQ4KM Response: This is another excellent question. In the article to which you refer, I use this expression in a general sense. When I evoke the “primordial” sounds of the biosphere in this publication and others, I am underscoring the importance of becoming attuned or reconnecting ourselves to the most essential sounds of the planet that we often dismiss as insignificant background noise. In biosemiotics terms, these sound systems are laden with meaning. To be honest, the question of inorganic matter is one that I need to develop more fully in future studies.

SSIQ5KM: Given that ‘*the disappearance of any non-human language is a potentially lethal catastrophe*’ (p.20), do you believe that non-human languages should fall within the remit of ecolinguistics?

SSIQ5KM Response: Yes, I firmly contend that ecolinguistics must engage with other-than-human languages directly. In addition to critical discourse analysis, I argue that the veritable sophistication of other-than-human languages is a branch of ecolinguistics that must be more fully developed in the coming years. In this regard, I invite other ecolinguists representing many different backgrounds to collaborate in these efforts. As I demonstrate in my research, there are many ecolinguistic insights that can be gleaned from the study of other-than-human languages. For instance, Con Slobodchikoff's discovery of syntax in prairie dog semiosis should be of interest to every ecolinguist. In my opinion, ecolinguistics has a major role to play in the deconstruction of the last form of human exceptionalism in the shape of language that has created a myopic and deadly sharp ontological gap between *Homo sapiens* and other species.

Questions on: ‘Is Preserving Indigenous Languages and Cultures the Key to Avoiding the Impending Eco-Apocalypse?: An Ecolinguistic Reading of Le Clézio’s *Le Rêve Mexicain*’

SSIQ6KM: With regard to ‘*non-anthropocentric thought systems*’ (p. 2), to the best of your knowledge, are “anthropocentric thought systems” characteristic of any indigenous populations outside of “the West”?

SSIQ6KM Response: I cannot claim whatsoever to be an expert on all of the rich indigenous cultures throughout the world. Nonetheless, in respect to the ones that I have studied, there are striking commonalities. Autochthonous civilizations whose existence still revolves around a direct, sensorial connection to the earth tend to view the world and their small place in it from a biocentric lens. Many other researchers have noted these similarities to which I allude.

SSIQ7KM: Page 3 of the above article notes that ‘*the budding and promising discipline of ecolinguistics is extremely diverse comprised of numerous subfields*’. Could you define the scope of ecolinguistics as you see it, and in particular its relationship with “language ecology” (i.e. where languages are treated as analogous to biological species) which is considered by some to be a different discipline

SSIQ7KM Response: As I highlight earlier, I think that it is essential for more ecolinguists to engage with other-than-human forms of semiosis or language. As someone who is staunchly against the compartmentalization of knowledge, I do not think that it is in the best interest of ecolinguists to try to define the parameters of the emerging field of ecolinguistics in a narrow way. In this vein, it is nearly impossible to create a clear distinction between biosemiotics and ecolinguistics. In my estimation, the greatest strength of ecolinguistics lies in the ability of researchers from this interdiscipline to break down porous, disciplinary demarcations instead of attempting to erect new ones. Of course, I realize that many people may disagree with my vision of the scope of ecolinguistics that practically knows no bounds. In many ways, I have to admit that I have deep epistemological tendencies. An epistemologist who is charged with the impossible task of attempting to know everything is able to conceive a more complete global picture of a given phenomenon, in spite of her or his inherent limitations. Owing to the fact that every ecolinguist derives inspiration from a particular ecosophy that is grounded in knowledge obtained from numerous fields, ecolinguists and epistemologists are not that dissimilar in my opinion.

SSIQ8KM: Page 4 notes that ‘*In stark contrast to many dominant world languages that laud unbridled consumption, narcissism, and extreme opulence, the linguistic codes that are embedded in the environmental discourse of minority civilizations emphasize cosmic humility and the importance of stewardship*’. Do you believe that the languages themselves are responsible for these differing attitudes, e.g. do indigenous peoples’ attitudes change upon changing language, or are their traditional values maintained but expressed through a different medium?

SSIQ8KM Response: Although debates revolving around the Sapir-Whorf hypothesis will continue to rage, I maintain that the language we speak on a regular basis without a passing thought influences how we think and act in the world. It would be interesting to study if the attitudes of indigenous peoples begin to evolve upon changing language. To the best of

my knowledge, this phenomenon has not been systematically investigated. Although I am merely speculating, it is possible that the internalization of anthropocentric codes predicated upon faulty, anthropocentric, dichotomous logic such as “human and animal” and “man and nature” would erode the very foundation of autochthonous philosophical and spiritual paradigms.

SSIQ9KM: In similar vein, with regard to Amerindian worldviews, page 6 of the above article notes that *‘by embedding these constructive discourses in a dominant world language, the author hopes that these traces could one day nuance Western ideas of progress and growth’*. This implies that these nuances will ultimately be expressed through the medium of Western languages. If such discourses can be expressed in dominant languages, do you nevertheless believe that the preservation of linguistic diversity is a worthwhile end in itself for its own sake?

SSIQ9KM Response: I steadfastly assert that we have to find a way to nuance the anthropocentric master narrative by embedding the more beneficial and sustainable environmental discourses of Amerindian civilizations into dominant Western languages. To answer the second portion of your question, the answer is an emphatic “yes.” I think that the 2008 Nobel Laureate in Literature J.M.G. Le Clézio answers this question perfectly in his “Eloge de la langue française” in which he affirms, “Every time that a language dies, it’s a tragedy that affects the entire world.” When a language vanishes entirely, an invaluable vantage point for perceiving the world and our place in it is forever lost as well.

SSIQ10KM: The dissertation of which this questionnaire forms a part will contain a section on several ‘false dichotomies’ such as ‘human/animal’ ‘mind/body’ and ‘culture/nature’. The subject matter of the above paper is therefore very relevant to these aspects. Do you think that these dichotomies and other examples of *‘wishful thinking’* have led to a corresponding dichotomy in the “two cultures” of the academic world (i.e. the sciences and the humanities)?

SSIQ10KM Response: First of all, I look forward to reading your dissertation in due course. The influence of dichotomous thinking is both pervasive and deadly in Western society. Yes, the problem is that our obsolete thought systems have yet to evolve to reflect the discoveries of modern science. Owing to the schism between the hard sciences and the humanities, it is only recently that humanists have started to reengage with scientific erudition. The insularity that I often decry is truly the root of this problem. Otherwise, our outmoded anthropocentric thought paradigms would have been challenged a long time ago. The lingering binaries that you intend to highlight in your dissertation do not stand up to any kind of critical scrutiny whatsoever. When placed in the light of modern science, the faulty logic undergirding these dichotomies collapses entirely.

And finally:

SSIQ11KM: If you feel that there are any relevant aspects of your research that have not been included in the previous questions, please feel free to expand on them here:

SSIQ11KM Response: I think that we have covered all of the basics. Good luck with your research project!

7.3: Analysis of biocultural diversity questionnaire responses

The main aim of this questionnaire was to catch a glimpse of a lay audience's awareness of the scale of both biological and cultural diversity globally, the perceived threats to these, and consequent attitudes towards their preservation.

The 16 questions were placed into three sub-categories, namely:

- How many?
- What percentage?
- How important?

The first two are of course quantifiable, while the last measures attitudes. Questions on languages and cultural heritage were deliberately interspersed between those on biodiversity in an attempt to avoid any second guessing as to the direction of travel. Establishing whether or not there was any difference in knowledge or attitudes between the “bio” and “cultural” sides of biocultural diversity was also an objective. Within the biological categories, the classes Mammalia and Amphibia were intentionally chosen to see whether lumpy toads elicited the same response as fluffy bunnies. Conifers were similarly selected to look for any differences in attitude between animal and plant life.

The first question, on the number of United Nations member states, was asked purely to establish the extent to which the perception, prevalent in Europe, that “every country has its own language” would feed back into the responses. That is, would the figures for the number of countries in the world and the number of languages in the world be similar? Bar for this, there would only have been 3 x 5 questions.

As it turned out, of the quantifiable responses, Question 1: “Approximately how many member states of the United Nations are there in total?” received far more correct answers than any of the others, with 66 participants out of 105 correctly noting that the United

Nations has approximately 200 members. This was in fact the only quantifiable question which received more correct than incorrect responses. In addition, very few participants selected the higher-end numbers, with 101 of them choosing a figure in the hundreds as opposed to the thousands. This suggests that there was a broad awareness of the number of United Nations members.

The second question, regarding the number of UNESCO world heritage sites, received 33 correct responses. There are approximately 1,000 such sites in total. One respondent left this question unanswered and so the total number of responses on this occasion was 104. Answers were spread more evenly over all the choices on offer, albeit with a tendency to gravitate towards the centre.

Just under half of respondents correctly noted that there are approximately 6,500 extant species of mammal (Q. 3) with very few this time selecting the numbers towards the lower end of the spectrum. As with the United Nations question, then, albeit at the other end of the scale, there seemed to be a common-sense realisation that the correct answer in this case would be in the thousands rather than the hundreds.

In each of the remaining “how many?” questions, on conifers, languages and amphibians respectively (Q 4, 5 and 6), between 30 and 36 respondents chose the correct option. It is also worth noting that even though the majority of respondents selected an incorrect answer to all questions except the first one, the correct answer nevertheless received more responses than any of the other individual answers on each occasion.

Table 5: Approximate numbers within different categories of biocultural diversity

Category	Actual Number	Underestimate	Correct Answer	Overestimate
UN Members	200	12	66	27
Heritage Sites *	1,000	48	33	23
Mammals	6,500	54	51	**0
Conifers	650	43	30	32
Languages*	6,500	69	35	**0
Amphibians	6,500	69	36	**0

*(These categories received 104 rather than 105 responses)

** (These categories could not be overestimated as the correct answer was the highest one on offer)

These stand in stark contrast, to the “what percentage?” questions (Q. 7 – 11), where the correct answer was not the highest scoring one on any occasion. The majority of respondents overestimated the threats to World Heritage Sites and mammals, but underestimated the threats to conifers, languages and amphibians. The levels of discrepancy are shown in the table below:

Table 6: Perceived threats to different categories of biocultural diversity*

Category	Actual Threat	Underestimate	Correct Answer	Overestimate
Heritage Sites	5%	0	4	101
Mammals	25%	23	19	63
Conifers	33%	56	18	31
Languages	40%	63	16	26
Amphibians	40%	64	23	18

*(all based on 105 responses)

The Heritage Sites overestimate can largely be based on the fact that a relatively small proportion of 5% are classified as in danger in the first place. This is considerably lower than all the others. The threat to the diversity of the world’s mammals was, much as expected, overestimated by the majority, while conifers, languages and amphibians were, by contrast, considerably underestimated.

Questions 12 – 16 asked how important it was for these different categories to be preserved. The choices on offer were: “extremely important”, “fairly important”, “not particularly important” and “not important at all”. These questions did not require competition between categories, such as, for instance, asking respondents to list them in order of importance. It was therefore possible to choose “extremely important” in every case, and this is indeed what the majority did. It was nevertheless interesting to examine the number of respondents who did not take this option. The table below shows the responses for all categories.

Table 7: Importance of preserving different categories of biocultural diversity*

Category	Extremely	Fairly	Not particularly	Not at all
Heritage Sites*	86	16	2	0
Mammals	93	11	1	0
Conifers	73	27	4	1
Languages	84	14	7	0
Amphibians	80	23	2	0

*(this question received 104 responses as opposed to the 105 in every other case)

Here again, mammals would seem to be the clear winners, followed by heritage sites. There did not seem to be a pattern of choosing the biological over the cultural per se or vice versa. Instead, different priorities appeared within the two, with mammals winning over conifers and amphibians, and heritage sites winning over languages. The relative lack of importance

displayed towards conifers in particular is rather ironic, given that, as “the lungs of the world” it could be argued that all of the others, either directly or indirectly, depend upon these in order to survive. The biocultural diversity questionnaire suggested no obvious prioritisation of the biological over the cultural, with attitudes more inclined to vary within these divisions than across them. It must be admitted that this came as something of a surprise. As far as factual knowledge is concerned, however, there are clearly gaps which, no doubt, reflect the media attention afforded to different components of the biocultural package.

8. Conclusions

Having examined literature related to the subject matter under discussion and conducted original research, this final part will attempt to provide an overall summary and conclusion. In so doing, it will offer some new definitions of old terms, and propose a “taxonomic” framework of academic disciplines which classifies them in accordance with characteristics which they do or do not share, as opposed to the “sovereignty” model so often promoted.

8.1 Language and Environment

The relationship between language and the environment has been an essential component of this essay. For the purposes of the present section, “environment” will be here defined as *everything external to the unit in question*. This unit will often, but not always, be an organism. It could equally be a cell, an organ, a language, or, indeed, an inanimate object. As far as any such unit is concerned, it should be emphasised that everything external to it forms part of its environment (so that an “internal environment” would be a contradiction in terms) and there is *no point* at which a given unit does not interact with its environment, whether such interaction involves sleeping in a chair, fleeing from a predator, receiving signals, or being blown about by the wind.

Turning firstly to the responses to the linguistic ecology questionnaire, some of the criticisms made seem rather harsh, if not unfair, especially those concerning the use of the term “language ecology” to refer to solely linguistic interaction. If “birdsong ecology” can be considered a valid aspect of ecology overall (Strauss, 2019), then “language ecology” must clearly also be so considered. Although the wider environmental context of languages must be remembered, there is no reason why language interaction cannot also be studied for its own sake, whilst acknowledging that such interaction is itself part of the environment. No animal species, for example, lives in isolation, all of them interact with other species and the inorganic

environment, but that is no justification for objecting to the study of, for instance, intraspecific competition in population ecology. Some comments also seem to imply that certain terms are “owned” by biological sciences and should not be interfered with by other disciplines. However, their use in these fields may well have been taken (and taken metaphorically to boot) from a more general context. According to the *Online Etymology Dictionary*, for example, the word “genetic” was first recorded in 1831, with the meaning “pertaining to origins” and it is hard to envisage ecologists objecting to the suggestion that languages have origins. Seen in this way, language ecology is no more or no less than a particular aspect of human ecology, which is in turn a particular aspect of ecology as a whole. Lack of a precise definition of the exact nature of “language ecology” versus “ecolinguistics” is no doubt causing problems, nevertheless, the “linguistic” versus “biological” differences seen in some responses make this field a likely candidate for one of the many casualties of dualism, with most of the negativity, in this instance, being shown by the biological sciences towards the social.

8.2 Language and Evolution

None of the elements present within living things are exclusive to them, as they are also found in the non-living world. All life on Earth, for example, is carbon-based, but carbon is also found in “dead” things such as diamonds and graphite. Nathalie Gontier is of the opinion that “there is no distinction between natural history and evolution” (SSIQ5NG) and “being alive is not necessary to be recognized to be the subject of evolution” (SSIQ6NG). It may ultimately be shown, then, that the evolution of living things is just one of many kinds of evolution, which also extends to inorganic matter. However, even if this were proven to be the case, this would not mean that the distinction between the biotic and the abiotic is somehow false, or that the organic and inorganic evolve in the same way.

This same principle extends to within the biotic world itself. There is a reason why “life” is subdivided into domains, kingdoms, phyla and so on. There are differences between them.

When considering parallels between languages and species, it must be remembered that Darwin's "curious parallels" quote from *The Descent of Man* refers to the formation of different languages and of distinct *species*, not all forms of life. Evolution leading to speciation and extinction is common to both languages and biological species, and therefore able to be represented by a family tree diagram.

Family tree models, however, may not be appropriate in every evolutionary scenario. Johann-Mattis List accepts "both the importance of the tree, and the fact that it is in part insufficient" (SSIQ4JL). It may be, for example, that speciation of the family tree kind may be appropriate for eukaryotic organisms but not prokaryotes. Baptiste et al (2009, p. 1) make the rather stark claim that "prokaryotic evolution and the tree of life are two different things, and we need to treat them as such". Prokaryotic life is no less life because it is unicellular and less complex, but horizontal/lateral gene transfer is commonplace here, and "scholars just don't know what is transferred and what is inherited" (SSIQ5JL). William Croft notes that "in both biology and language, some patterns of diversification are tree-like but some aren't." (QBLE3 – Q. 10). Nevertheless, the possibility that Darwin's tree of life does not extend to all life forms does not mean that he was wrong in those areas where he was right!

As far as links between biology and language are concerned, William Croft adds that there may be "a common evolutionary model behind both biological and linguistic entities, but one must be careful" (SSIQ1WC). In similar fashion, Salikoko Mufwene favours treating the biological and the linguistic in the same way when they are the same, and differently when they are different (SSIQ10SM). This seems like very sound advice, otherwise, as noted by Johann-Mattis List, there is a risk that scholars will "ignore the specifics of evolution in the different fields" with "the wish to unify everything... at times leading to annoyingly simplifying accounts" (SSIQ8JL). It will later be argued that this is every bit as true within culture as it is within biology, as well as between the two.

8.3 Language and Culture

The relationship between language and culture was considered central to this work from the outset. The “complex whole” definition of culture as originally championed by Tylor is here rejected as fundamentally flawed and demonstrably false, and some of the comments made by contributors to this work regarding how cultures should be quantified may help to illustrate why (without implying that they necessarily agree with this stance). Nathalie Gontier, for example, makes the succinct remark that any pastime practised by more than two people “can be understood as a culture” (SSIQ8NG), while William Croft notes the difficulties involved in trying to establish “the set of traits that constitutes a culture” (SSIQ3WC). Salikoko Mufwene lists individual characteristics such as music, cooking styles, legal and religious systems, and notes that these, rather than “cultures” are what should be quantified (SSIQ4SM). He also adds that “language and culture shifts do not go hand in hand” (SSIQ2SM). These comments, in addition to such traditional academic ventures as spending over a century inconclusively trying to find the “homeland” of the Celts or the Indo-Europeans based on the belief that speakers of a given language can be traced via their non-linguistic material culture, should be sufficient to support the view that different cultural practices disseminate separately, and that they are not the interconnected components of a “complex whole”.

Some of the difficulties involved in defining culture have been examined above, and it was noted that 164 definitions were proposed in one particular study. On this basis, it has been assumed that proposing a 165th could not do much harm, and so the rather basic definition of culture here suggested is *that which is learned via interaction with the environment*. There is no necessity for what has been learned to be acted upon, and so “culture” (if that is indeed the best term for it) is not the same thing as “learned behaviour”. This definition goes even further than the above response from Nathalie Gontier by allowing for the possibility of

culture being reduceable to the individual, and also being acquirable by any organism with the capacity to learn, and from any environmental source, including directly from the abiotic environment or from other species.

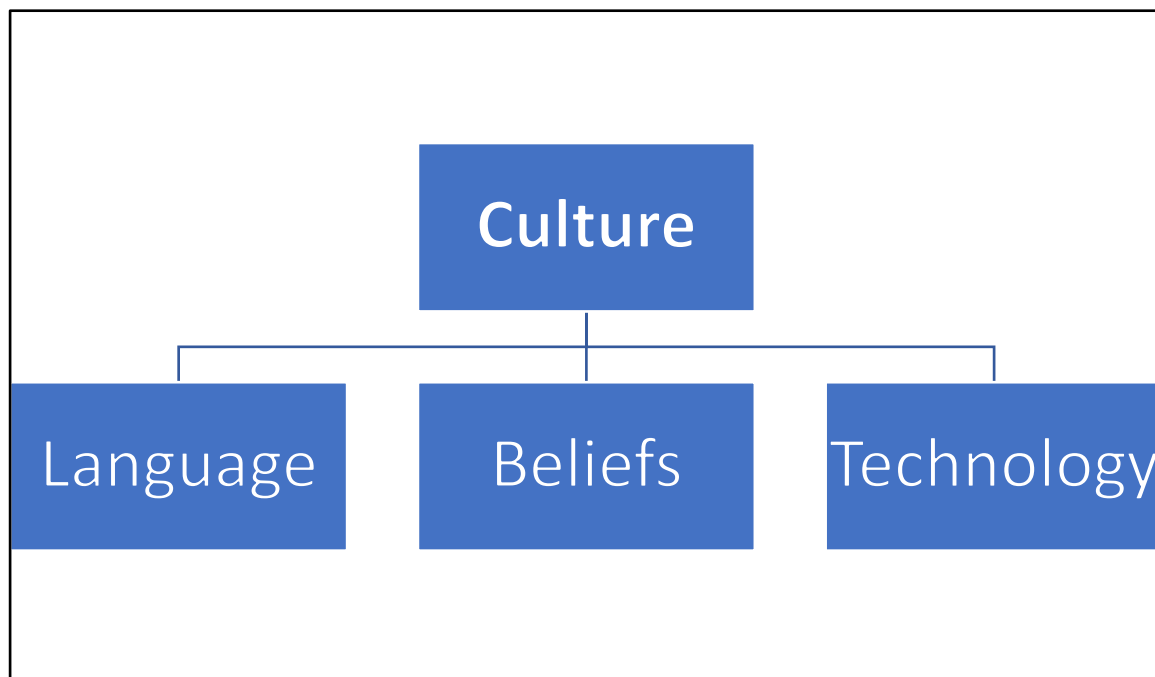
What then, is the relationship between languages and (other elements of) culture? Although the generic capacity for human language is clearly an inherited part of our physiology, it is equally clear that the individual languages we speak are learned. William Croft (SSIQ2WC) considers language to be a type of cultural transmission, but adds that “this does not preclude the possibility that there are aspects of language that make linguistic transmission different from transmission of other cultural traits.” In similar fashion, Nathalie Gontier suggests that language and culture are “sufficiently distinct to look into their evolution separately” (SSIQ9NG). If this is indeed the case, then there must be a need, at least some of the time, to treat language as separate from (other aspects of) culture.

8.4 A part or apart?

So is language part of culture, and culture part of biology? And why stop at biology? As noted above, living things are made of the same “stuff” as non-living things, and subject to the same generic “laws of nature”. It could, then, be argued that there is no need for an academic discipline of biology. In principle, to paraphrase Edward O. Wilson (albeit in a very different context) it could be “shrunk to a specialized branch of physics”. The reason why this is not done, of course, is because although the study of life is *a part of* natural science, it also has sufficient specific features to make it stand *apart from* all other such sciences. There is no danger in acknowledging both of these positions, but difficulties arise when one is accepted and the other rejected. For example, living things possess many characteristics which apply to them and them alone, however, no biologist would argue that they are subsequently not subject to the more general “laws” of, say, gravity or thermodynamics. This continuum,

however, appears to break down when the biological meets the cultural. For example, the traditional “four-field” discipline of anthropology consists of biological, cultural, archaeological and linguistic anthropology. The first two of these, in particular, have been “at war” with each other (Fearn, 2008) over whether or not “Darwinian evolutionary theory guides research into human behaviour” (ibid) and, indeed, over whether anthropology is a science or not (Dreger, 2010). Some practitioners of cultural anthropology are of the opinion that human culture is not a part of human biology, but instead stands apart from it. The “laws” of biology do not apply to them. The stance taken in this work, however, is that just as biology is part of nature, so culture is a part of biology, but not in a dual-inheritance way. Dual-inheritance theory is inherently dualist. As noted above, culture is seen as the manifestation of the capacity to learn, and, crucially, to learn how to deal with similar situations in a myriad of different ways. This capacity to learn is itself a product of our biological inheritance. Nevertheless, just as “life” can be subdivided into three or more domains which may evolve in different ways, the suggestion here is that the all-encompassing term “culture” can similarly be subdivided into (at least) three domains of its own, each of which is internally autonomous, that is, changes to one do not cause changes to the others. “Language” is here treated as one of these domains, being sufficiently discrete to warrant its separate treatment from (other aspects of) culture, with culture sufficiently discrete to warrant its separate treatment from (other aspects of) biology, and organic matter in turn sufficiently discrete to warrant its separate treatment from inorganic matter. Figure 5 shows a proposed outline of these “cultural” domains.

Figure 5: Proposed “domains” of culture (broad definition)



“Beliefs” here incorporate the “cultural core” of legal, political, religious, economic and other social systems, such as dance and dress codes, which represent the values and lifeways of a given group. Some of these may change independently, or alternatively have a knock-on effect on each other.

“Technology” is the third domain, defined here as *the use of materials from the environment as tools*. Items of aesthetic value will be treated as “tools” as they too have their uses and have been produced by the use of technology. Numerous academics, including contributors to this work, have referred to language itself as a technology. Dediu et al (2013 p. 310), for example, describe it as a form of “coordinative technology”, Salikoko Mufwene calls languages “technologies for communication” (SSIQ2SM) and Cynthia Rosenfeld (SSIQ7CR) expresses the opinion that “language is a human technology” with technology conceptualised as “arts and tools one uses for living”. With all due respect to these scholars (and in full agreement with Cynthia Rosenfeld’s conceptualisation), language is not here treated as technology, on the basis that only that which is taken from the environment should be so considered. Although also eventually becoming part of the environment, language originates

within our bodies (as production must precede reception) and is therefore considered part of our physiological inheritance instead. This same distinction would apply to “tools” inherent in other animals such as echolocation, web spinning, or teeth and claws.

Figure 6: Proposed “domains” of learning (with narrow definition of culture)

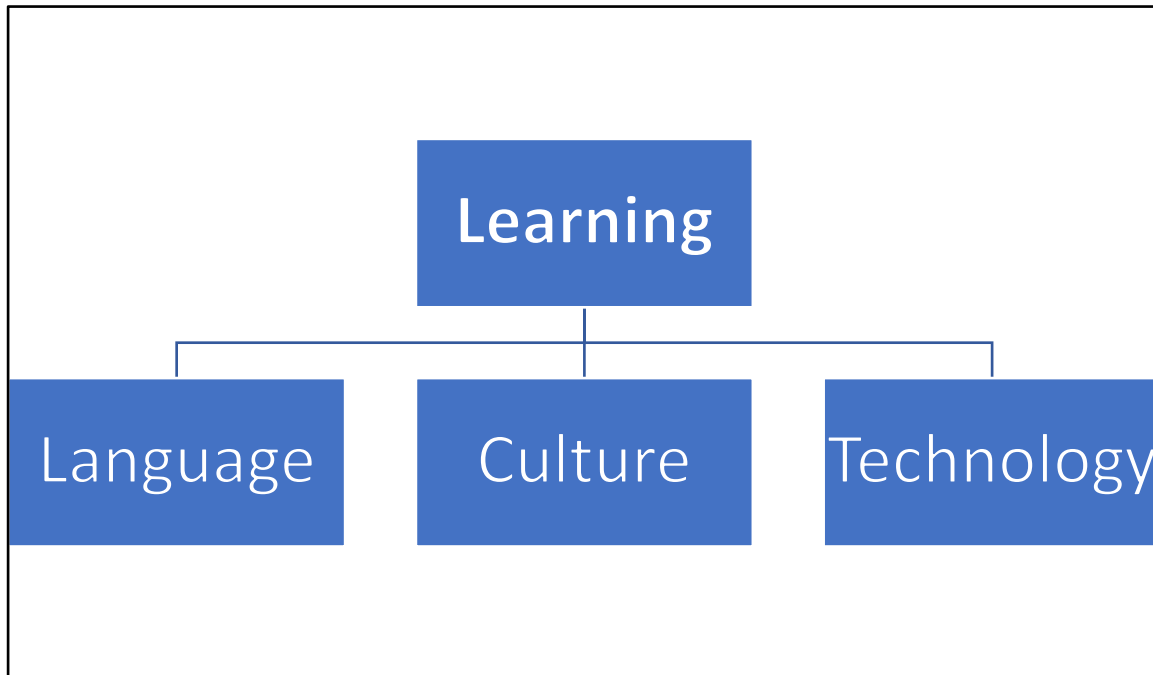


Figure 6 above represents an alternative version of the same categories but with “culture” more narrowly defined in the same position as the “beliefs” of Figure 5. In many ways, this division corresponds to existing usages elsewhere. If we take archaeology, as “material culture”, to be largely the study of technology, then the above domains roughly equate to the linguistic, cultural and archaeological subdisciplines of anthropology. Similarly, when looking at UNESCO classifications of a) languages, b) intangible cultural heritage and c) (physical) World Heritage, they also largely correspond with the above. It may be, then, that these “domains” reflect already understood distinctions. The essential point, however, is that languages, beliefs and technologies are not interconnected in an integrated whole and can change independently. A precision knife may be used by a robber to take a life or by a surgeon to save one, and “my smartphone is out of battery” is no more *linguistically* complex than “my pen is out of ink”.

8.5 Too curiously parallel for comfort

Of the three cultural domains listed in Figure 5, it is here suggested that:

- languages change in the manner most like natural selection;
- technology changes in the manner least like (indeed, very unlike) natural selection;
- changes to social beliefs fall somewhere in between.

There is of course more to evolution than natural selection alone, but there can be little doubt that this aspect above all is what Darwin was referring to with his “curious parallels” remark. All of the above “domains” involve descent with modification, but the amount of directed or artificial selection varies enormously between them to the point that some technologies in particular are more akin to acts of creation than evolution. Humans can not of course “create” in the true sense of the word, only modify an existing environment, however, we cannot say that human technology “has no purpose in mind” (Dawkins, 1986, p. 5) “does not plan for the future” (ibid) and “has no vision” (ibid). We cannot say that technology “should not be interpreted as progress” (Mufwene, 2001, loc. 2238) when it can be interpreted as precisely that. It is more than feasible, however, to claim that all these points are true of language. Many discussions on language change concentrate on phonology or lexis, however some of the most “evolution-like” aspects of language involve how words, or parts of words, are put together in combination in grammatical structures, both syntactic and morphological. According to Dediu et al (2013) “grammatical structure is largely “under the radar” as far as conscious manipulation by speakers is concerned” (p. 311). However, its being under the radar is exactly what gives it the features of evolution. William Croft (SSIQ7WC) states that an evolutionary model of language “provides a model of change that is not the result of the intentional behaviour of individual persons” and this unintentionality should in itself be significant enough to treat language separately.

Some of Pinker's "language instinct" claims go too far in the "innate" direction. This, however, should not be counterbalanced by going just as far in the opposite direction and sacrificing language particularism on the altar of a unified cultural evolution theory. In his book *The Unfolding of Language*, Guy Deutscher makes the following observation about the case system in Latin:

There was one question I could not get out of my mind: who could have dreamt up all these endings in the first place? And if they weren't invented, how else could such an elaborate system of conventions ever have arisen? I had childish visions of the elders of ancient Rome, sitting in assembly one hot summer day and debating what the case endings should be (Deutscher, 2005, loc. 96-98).

And this is precisely the point, the elders of ancient Rome did not sit in assembly debating what the case endings should be, but they no doubt did debate appropriate codes of dress, which laws should be enacted, which religious beliefs would or would not be sanctioned, the state of the economy and so on, and did so in a language not planned by any of them. Who decides whether a language should be SVO, VSO, VOS or OVS? What makes *accessible information* English but *information accessible* French?

Nathalie Gontier (SSIQ1NG) notes that "when natural history research took flight in the 19th century, scholars saw continuity between biological and cultural or linguistic evolution". The holistic nature of this enterprise was then subsequently interrupted by a century of ever-increasing academic specialisation and fragmentation. In particular, a solid division was formed between "natural" sciences and "social" sciences (a distinction which implies that human society is in some way "unnatural"). Recent decades have seen some crossover between these two sides, but the chasm remains wide. As Kravchenko notes:

The ousting of the ideology of holism from scientific research, and the persisting reliance on analytical methods have led to an extreme fragmentation of our knowledge of the world and language as a specific domain of human existence in this world which sets humans radically apart from all other known biological species (p. 103).

He adds that there is a “methodological dead-end in the humanities in general, and in linguistics in particular” (p. 104) which can only be escaped from by acknowledging that “language as a phenomenon is grounded in human biology” (ibid). Keith Moser echoes these sentiments (SSIQ5KM), describing language as “the last form of human exceptionalism ...that has created a myopic and deadly sharp ontological gap between *Homo sapiens* and other species”. It is, indeed, highly ironic that the world of scholarship was more unified before Darwin’s great unifying theory than it is today. If we cannot knock down the twin pillars of the sciences and the humanities, we should at least attempt to build a bridge between them in the form of “biosocial sciences”, which would include those disciplines which have both a biological and social element to them. The comprehensive study of language should of course be among them. Nor should we exclude the possibility that linguistic evolution shares many parallels with biological evolution because it *is* biological evolution. There can be little doubt that the communication system of any other animal species which changed by descent with modification would be viewed in this way. Languages, like species, are complex adaptive systems, they influence and are influenced by their environment, they change gradually over time, and split into new forms by methods which were, and still are, curiously parallel. So, let this work end as it started, from the horse’s mouth, so to speak, with a quote from the same author and the same book: “The survival or preservation of certain favoured words in the struggle for existence is natural selection.” (Darwin, 1871, p. 61)

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Curious Parallels

***An examination of terms and concepts shared between biology and linguistics,
and their relevance to the study of languages.***

Appendices: Specialist Questionnaires

Andrew Currie: 1403206

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Animal Communication Questionnaire QAC1

Background information:

The purpose of this questionnaire is to gather information which will help to establish the extent to which academics studying aspects of animal communication use theories and methods from linguistics in their research, and where animal communication sits as a discipline. Given the enormous scope of the field, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would, nevertheless, be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: Do you consider the study of animal communication to be a branch of any of the following academic disciplines? (please highlight as many as you feel relevant):

- a) Biology
- b) Zoology
- c) Ecology
- d) Ethology
- e) Behavioural science
- f) Cognitive science
- g) Psychology
- h) Linguistics
- i) Other (please specify)

If you would like to expand on the above response, please do so here:

Question 2: Do you consider yourself to be any of the following? (please highlight as many as you feel relevant):

- a) Biologist
- b) Zoologist
- c) Ecologist
- d) Ethologist
- e) Behavioural scientist

f) Cognitive scientist

g) Psychologist

h) Linguist

i) Other (please specify)

If you would like to expand on the above response, please do so here:

Question 3: Could you explain in simple terms which aspects of animal communication have primarily featured in any research you have undertaken:

Early in my career, I focused on the structure and function of signals, including the mechanisms by which they were produced. I subsequently have worked extensively on the question of signal reliability, asking how reliability (i.e., "honesty") can be maintained in male-female and male-male signalling systems. Most recently, I've begun to take a sensory ecological approach, asking how perceptual mechanisms (such as categorical perception) enable or constrain the evolution of signalling systems.

Question 4: Does the study of animal communication in general have its own specific methods which are distinct from other disciplines?

I don't think so. Studying animal communication is inherently multidisciplinary and those who do it best draw on methods and perspectives from a wide range of disciplines.

Question 5: In your opinion, should human language fall within the scope of animal communication?

a) Yes, in principle, but due to its ubiquity and complexity, human language would still require a specific discipline of its own

b) No, its inclusion would detract from the study of other animal species

c) Partially, the study of human language should be seen as a 'sister' but separate discipline

d) Other?

If you would like to expand on the above response, please do so here:

Question 6: In your opinion, is collaborative research between animal communication and linguistics:

- a) Unnecessary
- b) Desirable**
- c) Essential
- d) Other?

If you would like to expand on the above response, please do so here:

My best answer would be somewhere between “desirable” and “essential” – perhaps “highly desirable and likely to be productive” is the best answer.

Question 7: Do you use methods from linguistics in your study of animal communication?

- a) Regularly
- b) Often
- c) Sometimes**
- d) Rarely
- e) Only in very specific cases such as those related to the evolution of language**
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

I sometimes use methods from linguistics in my studies of animal signals; I’ve also written reviews that more explicitly draw comparisons between animal signalling and human language that draw deeply from linguistics.

Question 8: Does any aspect of your specific personal research involve collaboration with linguists?

Not at present, but it has on occasion in the past and will likely require more such collaboration in the future.

Question 9: Does the study of animal communication in general routinely involve collaboration with linguists?

No, not as it is practiced by most researchers today.

Question 10: To the best of your knowledge, do linguists currently make use of findings from the field of animal communication?

- a) Regularly
- b) Often
- c) Sometimes
- d) Rarely
- e) Only in very specific cases such as those related to the evolution of language
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

I think biologists interested in animal communication are more likely to make use of findings from linguistics than are linguists interested in human language likely to make use of findings from those studying animal communication.

Further (and perhaps unfortunately), I think linguists who do draw on findings from studies of animal communication sometimes “cherry pick” ideas and results and therefore draw on those studies in a shallow fashion.

Question 11: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

- a) Facilitate collaboration between animal communication and linguistics
- b) Inhibit collaboration between animal communication and linguistics
- c) Neither facilitate nor inhibit collaboration between animal communication and linguistics
- d) Other?

If you would like to expand on the above response, please do so here:

Question 12: To the best of your knowledge, does research in animal communication suggest that **similarities across different animal species** are primarily driven by: (please highlight as many as you feel relevant):

- a) Shared evolutionary inheritance (taxonomic genus/class etc)
- b) Shared environmental factors (e.g. 'social' structures and living patterns)
- c) Geographical proximity
- d) Other?

If you would like to expand on the above response, please do so here:

Question 13: To the best of your knowledge, does research in animal communication suggest that **different 'dialects' or 'accents' found within the same individual species** are primarily: (please highlight as many as you feel relevant):

- a) Inherited through the genes
- b) The result of learned behaviour
- c) The result of geographical separation
- d) Other?

If you would like to expand on the above response, please do so here:

In some cases, such as birdsong, learning is clearly the primary source of dialect differences. In other cases there may be a mix and in yet other cases, genetic differences are the most parsimonious explanation. Evidence for learning of animal signals is pretty weak in most groups, but this is an understudied area.

Question 14: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

- a) Yes, of course
- b) No, unfortunately not
- c) Possibly, if a convenient time can be arranged

If you would like to expand on the above response, please do so here:

Thank you very much for your time,

Andrew Currie

Animal Communication Questionnaire QAC2

Background information:

The purpose of this questionnaire is to gather information which will help to establish the extent to which academics studying aspects of animal communication use theories and methods from linguistics in their research, and where animal communication sits as a discipline. Given the enormous scope of the field, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would, nevertheless, be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: Do you consider the study of animal communication to be a branch of any of the following academic disciplines? (please highlight as many as you feel relevant):

- a) Biology X
- b) Zoology X
- c) Ecology
- d) Ethology X**
- e) Behavioural science
- f) Cognitive science
- g) Psychology
- h) Linguistics
- i) Other (please specify)

If you would like to expand on the above response, please do so here:

Question 2: Do you consider yourself to be any of the following? (please highlight as many as you feel relevant):

- a) Biologist
- b) Zoologist
- c) Ecologist
- d) Ethologist

e) Behavioural scientist X

f) Cognitive scientist X

g) Psychologist X

h) Linguist

i) Other (please specify)

If you would like to expand on the above response, please do so here:

Question 3: Could you explain in simple terms which aspects of animal communication have primarily featured in any research you have undertaken:

Perception and categorization of human speech prosody.

Question 4: Does the study of animal communication in general have its own specific methods which are distinct from other disciplines?

I think so, especially considering the different modalities of communication among the animal kingdom, and the specific constraints of every animal species.

Question 5: In your opinion, should human language fall within the scope of animal communication?

a) Yes, in principle, but due to its ubiquity and complexity, human language would still require a specific discipline of its own X

b) No, its inclusion would detract from the study of other animal species

c) Partially, the study of human language should be seen as a 'sister' but separate discipline

d) Other?

If you would like to expand on the above response, please do so here:

Question 6: In your opinion, is collaborative research between animal communication and linguistics:

- a) Unnecessary
- b) Desirable
- c) Essential X
- d) Other?

If you would like to expand on the above response, please do so here:

Question 7: Do you use methods from linguistics in your study of animal communication?

- a) Regularly X
- b) Often
- c) Sometimes
- d) Rarely
- e) Only in very specific cases such as those related to the evolution of language
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 8: Does any aspect of your specific personal research involve collaboration with linguists?

Yes, establishing and development of speech rhythmic and intonational patterns for testing prosody perception.

Question 9: Does the study of animal communication in general routinely involve collaboration with linguists?

I would say so, but I'm not really sure :(

Question 10: To the best of your knowledge, do linguists currently make use of findings from the field of animal communication?

- a) Regularly
- b) Often
- c) Sometimes X
- d) Rarely
- e) Only in very specific cases such as those related to the evolution of language
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 11: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

- a) Facilitate collaboration between animal communication and linguistics
- b) Inhibit collaboration between animal communication and linguistics
- c) Neither facilitate nor inhibit collaboration between animal communication and linguistics X
- d) Other?

If you would like to expand on the above response, please do so here:

Question 12: To the best of your knowledge, does research in animal communication suggest that **similarities across different animal species** are primarily driven by: (please highlight as many as you feel relevant):

a) Shared evolutionary inheritance (taxonomic genus/class etc) **X**

b) Shared environmental factors (e.g. 'social' structures and living patterns) X

c) Geographical proximity

d) Other?

If you would like to expand on the above response, please do so here:

Question 13: To the best of your knowledge, does research in animal communication suggest that **different 'dialects' or 'accents' found within the same individual species** are primarily: (please highlight as many as you feel relevant):

a) Inherited through the genes

b) The result of learned behaviour

c) The result of geographical separation **X**

d) Other?

If you would like to expand on the above response, please do so here:

Question 14: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

a) Yes, of course

b) No, unfortunately not **X**

c) Possibly, if a convenient time can be arranged

If you would like to expand on the above response, please do so here:

Thank you very much for your time,

Andrew Currie

Animal Communication Questionnaire QAC3

Background information:

The purpose of this questionnaire is to gather information which will help to establish the extent to which academics studying aspects of animal communication use theories and methods from linguistics in their research, and where animal communication sits as a discipline. Given the enormous scope of the field, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would, nevertheless, be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: Do you consider the study of animal communication to be a branch of any of the following academic disciplines? (please highlight as many as you feel relevant):

- a) **Biology**
- b) Zoology
- c) Ecology
- d) **Ethology**
- e) Behavioural science
- f) **Cognitive science**
- g) Psychology
- h) Linguistics
- i) Other (please specify)

If you would like to expand on the above response, please do so here:

Question 2: Do you consider yourself to be any of the following? (please highlight as many as you feel relevant):

- a) **Biologist**
- b) Zoologist
- c) Ecologist
- d) **Ethologist**
- e) Behavioural scientist

f) Cognitive scientist

g) Psychologist

h) Linguist

i) Other (please specify)

If you would like to expand on the above response, please do so here:

Question 3: Could you explain in simple terms which aspects of animal communication have primarily featured in any research you have undertaken:

Language evolution; bio-acoustics; eco-acoustics; articulation; semantics; syntax; socio-ecology

Question 4: Does the study of animal communication in general have its own specific methods which are distinct from other disciplines?

No.

Question 5: In your opinion, should human language fall within the scope of animal communication?

a) Yes, in principle, but due to its ubiquity and complexity, human language would still require a specific discipline of its own

b) No, its inclusion would detract from the study of other animal species

c) Partially, the study of human language should be seen as a 'sister' but separate discipline

d) Other?

If you would like to expand on the above response, please do so here:

Question 6: In your opinion, is collaborative research between animal communication and linguistics:

- a) Unnecessary
- b) Desirable
- c) Essential
- d) Other?

If you would like to expand on the above response, please do so here:

Question 7: Do you use methods from linguistics in your study of animal communication?

- a) Regularly
- b) Often
- d) Sometimes
- d) Rarely
- e) Only in very specific cases such as those related to the evolution of language
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 8: Does any aspect of your specific personal research involve collaboration with linguists?

Yes.

Question 9: Does the study of animal communication in general routinely involve collaboration with linguists?

Only occasionally.

Question 10: To the best of your knowledge, do linguists currently make use of findings from the field of animal communication?

- a) Regularly
- b) Often
- d) Sometimes
- d) **Rarely**
- e) Only in very specific cases such as those related to the evolution of language
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 11: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

- a) Facilitate collaboration between animal communication and linguistics
- b) Inhibit collaboration between animal communication and linguistics
- c) Neither facilitate nor inhibit collaboration between animal communication and linguistics
- d) Other?

No particular opinion.

Question 12: To the best of your knowledge, does research in animal communication suggest that **similarities across different animal species** are primarily driven by: (please highlight as many as you feel relevant):

- a) Shared evolutionary inheritance (taxonomic genus/class etc)
- b) Shared environmental factors (e.g. 'social' structures and living patterns)
- c) Geographical proximity
- d) Other?

For any pair of species, the reasons will be different.

Question 13: To the best of your knowledge, does research in animal communication suggest that **different 'dialects' or 'accents' found within the same individual species** are primarily: (please highlight as many as you feel relevant):

- a) Inherited through the genes
- b) The result of learned behaviour
- c) The result of geographical separation
- d) Other?

Both types of variation can be either innate or learned.

Question 14: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

- a) Yes, of course
- b) **No, unfortunately not**
- c) Possibly, if a convenient time can be arranged

If you would like to expand on the above response, please do so here:

Thank you very much for your time,

Andrew Currie

Animal Communication Questionnaire QAC4

Background information:

The purpose of this questionnaire is to gather information which will help to establish the extent to which academics studying aspects of animal communication use theories and methods from linguistics in their research, and where animal communication sits as a discipline. Given the enormous scope of the field, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would, nevertheless, be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: Do you consider the study of animal communication to be a branch of any of the following academic disciplines? (please highlight as many as you feel relevant):

- a) Biology X
- b) Zoology X
- c) Ecology
- d) Ethology X
- e) Behavioural science X
- f) Cognitive science X
- g) Psychology X
- h) Linguistics
- i) Other (please specify)

If you would like to expand on the above response, please do so here:

Question 2: Do you consider yourself to be any of the following? (please highlight as many as you feel relevant):

- a) Biologist
- b) Zoologist X
- c) Ecologist
- d) Ethologist X
- e) Behavioural scientist X

f) Cognitive scientist

g) Psychologist X

h) Linguist

i) Other (please specify)

If you would like to expand on the above response, please do so here:

Question 3: Could you explain in simple terms which aspects of animal communication have primarily featured in any research you have undertaken:

The social functions of more complex forms (enhanced repertoire size) of communication

Question 4: Does the study of animal communication in general have its own specific methods which are distinct from other disciplines?

Acoustic data collection and playback experiments are relatively unique to animal communication. These methods overlap somewhat with the study of human speech.

Question 5: In your opinion, should human language fall within the scope of animal communication?

a) Yes, in principle, but due to its ubiquity and complexity, human language would still require a specific discipline of its own X

b) No, its inclusion would detract from the study of other animal species

c) Partially, the study of human language should be seen as a 'sister' but separate discipline

d) Other?

If you would like to expand on the above response, please do so here:

Question 6: In your opinion, is collaborative research between animal communication and linguistics:

- a) Unnecessary
- b) Desirable
- c) Essential X
- d) Other?

If you would like to expand on the above response, please do so here:

Question 7: Do you use methods from linguistics in your study of animal communication?

- a) Regularly
- b) Often
- e) Sometimes X
- d) Rarely
- e) Only in very specific cases such as those related to the evolution of language
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 8: Does any aspect of your specific personal research involve collaboration with linguists?

Yes some of my work has been in collaborative with researchers from quantitative linguistics

Question 9: Does the study of animal communication in general routinely involve collaboration with linguists?

No, not usually

Question 10: To the best of your knowledge, do linguists currently make use of findings from the field of animal communication?

- a) Regularly
- b) Often
- e) Sometimes
- d) Rarely
- e) Only in very specific cases such as those related to the evolution of language X
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 11: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

- a) Facilitate collaboration between animal communication and linguistics
- b) Inhibit collaboration between animal communication and linguistics X
- c) Neither facilitate nor inhibit collaboration between animal communication and linguistics
- d) Other?

If you would like to expand on the above response, please do so here:

Question 12: To the best of your knowledge, does research in animal communication suggest that **similarities across different animal species** are primarily driven by: (please highlight as many as you feel relevant):

- a) Shared evolutionary inheritance (taxonomic genus/class etc) X
- b) Shared environmental factors (e.g. 'social' structures and living patterns) X
- c) Geographical proximity X
- d) Other?

If you would like to expand on the above response, please do so here:

There is evidence for all of these options

Question 13: To the best of your knowledge, does research in animal communication suggest that **different 'dialects' or 'accents' found within the same individual species** are primarily: (please highlight as many as you feel relevant):

- a) Inherited through the genes
- b) The result of learned behaviour
- c) The result of geographical separation
- d) Other? ☒ X

If you would like to expand on the above response, please do so here:

This is thought to depend on the species. For example, bird song dialect is often thought to be learned, whereas variation in primate vocalizations is typically thought to be innate.

Question 14: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

- a) Yes, of course
- b) No, unfortunately not ☒ X
- c) Possibly, if a convenient time can be arranged

If you would like to expand on the above response, please do so here:

Thank you very much for your time,

Andrew Currie

Questionnaire on links between evolutionary biology and historical linguistics QBLE1

Background information:

The purpose of this questionnaire is to gather information which will help shed further light on the shared terms and concepts used in (evolutionary) biology and (historical) linguistics. Given the enormous scope of the field, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would, nevertheless, be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: The terms '**vulnerable**', '**critically endangered**' and '**extinct**' are used to classify levels of endangerment not only of biological species (IUCN) but also of languages (UNESCO). Do you consider the application of the same terms for these different phenomena to be:

- a) **Of no consequence, both are easily understood and separated**
- b) Of use and of some significance, indicating the similar dangers facing both biodiversity and linguistic diversity
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

If you would like to expand on the above response, please do so here:

Question 2: Terms such as '**living**', '**dead**' and '**genetically related**' are frequently used to describe languages. Do you consider the application of such terms to languages to be:

- a) **Of no consequence, their meaning is easily understood**
- b) Of use and of some significance, indicating similarities in the ways that both biological species and languages come into being, cease to exist and relate to each other
- c) Unhelpful and misleading, given that languages are neither living organisms nor related to each other by genes
- d) Other?

If you would like to expand on the above response, please do so here:

Question 3: The term '**biocultural diversity**' has been defined as "*the diversity of life in all its manifestations: biological, cultural, and linguistic*". All three types of diversity are often noted as facing similar threats. Do you consider these common threats to be:

- a) Clearly linked, there is a knock-on effect between all three
- b) Environmentally determined. Biological, cultural and linguistic diversity are similar in certain areas simply because they share the same kind of biome (e.g. dense rainforest versus arctic tundra)
- c) Entirely coincidental, they are not interrelated

d) Other?

If you would like to expand on the above response, please do so here:

I am agnostic with respect to this question.

Question 4: **Binomial nomenclature** (e.g. *Canis lupus*) is applied to biological species, often alongside a common name (e.g. *wolf*). In your opinion, would the application of binomial nomenclature to the world's languages in similar fashion be:

- a) **Of no practical purpose**
- b) A useful means of distinguishing languages from each other, especially in the more linguistically diverse parts of the world
- c) Another example of blurring the distinction between biological organisms and languages
- d) Other?

If you would like to expand on the above response, please do so here:

We already have glottolog, so we do not need extra nomenclature.

Question 5: In your opinion, is collaborative research between evolutionary biology and historical linguistics:

- a) Unnecessary
- b) Desirable
- c) Essential

d) Other?

If you would like to expand on the above response, please do so here:

Potentially useful (depending on the questions being asked, and on the degree to which collaboration is really interested in understanding each other discipline).

Question 6: Do you use methods from both evolutionary biology and historical linguistics in your personal research?

- a) **Regularly**
- b) Often
- c) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 7: To the best of your knowledge, do historical linguists in general make use of findings from the field of evolutionary biology?

- a) Regularly
- b) Often
- c) **Sometimes**
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

It is often exaggerated, to which degree bioinformatics would have an influence on our methodology in linguistics. In some areas, we adapt methods, in others, we have our own techniques.

Question 8: To the best of your knowledge, do evolutionary biologists in general make use of findings from the field of historical linguists?

- a) Regularly
- b) Often
- c) Sometimes
- d) **Rarely**
- e) Only in very specific cases

- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 9: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

- a) Facilitate collaboration between evolutionary biology and historical linguistics
- b) Inhibit collaboration between evolutionary biology and historical linguistics
- c) Neither facilitate nor inhibit collaboration between evolutionary biology and historical linguistics

d) Other?

If you would like to expand on the above response, please do so here:

Making collaboration more difficult, as biologists rarely feel obliged to learn about linguistics, while linguists often learn at least something about biology.

Question 10: In your opinion, is the ‘family tree’ model of indicating evolutionary relationships: (please highlight as many as you feel relevant)

- a) An adequate model for all biological species**
- b) An adequate model for all languages**
- c) An adequate model for some biological species, but not all
- d) An adequate model for some languages, but not all
- e) An inadequate model for biological species
- f) An inadequate model for languages
- g) Other?

If you would like to expand on the above response, please do so here:

It is well known that the alternative to the tree model would be a network, but a network would also have one or more trees of which it would be constructed, so in this sense, our research best assumes all relations can be handled by a tree, but would then test if this really is the case.

Question 11: In your opinion, which of the following definitions best explains the term ‘evolution’ as applied to **languages** (i.e., language change from protolanguage to daughter languages or from early to middle to modern periods etc, as opposed to the evolution of the human capacity for language):

- a) The evolution of languages is part of an exclusive process which applies to languages alone

b) The evolution of languages is part of the wider process of cultural evolution which includes other aspects of culture but is separate from biological evolution

c) The evolution of languages is part of the wider process of biological evolution, as are other forms of animal communication

c) Other?

If you would like to expand on the above response, please do so here:

It depends on the domain of language change. Some are similar to cultural evolution, some aspects not. Same for biology. Thus, the question seems ill-stated.

Question 12: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

a) Yes, of course

b) No, unfortunately not

c) Possibly, if a convenient time can be arranged

If you would like to expand on the above response, please do so here:

Depending on my schedule, but in principle: yes

Thank you very much for your time

Andrew Currie

Questionnaire on links between evolutionary biology and historical linguistics QBLE2

Background information:

The purpose of this questionnaire is to gather information which will help shed further light on the shared terms and concepts used in (evolutionary) biology and (historical) linguistics. Given the enormous scope of the field, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would, nevertheless, be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: The terms '**vulnerable**', '**critically endangered**' and '**extinct**' are used to classify levels of endangerment not only of biological species (IUCN) but also of languages (UNESCO). Do you consider the application of the same terms for these different phenomena to be:

- a) Of no consequence, both are easily understood and separated
- b) Of use and of some significance, indicating the similar dangers facing both biodiversity and linguistic diversity**
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

If you would like to expand on the above response, please do so here:

Question 2: Terms such as '**living**', '**dead**' and '**genetically related**' are frequently used to describe languages. Do you consider the application of such terms to languages to be:

- a) Of no consequence, their meaning is easily understood
- b) Of use and of some significance, indicating similarities in the ways that both biological species and languages come into being, cease to exist and relate to each other**
- c) Unhelpful and misleading, given that languages are neither living organisms nor related to each other by genes
- d) Other?

If you would like to expand on the above response, please do so here:

Question 3: The term ‘**biocultural diversity**’ has been defined as “*the diversity of life in all its manifestations: biological, cultural, and linguistic*”. All three types of diversity are often noted as facing similar threats. Do you consider these common threats to be:

a) Clearly linked, there is a knock-on effect between all three

b) Environmentally determined. Biological, cultural and linguistic diversity are similar in certain areas simply because they share the same kind of biome (e.g. dense rainforest versus arctic tundra)

c) Entirely coincidental, they are not interrelated

d) Other?

If you would like to expand on the above response, please do so here:

Question 4: **Binomial nomenclature** (e.g. *Canis lupus*) is applied to biological species, often alongside a common name (e.g. *wolf*). In your opinion, would the application of binomial nomenclature to the world’s languages in similar fashion be:

a) Of no practical purpose

b) A useful means of distinguishing languages from each other, especially in the more linguistically diverse parts of the world

c) Another example of blurring the distinction between biological organisms and languages

d) Other?

If you would like to expand on the above response, please do so here:

Question 5: In your opinion, is collaborative research between evolutionary biology and historical linguistics:

a) Unnecessary

b) Desirable

c) Essential

d) Other?

If you would like to expand on the above response, please do so here:

Question 6: Do you use methods from both evolutionary biology and historical linguistics in your personal research?

- a) Regularly
- b) Often**
- c) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 7: To the best of your knowledge, do historical linguists in general make use of findings from the field of evolutionary biology?

- a) Regularly
- b) Often
- c) Sometimes**
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 8: To the best of your knowledge, do evolutionary biologists in general make use of findings from the field of historical linguistics?

- a) Regularly
- b) Often
- c) Sometimes

- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 9: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

- a) Facilitate collaboration between evolutionary biology and historical linguistics
- b) Inhibit collaboration between evolutionary biology and historical linguistics**
- c) Neither facilitate nor inhibit collaboration between evolutionary biology and historical linguistics
- d) Other?

If you would like to expand on the above response, please do so here:

Question 10: In your opinion, is the **'family tree'** model of indicating evolutionary relationships: (please highlight as many as you feel relevant)

- a) An adequate model for all biological species
- b) An adequate model for all languages
- c) An adequate model for some biological species, but not all
- d) An adequate model for some languages, but not all
- e) An inadequate model for biological species**
- f) An inadequate model for languages**
- g) Other?

If you would like to expand on the above response, please do so here:

"Inadequate" is too strong, but equally I didn't want to say that it was adequate for specific languages or species. It's an OK approximation most of the time I'd say as long as we don't take it too seriously.

Question 11: In your opinion, which of the following definitions best explains the term 'evolution' as applied to **languages** (i.e., language change from protolanguage to daughter languages or from early to middle to modern periods etc, as opposed to the evolution of the human capacity for language):

a) The evolution of languages is part of an exclusive process which applies to languages alone

b) The evolution of languages is part of the wider process of cultural evolution which includes other aspects of culture but is separate from biological evolution

c) The evolution of languages is part of the wider process of biological evolution, as are other forms of animal communication

c) Other?

If you would like to expand on the above response, please do so here:

B is closest, but not quite right. It's useful to think of cultural evolution and biological evolution separately, but really biological evolution is necessarily shaped by cultural evolution in those species that have culture (equally, the capacity for culture is itself the product of biological evolution).

Question 12: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

a) Yes, of course

b) No, unfortunately not

c) Possibly, if a convenient time can be arranged

If you would like to expand on the above response, please do so here:

Sorry – I'm super busy right now!

Thank you very much for your time

Andrew Currie

Questionnaire on links between evolutionary biology and historical linguistics QBLE3

Background information:

The purpose of this questionnaire is to gather information which will help shed further light on the shared terms and concepts used in (evolutionary) biology and (historical) linguistics. Given the enormous scope of the field, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would, nevertheless, be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: The terms '**vulnerable**', '**critically endangered**' and '**extinct**' are used to classify levels of endangerment not only of biological species (IUCN) but also of languages (UNESCO). Do you consider the application of the same terms for these different phenomena to be:

- a) Of no consequence, both are easily understood and separated
- b) Of use and of some significance, indicating the similar dangers facing both biodiversity and linguistic diversity**
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

If you would like to expand on the above response, please do so here:

Question 2: Terms such as '**living**', '**dead**' and '**genetically related**' are frequently used to describe languages. Do you consider the application of such terms to languages to be:

- a) Of no consequence, their meaning is easily understood
- b) Of use and of some significance, indicating similarities in the ways that both biological species and languages come into being, cease to exist and relate to each other
- c) Unhelpful and misleading, given that languages are neither living organisms nor related to each other by genes**
- d) Other?

If you would like to expand on the above response, please do so here: **(c) is perhaps too strong, but these terms can be misleading. Languages can be revived in a way that species can't (not yet, at least). The term 'genetically related' makes no sense in biology because biologists believe that all living things are 'genetically related'. In linguistics, 'genetically related' is pretty useless because if two languages are 'genetically related', what really matters is how closely related the**

language are, and if they are not 'genetically related', that just means 'we don't have enough information to decide where they belong in the phylogeny of languages'.

Question 3: The term '**biocultural diversity**' has been defined as "*the diversity of life in all its manifestations: biological, cultural, and linguistic*". All three types of diversity are often noted as facing similar threats. Do you consider these common threats to be:

- a) **Clearly linked, there is a knock-on effect between all three**
- b) **Environmentally determined. Biological, cultural and linguistic diversity are similar in certain areas simply because they share the same kind of biome (e.g. dense rainforest versus arctic tundra)**
- c) Entirely coincidental, they are not interrelated
- d) Other?

If you would like to expand on the above response, please do so here: **They are clearly linked, though not identical; and also, the same factors threaten biological, cultural and linguistic diversity.**

Question 4: **Binomial nomenclature** (e.g. *Canis lupus*) is applied to biological species, often alongside a common name (e.g. *wolf*). In your opinion, would the application of binomial nomenclature to the world's languages in similar fashion be:

- a) **Of no practical purpose**
- b) A useful means of distinguishing languages from each other, especially in the more linguistically diverse parts of the world
- c) Another example of blurring the distinction between biological organisms and languages
- d) Other?

If you would like to expand on the above response, please do so here: **Of no practical purpose at the moment. Also, don't underestimate the controversies and debates about the right binomial nomenclature in biology; we would have the same problems in linguistics.**

Question 5: In your opinion, is collaborative research between evolutionary biology and historical linguistics:

- a) Unnecessary
- b) **Desirable**
- c) **Essential**
- d) Other?

If you would like to expand on the above response, please do so here: **What is most essential, in my opinion, is recognizing that there is an abstract theory of evolutionary change (change by**

replication) that subsumes biological evolution, cultural evolution and language change. There are differences in how it is instantiated in these domains, and these differences can cause (and have caused) misinterpretations and mis-adaptations of ideas. There has to be some recognition of these facts on the part of both the biologists and the linguists who are collaborating, for it to be productive.

Question 6: Do you use methods from both evolutionary biology and historical linguistics in your personal research?

- a) **Regularly**
- b) Often
- d) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here: **I've written a lot about this, which is presumably why you've asked me to respond to this questionnaire.**

Question 7: To the best of your knowledge, do historical linguists in general make use of findings from the field of evolutionary biology?

- a) Regularly
- b) Often
- d) Sometimes
- d) Rarely
- e) **Only in very specific cases**
- f) Never
- g) Other

If you would like to expand on the above response, please do so here: **Apart from a few historical linguists, it is mainly having an effect in the phylogenetic classification of languages; but even there it is rarely used by historical linguists.**

Question 8: To the best of your knowledge, do evolutionary biologists in general make use of findings from the field of historical linguistics?

- a) Regularly
- b) Often

- d) Sometimes
- d) Rarely**
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here: **I am not aware of much if any influence in the direction from historical linguistics to evolutionary biology.**

Question 9: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

- a) Facilitate collaboration between evolutionary biology and historical linguistics
- b) Inhibit collaboration between evolutionary biology and historical linguistics
- c) Neither facilitate nor inhibit collaboration between evolutionary biology and historical linguistics
- d) Other?**

If you would like to expand on the above response, please do so here: **This is tricky to answer. Natural sciences and social sciences/humanities are different, although they are not as different as some think. So somehow "merging" them will cause problems even if it also might facilitate collaboration. Changing the academic reward system to genuinely encourage interdisciplinary collaboration would be more helpful.**

Question 10: In your opinion, is the 'family tree' model of indicating evolutionary relationships: (please highlight as many as you feel relevant)

- a) An adequate model for all biological species
- b) An adequate model for all languages
- c) An adequate model for some biological species, but not all**
- d) An adequate model for some languages, but not all**
- e) An inadequate model for biological species**
- f) An inadequate model for languages**
- g) Other?

If you would like to expand on the above response, please do so here: **In both biology and language, some patterns of diversification are tree-like but some aren't, and the "partly true" aspect applies to all languages and species, not just a subset as implied by (c)-(d).**

Question 11: In your opinion, which of the following definitions best explains the term 'evolution' as applied to **languages** (i.e., language change from protolanguage to daughter languages or from early to middle to modern periods etc, as opposed to the evolution of the human capacity for language):

- a) The evolution of languages is part of an exclusive process which applies to languages alone
- b) The evolution of languages is part of the wider process of cultural evolution which includes other aspects of culture but is separate from biological evolution
- c) The evolution of languages is part of the wider process of biological evolution, as are other forms of animal communication**
- c) Other?

If you would like to expand on the above response, please do so here: **See my answer to (5), and my publications, for details about this.**

Question 12: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

- a) Yes, of course
- b) No, unfortunately not
- c) Possibly, if a convenient time can be arranged**

If you would like to expand on the above response, please do so here: **I'm quite busy despite just having retired from teaching, but maybe something can be arranged if you're interested.**

Thank you very much for your time

Andrew Currie

Questionnaire on links between evolutionary biology and historical linguistics QBLE4

Background information:

The purpose of this questionnaire is to gather information which will help shed further light on the shared terms and concepts used in (evolutionary) biology and (historical) linguistics. Given the enormous scope of the field, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would, nevertheless, be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: The terms '**vulnerable**', '**critically endangered**' and '**extinct**' are used to classify levels of endangerment not only of biological species (IUCN) but also of languages (UNESCO). Do you consider the application of the same terms for these different phenomena to be:

- a) Of no consequence, both are easily understood and separated
- b) Of use and of some significance, indicating the similar dangers facing both biodiversity and linguistic diversity
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

Don't know the historical roots of these, eg who wrote the acts? But I also think your c in itself is interesting, quite some work done on transitions from languages as organisms to languages as species. See eg On constructing a research model for historical cognitive linguistics (HCL): Some theoretical considerations

Question 2: Terms such as '**living**', '**dead**' and '**genetically related**' are frequently used to describe languages. Do you consider the application of such terms to languages to be:

- a) Of no consequence, their meaning is easily understood
- b) Of use and of some significance, indicating similarities in the ways that both biological species and languages come into being, cease to exist and relate to each other
- c) Unhelpful and misleading, given that languages are neither living organisms nor related to each other by genes
- d) Other?

If you would like to expand on the above response, please do so here:

The speakers of similar languages are often genetically related (eg Cavalli Sforza)

Also, genetics is not necessarily a biological word, look into the etymology and history of the term

Question 3: The term '**biocultural diversity**' has been defined as "*the diversity of life in all its manifestations: biological, cultural, and linguistic*". All three types of diversity are often noted as facing similar threats. Do you consider these common threats to be:

- a) Clearly linked, there is a knock-on effect between all three
- b) Environmentally determined. Biological, cultural and linguistic diversity are similar in certain areas simply because they share the same kind of biome (e.g. dense rainforest versus arctic tundra)
- c) Entirely coincidental, they are not interrelated

d) Other?

If you would like to expand on the above response, please do so here:

I think these are consequences of complex phenomena that cannot be captured by the choices here provided

Question 4: **Binomial nomenclature** (e.g. *Canis lupus*) is applied to biological species, often alongside a common name (e.g. *wolf*). In your opinion, would the application of binomial nomenclature to the world's languages in similar fashion be:

a) Of no practical purpose

b) A useful means of distinguishing languages from each other, especially in the more linguistically diverse parts of the world

c) Another example of blurring the distinction between biological organisms and languages

d) Other?

If you would like to expand on the above response, please do so here:

Question 5: In your opinion, is collaborative research between evolutionary biology and historical linguistics:

a) Unnecessary

b) Desirable

c) Essential

d) Other?

If you would like to expand on the above response, please do so here:

Question 6: Do you use methods from both evolutionary biology and historical linguistics in your personal research?

a) Regularly

b) Often

e) Sometimes

d) Rarely

e) Only in very specific cases

f) Never

g) Other

If you would like to expand on the above response, please do so here:

Question 7: To the best of your knowledge, do historical linguists in general make use of findings from the field of evolutionary biology?

a) Regularly

b) Often

e) Sometimes

d) Rarely

e) Only in very specific cases

f) Never

g) Other

If you would like to expand on the above response, please do so here:

Question 8: To the best of your knowledge, do evolutionary biologists in general make use of findings from the field of historical linguists?

- a) Regularly
- b) Often
- e) Sometimes
- d) **Rarely**
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 9: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

- a) Facilitate collaboration between evolutionary biology and historical linguistics
- b) **Inhibit collaboration between evolutionary biology and historical linguistics**
- c) Neither facilitate nor inhibit collaboration between evolutionary biology and historical linguistics
- d) Other?

If you would like to expand on the above response, please do so here:

Question 10: In your opinion, is the **'family tree'** model of indicating evolutionary relationships: (please highlight as many as you feel relevant)

- a) An adequate model for all biological species
- b) An adequate model for all languages
- c) An adequate model for some biological species, but not all
- d) An adequate model for some languages, but not all
- e) **An inadequate model for biological species**
- f) **An inadequate model for languages**
- g) Other?

If you would like to expand on the above response, please do so here:

Question 11: In your opinion, which of the following definitions best explains the term 'evolution' as applied to **languages** (i.e., language change from protolanguage to daughter languages or from early to middle to modern periods etc, as opposed to the evolution of the human capacity for language):

- a) The evolution of languages is part of an exclusive process which applies to languages alone
- b) The evolution of languages is part of the wider process of cultural evolution which includes other aspects of culture but is separate from biological evolution
- c) The evolution of languages is part of the wider process of biological evolution, as are other forms of animal communication

c) Other?

If you would like to expand on the above response, please do so here:

The evolution of language is part of the wide phenomenon of evolution

Question 12: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

a) Yes, of course

b) No, unfortunately not

c) Possibly, if a convenient time can be arranged

If you would like to expand on the above response, please do so here:

These publications might interest you

Pattern similarity in biological, linguistic, and sociocultural evolution

What are the levels and mechanisms/processes of language evolution

What are the Units of Language Evolution?

Guest-Editorial Introduction: Converging Evolutionary Patterns in Life and Culture

Applied Evolutionary Epistemology: A new method to enhance interdisciplinary research between the life and human sciences.

Introducing Universal Symbiogenesis

Depicting the Tree of Life: the Philosophical and Historical Roots of Evolutionary Tree Diagrams

Thank you very much for your time

Andrew Currie

Questionnaire on links between evolutionary biology and historical linguistics QBLE5

Background information:

The purpose of this questionnaire is to gather information which will help shed further light on the shared terms and concepts used in (evolutionary) biology and (historical) linguistics. Given the enormous scope of the field, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would, nevertheless, be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: The terms '**vulnerable**', '**critically endangered**' and '**extinct**' are used to classify levels of endangerment not only of biological species (IUCN) but also of languages (UNESCO). Do you consider the application of the same terms for these different phenomena to be:

- X a) Of no consequence, both are easily understood and separated
- b) Of use and of some significance, indicating the similar dangers facing both biodiversity and linguistic diversity
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

If you would like to expand on the above response, please do so here:

Question 2: Terms such as '**living**', '**dead**' and '**genetically related**' are frequently used to describe languages. Do you consider the application of such terms to languages to be:

- X a) Of no consequence, their meaning is easily understood
- b) Of use and of some significance, indicating similarities in the ways that both biological species and languages come into being, cease to exist and relate to each other
- c) Unhelpful and misleading, given that languages are neither living organisms nor related to each other by genes
- d) Other?

If you would like to expand on the above response, please do so here:

Question 3: The term '**biocultural diversity**' has been defined as "*the diversity of life in all its manifestations: biological, cultural, and linguistic*". All three types of diversity are often noted as facing similar threats. Do you consider these common threats to be:

- a) Clearly linked, there is a knock-on effect between all three
- ☒ b) Environmentally determined. Biological, cultural and linguistic diversity are similar in certain areas simply because they share the same kind of biome (e.g. dense rainforest versus arctic tundra)
- c) Entirely coincidental, they are not interrelated
- d) Other?

If you would like to expand on the above response, please do so here:

Question 4: **Binomial nomenclature** (e.g. *Canis lupus*) is applied to biological species, often alongside a common name (e.g. *wolf*). In your opinion, would the application of binomial nomenclature to the world's languages in similar fashion be:

- a) Of no practical purpose
- ☒ b) A useful means of distinguishing languages from each other, especially in the more linguistically diverse parts of the world
- c) Another example of blurring the distinction between biological organisms and languages
- d) Other?

If you would like to expand on the above response, please do so here:

Question 5: In your opinion, is collaborative research between evolutionary biology and historical linguistics:

- a) Unnecessary
- ☒ b) Desirable
- c) Essential
- d) Other?

If you would like to expand on the above response, please do so here:

Question 6: Do you use methods from both evolutionary biology and historical linguistics in your personal research?

- a) Regularly
- b) Often
- X c) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 7: To the best of your knowledge, do historical linguists in general make use of findings from the field of evolutionary biology?

- a) Regularly
- b) Often
- X c) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 8: To the best of your knowledge, do evolutionary biologists in general make use of findings from the field of historical linguistics?

- a) Regularly
- b) Often
- f) Sometimes

- d) Rarely
- ☒ e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 9: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

- a) Facilitate collaboration between evolutionary biology and historical linguistics
- b) Inhibit collaboration between evolutionary biology and historical linguistics
- ☒ c) Neither facilitate nor inhibit collaboration between evolutionary biology and historical linguistics
- d) Other?

If you would like to expand on the above response, please do so here:

Question 10: In your opinion, is the **'family tree'** model of indicating evolutionary relationships: (please highlight as many as you feel relevant)

- ☒ a) An adequate model for all biological species
- ☒ b) An adequate model for all languages
- c) An adequate model for some biological species, but not all
- d) An adequate model for some languages, but not all
- e) An inadequate model for biological species
- f) An inadequate model for languages
- g) Other?

If you would like to expand on the above response, please do so here:

Question 11: In your opinion, which of the following definitions best explains the term 'evolution' as applied to **languages** (i.e., language change from protolanguage to daughter languages or from early to middle to modern periods etc, as opposed to the evolution of the human capacity for language):

- a) The evolution of languages is part of an exclusive process which applies to languages alone
- b) The evolution of languages is part of the wider process of cultural evolution which includes other aspects of culture but is separate from biological evolution
- X c) The evolution of languages is part of the wider process of biological evolution, as are other forms of animal communication
- c) Other?

If you would like to expand on the above response, please do so here:

Question 12: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

- a) Yes, of course
- b) No, unfortunately not
- X c) Possibly, if a convenient time can be arranged

If you would like to expand on the above response, please do so here:

Thank you very much for your time

Andrew Currie

Questionnaire on links between evolutionary biology and historical linguistics QBLE6

Background information:

The purpose of this questionnaire is to gather information which will help shed further light on the shared terms and concepts used in (evolutionary) biology and (historical) linguistics. Given the enormous scope of the field, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would, nevertheless, be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: The terms '**vulnerable**', '**critically endangered**' and '**extinct**' are used to classify levels of endangerment not only of biological species (IUCN) but also of languages (UNESCO). Do you consider the application of the same terms for these different phenomena to be:

- a) Of no consequence, both are easily understood and separated
- b) Of use and of some significance, indicating the similar dangers facing both biodiversity and linguistic diversity**
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

If you would like to expand on the above response, please do so here:

Question 2: Terms such as '**living**', '**dead**' and '**genetically related**' are frequently used to describe languages. Do you consider the application of such terms to languages to be:

- a) Of no consequence, their meaning is easily understood
- b) Of use and of some significance, indicating similarities in the ways that both biological species and languages come into being, cease to exist and relate to each other**
- c) Unhelpful and misleading, given that languages are neither living organisms nor related to each other by genes
- d) Other?

If you would like to expand on the above response, please do so here:

Sometimes it is important to make a distinction between human genetics and linguistic shared ancestry, as it may be confusing

Question 3: The term **‘biocultural diversity’** has been defined as *“the diversity of life in all its manifestations: biological, cultural, and linguistic”*. All three types of diversity are often noted as facing similar threats. Do you consider these common threats to be:

- a) Clearly linked, there is a knock-on effect between all three
- b) Environmentally determined. Biological, cultural and linguistic diversity are similar in certain areas simply because they share the same kind of biome (e.g. dense rainforest versus arctic tundra)
- c) Entirely coincidental, they are not interrelated

d) Other?

If you would like to expand on the above response, please do so here:

I personally think they are linked (so that excludes c for me) but I do not think that we understand these connections well enough to support b or a.

Question 4: **Binomial nomenclature** (e.g. *Canis lupus*) is applied to biological species, often alongside a common name (e.g. *wolf*). In your opinion, would the application of binomial nomenclature to the world’s languages in similar fashion be:

a) Of no practical purpose

- b) A useful means of distinguishing languages from each other, especially in the more linguistically diverse parts of the world
- c) Another example of blurring the distinction between biological organisms and languages
- d) Other?

If you would like to expand on the above response, please do so here:

I think that mentioning the language family and/or area when needed should be enough to dispel potential confusions, but I personally recommend always adding ISO or Glottolog codes for clarity

Question 5: In your opinion, is collaborative research between evolutionary biology and historical linguistics:

- a) Unnecessary
- b) Desirable
- c) **Essential**
- d) Other?

If you would like to expand on the above response, please do so here:

There’s too much to discuss here, but, briefly, the processes are similar enough to warrant a shared understanding

Question 6: Do you use methods from both evolutionary biology and historical linguistics in your personal research?

- a) Regularly
- b) Often**
- f) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Methods from phylogenetics and population genetics but, most importantly, concepts, theories and paradigms

Question 7: To the best of your knowledge, do historical linguists in general make use of findings from the field of evolutionary biology?

- a) Regularly
- b) Often
- f) Sometimes**
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

It is still not part of the basic training, but it is changing relatively fast

Question 8: To the best of your knowledge, do evolutionary biologists in general make use of findings from the field of historical linguists?

- a) Regularly
- b) Often
- g) Sometimes
- d) Rarely
- e) Only in very specific cases**
- f) Never

g) Other

If you would like to expand on the above response, please do so here:

Normally, I don't think they're very much aware of that and may use them when they deal with languages/communities/demographic processes, or, if they study aspects of the "extended synthesis" that touch on culture/cultural niche construction and things like that. Overall, a minority...

Question 9: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

a) Facilitate collaboration between evolutionary biology and historical linguistics

b) Inhibit collaboration between evolutionary biology and historical linguistics

c) Neither facilitate nor inhibit collaboration between evolutionary biology and historical linguistics

d) Other?

If you would like to expand on the above response, please do so here:

I find this distinction rooted in historical accident and presently positively misleading

Question 10: In your opinion, is the 'family tree' model of indicating evolutionary relationships: (please highlight as many as you feel relevant)

a) An adequate model for all biological species

b) An adequate model for all languages

c) An adequate model for some biological species, but not all

d) An adequate model for some languages, but not all

e) An inadequate model for biological species

f) An inadequate model for languages

g) Other?

If you would like to expand on the above response, please do so here:

I think it is much more appropriate for biology ("horizontal" processes play a more limited role) than for language (large horizontal influence and lack of a "universal" tree – not that the TOL is doing particularly well these days 😊 but still seems to point to something at least partly real)

Question 11: In your opinion, which of the following definitions best explains the term 'evolution' as applied to **languages** (i.e., language change from protolanguage to daughter languages or from early to middle to modern periods etc, as opposed to the evolution of the human capacity for language):

a) The evolution of languages is part of an exclusive process which applies to languages alone

b) The evolution of languages is part of the wider process of cultural evolution which includes other aspects of culture but is separate from biological evolution

c) The evolution of languages is part of the wider process of biological evolution, as are other forms of animal communication

c) Other?

If you would like to expand on the above response, please do so here:

My preference goes something like 80%b + 20%c – so there's many things shared across these domains but there are also specificities

Question 12: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

a) Yes, of course

b) No, unfortunately not

c) Possibly, if a convenient time can be arranged

If you would like to expand on the above response, please do so here:

Thank you very much for your time

Andrew Currie

Questionnaire on links between linguistic and biological ecology QEL1

Background information:

The purpose of this questionnaire is to gather information which will help shed further light on the shared terms and concepts used in linguistic and biological ecology. Given the enormous scope of these fields, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would nevertheless be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: The term '**ecology**' is often used to describe interactions between not only biological organisms but also languages in their respective environments. Do you consider the application of the same term for these different phenomena to be:

- a) **Of no consequence, both concepts are easily understood and separated**
- b) Useful and of some significance, indicating the similar processes affecting both biodiversity and linguistic diversity
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

If you would like to expand on the above response, please do so here: I think it is a bit trendy, it's a way of thinking about language that would never occur to me..so far in my reading of Ecolinguistics I have yet to come across a convincing paper on the topic, so I have yet to understand what 'ecology' applied to a language could mean..but I don't go as far as c)

Question 2: The terms '**vulnerable**', '**critically endangered**' and '**extinct**' are used to classify levels of endangerment not only of biological species (IUCN) but also of languages (UNESCO). Do you consider the application of the same terms for these different phenomena to be:

- a) Of no consequence, both are easily understood and separated
- b) **Of use and of some significance, indicating the similar dangers facing both biodiversity and linguistic diversity**
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

If you would like to expand on the above response, please do so here:

Question 3: Terms such as ‘**living**’, ‘**dead**’ and ‘**genetically related**’ are frequently used to describe languages. Do you consider the application of such terms to languages to be:

- a) Of no consequence, their meaning is easily understood
- b) Of use and of some significance, indicating similarities in the ways that both biological species and languages come into being, cease to exist and relate to each other**
- c) Unhelpful and misleading, given that languages are neither living organisms nor related to each other by genes
- d) Other?

If you would like to expand on the above response, please do so here: not sure about ‘genetically related’ applied to languages

Question 4: The term ‘**biocultural diversity**’ has been defined as “*the diversity of life in all its manifestations: biological, cultural, and linguistic*”. All three types of diversity are often noted as facing similar threats. Do you consider these common threats to be:

- a) Clearly linked, there is a knock-on effect between all three**
- b) Environmentally determined. Biological, cultural and linguistic diversity are similar in certain areas simply because they share the same kind of biome (e.g. dense rainforest versus arctic tundra)
- c) Entirely coincidental, they are not interrelated
- d) Other?

If you would like to expand on the above response, please do so here: more a) than the others,

Question 5: In your opinion, which of the following definitions best explains the term ‘ecology’ as applied to **languages**:

- a) Linguistic ecology refers to the interaction of languages within their wider linguistic environment, and is an exclusive process which applies to languages alone
- b) Linguistic ecology is part of the wider process of cultural ecology which includes other aspects of culture, but is separate from biological ecology**

c) Linguistic ecology is part of the wider process of biological ecology, as are all other aspects of human culture

c) Other?

If you would like to expand on the above response, please do so here:

Question 6: **Binomial nomenclature** (e.g. *Canis lupus*) is applied to biological species, often alongside a common name (e.g. *wolf*). In your opinion, would the application of binomial nomenclature to the world's languages in similar fashion be:

a) Of no practical purpose

b) A useful means of distinguishing languages from each other, especially in the more linguistically diverse parts of the world

c) Another example of blurring the distinction between biological organisms and languages

d) Other?

If you would like to expand on the above response, please do so here:

Question 7: In your opinion, is collaborative research between biological and linguistic ecologists:

a) Unnecessary

b) Desirable

c) Essential

d) Other?

If you would like to expand on the above response, please do so here: I think from a strategic perspective, in terms of producing research that might influence opinion outside academia..at a social or political level..

Question 8: Do you use methods from both biological and linguistic ecology in your personal research?

a) Regularly

- b) Often
- f) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) **Never**
- g) Other

If you would like to expand on the above response, please do so here:

Question 9: To the best of your knowledge, do linguistic ecologists in general make use of findings from the field of biological ecology?

- a) Regularly
- b) Often
- g) **Sometimes**
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 10: To the best of your knowledge, do biological ecologists in general make use of findings from the field of linguistic ecology?

- a) Regularly
- b) Often
- h) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) **Other**

If you would like to expand on the above response, please do so here: no idea

Question 11: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

- a) Facilitate collaboration between biological and linguistic ecology
- b) Inhibit collaboration between evolutionary biological and linguistic ecology**
- c) Neither facilitate nor inhibit collaboration between biological and linguistic ecology
- d) Other?

If you would like to expand on the above response, please do so here: there are no interdisciplinary journals that I know of so there is a strict separation between fields

Question 12: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

- a) Yes, of course
- b) No, unfortunately not
- c) Possibly, if a convenient time can be arranged**

If you would like to expand on the above response, please do so here:

Thank you very much for your time

Andrew Currie

Questionnaire on links between linguistic and biological ecology QEL2

Background information:

The purpose of this questionnaire is to gather information which will help shed further light on the shared terms and concepts used in linguistic and biological ecology. Given the enormous scope of these fields, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would nevertheless be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: The term **'ecology'** is often used to describe interactions between not only biological organisms but also languages in their respective environments. Do you consider the application of the same term for these different phenomena to be:

- a) Of no consequence, both concepts are easily understood and separated
- b) Useful and of some significance, indicating the similar processes affecting both biodiversity and linguistic diversity
- c) Unhelpful and misleading, giving the impression that languages are living organisms**
- d) Other?

If you would like to expand on the above response, please do so here:

The way that languages interact with each other is different from how biological organisms interact. Forcing the metaphor onto languages could potentially distort observations – we should just look at languages and describe how they interact without *a priori* deciding that it's obviously the same as how species interact with each other. My main objection, however, is that it is anthropocentric to use the term 'ecology' in a way that excludes animals, plants, forests, rivers and trees at a time in history that we most need to focus on them. So I would much prefer it if 'language ecology' was instead referred to as 'language interaction'.

Question 2: The terms **'vulnerable'**, **'critically endangered'** and **'extinct'** are used to classify levels of endangerment not only of biological species (IUCN) but also of languages (UNESCO). Do you consider the application of the same terms for these different phenomena to be:

- a) Of no consequence, both are easily understood and separated**
- b) Of use and of some significance, indicating the similar dangers facing both biodiversity and linguistic diversity
- c) Unhelpful and misleading, giving the impression that languages are living organisms

d) Other?

If you would like to expand on the above response, please do so here:

These terms generally make sense and don't imply that languages behave like species in general (in the way that 'language ecology' does).

Question 3: Terms such as '**living**', '**dead**' and '**genetically related**' are frequently used to describe languages. Do you consider the application of such terms to languages to be:

- a) Of no consequence, their meaning is easily understood
- b) Of use and of some significance, indicating similarities in the ways that both biological species and languages come into being, cease to exist and relate to each other
- c) Unhelpful and misleading, given that languages are neither living organisms nor related to each other by genes

d) Other?

If you would like to expand on the above response, please do so here:

'genetically related' may be misleading since it implies too strongly that languages behave in the same way as species, which might blind researchers to ways that they might be different. Living and dead could be misleading since sometimes 'dead' languages are brought to life (e.g., Hebrew), but it's not a big issue.

Question 4: The term '**biocultural diversity**' has been defined as "*the diversity of life in all its manifestations: biological, cultural, and linguistic*". All three types of diversity are often noted as facing similar threats. Do you consider these common threats to be:

- a) **Clearly linked, there is a knock-on effect between all three**
- b) Environmentally determined. Biological, cultural and linguistic diversity are similar in certain areas simply because they share the same kind of biome (e.g. dense rainforest versus arctic tundra)
- c) Entirely coincidental, they are not interrelated
- d) Other?

If you would like to expand on the above response, please do so here:

I am happy with this because it does not erase animals, plants, forests rivers etc.

Question 5: In your opinion, which of the following definitions best explains the term 'ecology' as applied to **languages**:

a) Linguistic ecology refers to the interaction of languages within their wider linguistic environment, and is an exclusive process which applies to languages alone

b) Linguistic ecology is part of the wider process of cultural ecology which includes other aspects of culture, but is separate from biological ecology

c) Linguistic ecology is part of the wider process of biological ecology, as are all other aspects of human culture

c) Other? Ecology is the interaction of humans with other humans, other species and the physical environment. Language use plays a role within ecology since it is one of the ways that humans interact with each other.

If you would like to expand on the above response, please do so here:

Question 6: **Binomial nomenclature** (e.g. *Canis lupus*) is applied to biological species, often alongside a common name (e.g. *wolf*). In your opinion, would the application of binomial nomenclature to the world's languages in similar fashion be:

a) Of no practical purpose

b) A useful means of distinguishing languages from each other, especially in the more linguistically diverse parts of the world

c) Another example of blurring the distinction between biological organisms and languages

d) Other? It could potentially be useful, and I don't think it blurs the boundary.

If you would like to expand on the above response, please do so here:

Question 7: In your opinion, is collaborative research between biological and linguistic ecologists:

a) Unnecessary

b) Desirable

c) Essential

d) Other?

If you would like to expand on the above response, please do so here:

If a "linguistic ecologist" only considers relationships of languages with other languages without considering the biological and physical world then it would be useless – the linguist could offer nothing to the ecologist. It would be much better for ecologists to meet ecolinguists.

Question 8: Do you use methods from both biological and linguistic ecology in your personal research?

- a) Regularly
- b) Often
- i) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never**
- g) Other

If you would like to expand on the above response, please do so here:

Question 9: To the best of your knowledge, do linguistic ecologists in general make use of findings from the field of biological ecology?

- a) Regularly
- b) Often
- j) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

I think that they may borrow terminology from biological ecology (e.g., semantic niche) and then (in an often forced way) try to apply it to language.

Question 10: To the best of your knowledge, do biological ecologists in general make use of findings from the field of linguistic ecology?

- a) Regularly
- b) Often
- k) Sometimes
- d) Rarely

e) Only in very specific cases

f) Never

g) Other

If you would like to expand on the above response, please do so here:

I think that they may make use of research into language contact, language interaction etc, but probably not works which are specifically labelled 'linguistic ecology'

Question 11: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

a) Facilitate collaboration between biological and linguistic ecology

b) Inhibit collaboration between evolutionary biological and linguistic ecology

c) Neither facilitate nor inhibit collaboration between biological and linguistic ecology

d) Other?

If you would like to expand on the above response, please do so here:

Question 12: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

a) Yes, of course

b) No, unfortunately not

c) Possibly, if a convenient time can be arranged

If you would like to expand on the above response, please do so here:

Thank you very much for your time

Andrew Currie

Questionnaire on links between linguistic and biological ecology QEL3

Background information:

The purpose of this questionnaire is to gather information which will help shed further light on the shared terms and concepts used in linguistic and biological ecology. Given the enormous scope of these fields, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would nevertheless be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: The term '**ecology**' is often used to describe interactions between not only biological organisms but also languages in their respective environments. Do you consider the application of the same term for these different phenomena to be:

- a) Of no consequence, both concepts are easily understood and separated
- b) Useful and of some significance, indicating the similar processes affecting both biodiversity and linguistic diversity
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

If you would like to expand on the above response, please do so here:

The notion of "ecology" is used in reference to the environment that influences the evolution of (a) language. It helps articulate factors outside (a) language ("external ecology") and also within (a) language ("internal ecology") that influence the behaviors of speakers, which bear on language evolution. The invocations make it possible to deal with the actuation of change, including structural changes, language speciation, and language endangerment and loss.

Question 2: The terms '**vulnerable**', '**critically endangered**' and '**extinct**' are used to classify levels of endangerment not only of biological species (IUCN) but also of languages (UNESCO). Do you consider the application of the same terms for these different phenomena to be:

- a) Of no consequence, both are easily understood and separated
- b) Of use and of some significance, indicating the similar dangers facing both biodiversity and linguistic diversity
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

If you would like to expand on the above response, please do so here: [The terms are useful to the extent that they highlight similarities between languages and biological species and, from my point of view, how changes in their ecologies affect their vitality.](#)

Question 3: Terms such as **‘living’**, **‘dead’** and **‘genetically related’** are frequently used to describe languages. Do you consider the application of such terms to languages to be:

- a) Of no consequence, their meaning is easily understood
- b) Of use and of some significance, indicating similarities in the ways that both biological species and languages come into being, cease to exist and relate to each other
- c) Unhelpful and misleading, given that languages are neither living organisms nor related to each other by genes
- d) Other?

If you would like to expand on the above response, please do so here: [Linguists have been interested in classifying languages genetically since the 19th century. Apparently, August Schleicher produced the Stammbaum for languages before Charles Darwin produced cladograms. Since the 19th century, linguists have often analogized languages with either organisms or \(in my work\) species in biology. It makes a lot of sense to speak of “living” and “dead” languages. The analogy is useful, especially if languages are conceived of as populations of idiolects \(like species are populations of organisms\) sharing a common ancestry and “inter-breeding” \(albeit communicating successfully\) with each other. This puts pressure on practitioners of evolutionary linguistics \(on the model of evolutionary biology\) to ponder on how languages die \(just like evolutionary biologists can explain how species die\).](#)

Question 4: The term **‘biocultural diversity’** has been defined as *“the diversity of life in all its manifestations: biological, cultural, and linguistic”*. All three types of diversity are often noted as facing similar threats. Do you consider these common threats to be:

- a) Clearly linked, there is a knock-on effect between all three
- b) Environmentally determined. Biological, cultural and linguistic diversity are similar in certain areas simply because they share the same kind of biome (e.g. dense rainforest versus arctic tundra)
- c) Entirely coincidental, they are not interrelated
- d) Other?

If you would like to expand on the above response, please do so here: [This is where I disagree with fellow linguists. Languages are themselves cultural artefacts. So, I don’t like the phrase “language and culture.” A language may die or survive while other aspects of the same culture survive or die. A population shifting to another population’s language usually influences the prevailing language’s culture. Things are more complicated than the literature on “biocultural diversity” discusses them.](#)

Question 5: In your opinion, which of the following definitions best explains the term 'ecology' as applied to **languages**:

- a) Linguistic ecology refers to the interaction of languages within their wider linguistic environment, and is an exclusive process which applies to languages alone
- b) Linguistic ecology is part of the wider process of cultural ecology which includes other aspects of culture, but is separate from biological ecology
- c) Linguistic ecology is part of the wider process of biological ecology, as are all other aspects of human culture
- c) Other?

If you would like to expand on the above response, please do so here: If "ecology" is interpreted as 'environment', it cannot be a process or activities. Interactions between a language and its ecology are existential relations. The ecology of a language is not limited to the other languages that it coexists and may compete with. It includes a host of socioeconomic and natural ecology pressures that affect the behaviors of speakers. I say this in my book *The Ecology of Language Evolution* (CUP, 2001). In the history of languages, we hardly ever have to refer to the biological ecology of language(s). However, when we discuss the phylogenetic emergence of language, then we have to invoke the human brain/mind and buccopharyngeal structures (for spoken languages) or hands (for signed languages) as primary ecologies.

Question 6: **Binomial nomenclature** (e.g. *Canis lupus*) is applied to biological species, often alongside a common name (e.g. *wolf*). In your opinion, would the application of binomial nomenclature to the world's languages in similar fashion be:

- a) Of no practical purpose
- b) A useful means of distinguishing languages from each other, especially in the more linguistically diverse parts of the world
- c) Another example of blurring the distinction between biological organisms and languages
- d) Other?

If you would like to expand on the above response, please do so here: The answers a), b) and c) are not mutually exclusive. They all apply.

Question 7: In your opinion, is collaborative research between biological and linguistic ecologists:

- a) Unnecessary
- b) Desirable
- c) Essential
- d) Other?

If you would like to expand on the above response, please do so here: It is desirable. Because biologists have made more progress in ecology than linguists have, it should help the latter to read the literature produced in macroecology and by environmentalists. I published an article in *Language* in December 2017, in which I highlight this scholarly connection. One does not know what biologists may learn in return from linguists. If they can, collaborative research may be said to be essential.

Question 8: Do you use methods from both biological and linguistic ecology in your personal research?

- a) Regularly
- b) Often
- l) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here: I claim my work in evolutionary linguistics to be informed by genetic linguistics and macroecology. However, I'm self-trained in these fields and have discussed my work with people that understand these fields better than I do. Linguists complain that I am too biologically oriented, while some biologists like what I do. But I really don't know whether I should say I use "methods from biological ... ecology."

Question 9: To the best of your knowledge, do linguistic ecologists in general make use of findings from the field of biological ecology?

- a) Regularly
- b) Often
- m) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here: I think most "ecolinguists" as they call themselves (and I hate the term *ecolinguistics*!) are much influenced by environmentalists but have expressed little interest in macroecology. So their discourse is more moralizing than it can explain what is happening from an evolutionary perspective.

Question 10: To the best of your knowledge, do biological ecologists in general make use of findings from the field of linguistic ecology?

- a) Regularly
- b) Often
- n) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here: [I'm not sure that biologists really know about ecolinguistics or the ecology of language.](#)

Question 11: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

- a) Facilitate collaboration between biological and linguistic ecology
- b) Inhibit collaboration between evolutionary biological and linguistic ecology
- c) Neither facilitate nor inhibit collaboration between biological and linguistic ecology
- d) Other?

If you would like to expand on the above response, please do so here: [My position of c\). I think, however, that linguists have done little interest biologists in what they do.](#)

Question 12: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

- a) Yes, of course
- b) No, unfortunately not
- c) Possibly, if a convenient time can be arranged

If you would like to expand on the above response, please do so here: [Yes, if a convenient time can be arranged.](#)

Thank you very much for your time

Andrew Currie

Questionnaire on links between linguistic and biological ecology QEL4

Background information:

The purpose of this questionnaire is to gather information which will help shed further light on the shared terms and concepts used in linguistic and biological ecology. Given the enormous scope of these fields, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would nevertheless be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: The term **'ecology'** is often used to describe interactions between not only biological organisms but also languages in their respective environments. Do you consider the application of the same term for these different phenomena to be:

c) Unhelpful and misleading, giving the impression that languages are living organisms

I find it unhelpful, but not for the reason stated above. Although I have used and continue to be interested in a language ecology approach, the term itself seems to be applied to mean two very different things: 1) the relationship between languages within a given social/ political context, and 2) the relationship between languages and the physical environment. There is basically disagreement about what constitutes the environment – is it social/political or physical/biological? As someone interested in language politics, the first approach is helpful, the second one isn't.

Question 2: The terms **'vulnerable'**, **'critically endangered'** and **'extinct'** are used to classify levels of endangerment not only of biological species (IUCN) but also of languages (UNESCO). Do you consider the application of the same terms for these different phenomena to be:

b) Of use and of some significance, indicating the similar dangers facing both biodiversity and linguistic diversity

Again my answer differs from the reasons given above. I think the labels are fine, and useful. However, I've increasingly come to think that they are inadequate for a number of reasons. One is that they assess proximity to 'extinction' rather than 'shift', so they are of limited practical value to communities when the language is still healthy – what they require are tools that will help them forecast the near to distant future of the language. And secondly, I think these labels are misleading because endangerment isn't a property of a language. It's the product of a political context – we should be rating that. Labelling languages 'endangered' etc verges on victim blaming.

Question 3: Terms such as **'living'**, **'dead'** and **'genetically related'** are frequently used to describe languages. Do you consider the application of such terms to languages to be:

c) Unhelpful and misleading, given that languages are neither living organisms nor related to each other by genes

d) Other?

Unhelpful, given that languages can be revitalized, and the ways in which discourses of death, etc impact the community and demotivate revitalization.

Question 4: The term '**biocultural diversity**' has been defined as "*the diversity of life in all its manifestations: biological, cultural, and linguistic*". All three types of diversity are often noted as facing similar threats. Do you consider these common threats to be:

d) Other?

I think that from the perspective of communities, the idea that these forms of diversity are linked is of little practical value. It doesn't provide very much useful information to help communities mobilize in defence of their languages. A view that centres the destructive forces which erode all varieties of diversity might be more productive in this sense.

Question 5: In your opinion, which of the following definitions best explains the term 'ecology' as applied to **languages**:

a) Linguistic ecology refers to the interaction of languages within their wider linguistic environment, and is an exclusive process which applies to languages alone

c) Other?

NA

Question 6: **Binomial nomenclature** (e.g. *Canis lupus*) is applied to biological species, often alongside a common name (e.g. *wolf*). In your opinion, would the application of binomial nomenclature to the world's languages in similar fashion be:

a) Of no practical purpose

Question 7: In your opinion, is collaborative research between biological and linguistic ecologists:

b) Desirable

If you would like to expand on the above response, please do so here:

Question 8: Do you use methods from both biological and linguistic ecology in your personal research?

d) Rarely

If you would like to expand on the above response, please do so here:

Question 9: To the best of your knowledge, do linguistic ecologists in general make use of findings from the field of biological ecology?

c) Sometimes

I have a degree in ecology and am surprised by how little use is actually made of ecological theory in ecological linguistics. There are so many concepts that could be deployed productively. But increasingly I think that developing this sort of theory has limited practical implications for speakers of endangered languages.

Question 10: To the best of your knowledge, do biological ecologists in general make use of findings from the field of linguistic ecology?

f) Never

I'm not aware of any examples.

Question 11: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

c) Neither facilitate nor inhibit collaboration between biological and linguistic ecology

If you would like to expand on the above response, please do so here:

Question 12: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

a) Yes, of course

If you would like to expand on the above response, please do so here:

Thank you very much for your time

Andrew Currie

Questionnaire on links between linguistic and biological ecology QEL5

Background information:

The purpose of this questionnaire is to gather information which will help shed further light on the shared terms and concepts used in linguistic and biological ecology. Given the enormous scope of these fields, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would nevertheless be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: The term **'ecology'** is often used to describe interactions between not only biological organisms but also languages in their respective environments. Do you consider the application of the same term for these different phenomena to be:

- a) Of no consequence, both concepts are easily understood and separated
- b) Useful and of some significance, indicating the similar processes affecting both biodiversity and linguistic diversity
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) **Other? Very useful.**

If you would like to expand on the above response, please do so here: "My particular approach to Ecolinguistics is called Ecosystemic Linguistics because it departs from Ecology's central concept, *ecosystem*, inside which what matters is not the living organisms or their environment, but interactions (organism-organism interaction → communication; organism-environment interaction → reference). Ecosystemic Linguistics does not borrow ecological concepts and use them as metaphors in language studies. EL is part of Macroecology. Therefore, it departs from within Ecology in order to study language phenomena. In the *Routledge handbook of Ecolinguistics*, edited by Alwin Fill & Hermine Penz there is a paper of mine in which you can find more information, in case you want to.

There is also some material on the internet: Ecosystemic Linguistics.

<https://ecosystemic-linguistics.blogspot.com.br>

Question 2: The terms **'vulnerable'**, **'critically endangered'** and **'extinct'** are used to classify levels of endangerment not only of biological species (IUCN) but also of languages (UNESCO). Do you consider the application of the same terms for these different phenomena to be:

- a) Of no consequence, both are easily understood and separated

b) Of use and of some significance, indicating the similar dangers facing both biodiversity and linguistic diversity

c) Unhelpful and misleading, giving the impression that languages are living organisms

d) Other?

If you would like to expand on the above response, please do so here:

Question 3: Terms such as **‘living’**, **‘dead’** and **‘genetically related’** are frequently used to describe languages. Do you consider the application of such terms to languages to be:

a) Of no consequence, their meaning is easily understood

b) Of use and of some significance, indicating similarities in the ways that both biological species and languages come into being, cease to exist and relate to each other

c) Unhelpful and misleading, given that languages are neither living organisms nor related to each other by genes

d) Other? In this case it is useful as metaphor because languages do not have muscles, blood, bones; It does not breathe etc. But as a metaphor these concepts may be useful.

If you would like to expand on the above response, please do so here:

Question 4: The term **‘biocultural diversity’** has been defined as *“the diversity of life in all its manifestations: biological, cultural, and linguistic”*. All three types of diversity are often noted as facing similar threats. Do you consider these common threats to be:

a) Clearly linked, there is a knock-on effect between all three

b) Environmentally determined. Biological, cultural and linguistic diversity are similar in certain areas simply because they share the same kind of biome (e.g. dense rainforest versus arctic tundra)

c) Entirely coincidental, they are not interrelated

d) Other?

If you would like to expand on the above response, please do so here:

Question 5: In your opinion, which of the following definitions best explains the term ‘ecology’ as applied to **languages**:

- a) Linguistic ecology refers to the interaction of languages within their wider linguistic environment, and is an exclusive process which applies to languages alone
- b) Linguistic ecology is part of the wider process of cultural ecology which includes other aspects of culture, but is separate from biological ecology
- c) Linguistic ecology is part of the wider process of biological ecology, as are all other aspects of human culture
- c) Other?

If you would like to expand on the above response, please do so here:

Question 6: **Binomial nomenclature** (e.g. *Canis lupus*) is applied to biological species, often alongside a common name (e.g. *wolf*). In your opinion, would the application of binomial nomenclature to the world’s languages in similar fashion be:

- a) Of no practical purpose
- b) A useful means of distinguishing languages from each other, especially in the more linguistically diverse parts of the world
- c) Another example of blurring the distinction between biological organisms and languages
- d) Other? See box!

If you would like to expand on the above response, please do so here: “Language is not a thing. Nor is it an instrument of communication; it is communication, or communicative interaction. In this case, we could say that a good way of naming languages would be as is done in southern Africa, where, for instance, **Sesotho** is the language of the **Basotho** people, which live in the **Lesotho** country. For these people, and for many other around the world, “language” means something like “the way of speaking of people x”. In Latin, you cannot translate directly “I speak Latin”. The Romans said, instead, “latine loqui”, i.e., to talk like the Latins.

Question 7: In your opinion, is collaborative research between biological and linguistic ecologists:

- a) Unnecessary
- b) Desirable
- c) Essential

d) Other?

If you would like to expand on the above response, please do so here:

Question 8: Do you use methods from both biological and linguistic ecology in your personal research?

- a) Regularly
- b) Often
- c) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 9: To the best of your knowledge, do linguistic ecologists in general make use of findings from the field of biological ecology?

- a) Regularly
- b) Often
- c) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 10: To the best of your knowledge, do biological ecologists in general make use of findings from the field of linguistic ecology?

- a) Regularly
- b) Often
- q) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) **Never**
- g) Other

If you would like to expand on the above response, please do so here:

Question 11: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

- a) Facilitate collaboration between biological and linguistic ecology
- b) **Inhibit collaboration between evolutionary biological and linguistic ecology**
- c) Neither facilitate nor inhibit collaboration between biological and linguistic ecology
- d) Other?

If you would like to expand on the above response, please do so here:

Question 12: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

- a) Yes, of course
- b) No, unfortunately not
- c) **Possibly, if a convenient time can be arranged**

If you would like to expand on the above response, please do so here:

Thank you very much for your time

Andrew Currie

Questionnaire on links between linguistic and biological ecology QEL6

Background information:

The purpose of this questionnaire is to gather information which will help shed further light on the shared terms and concepts used in linguistic and biological ecology. Given the enormous scope of these fields, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would nevertheless be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: The term **'ecology'** is often used to describe interactions between not only biological organisms but also languages in their respective environments. Do you consider the application of the same term for these different phenomena to be:

- a) Of no consequence, both concepts are easily understood and separated
- b) Useful and of some significance, indicating the similar processes affecting both biodiversity and linguistic diversity
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

One has to consider that we are dealing with a metaphor, in both cases! Consider the original meaning of ecology in Greek: the *logos* of the *oikos*, i.e. the considerations concerning the or the rationale of the household. Haeckel adopted the term – metaphorically – to biological “households”, and later Haugen – again metaphorically – to linguistic “households”. I think the question should not be whether biology and linguistics can be kept apart but whether researchers in biology and linguistics alike are aware of the metaphorical nature of the term and the consequences of using it. I.e., there is no “household” neither among biological entities nor among linguistic structures, but we find this metaphor useful as it provides us with a theory of how things among biological entities and linguistic structures work.

Question 2: The terms **'vulnerable'**, **'critically endangered'** and **'extinct'** are used to classify levels of endangerment not only of biological species (IUCN) but also of languages (UNESCO). Do you consider the application of the same terms for these different phenomena to be:

- a) Of no consequence, both are easily understood and separated
- b) Of use and of some significance, indicating the similar dangers facing both biodiversity and linguistic diversity

c) Unhelpful and misleading, giving the impression that languages are living organisms

d) Other?

Same as above. It is of significance and also of (some) use. But there is a theory behind it, equalling some aspects of languages with some aspects of living beings. This theory makes sense from one point of view, but is terribly misleading from another. Taking your example: the use of the ecology/life-metaphor highlights the danger of mankind losing most of its linguistic resources. If you want to preserve that diversity, it's a helpful illustration and a good theory. But you could also say that language is a social institution (that's a different theory!), meaning that if linguistic resources "die out", then it is because they are of no social or cultural use anymore, so preserving them would be a purely academic or archaeological issue.

Question 3: Terms such as '**living**', '**dead**' and '**genetically related**' are frequently used to describe languages. Do you consider the application of such terms to languages to be:

a) Of no consequence, their meaning is easily understood

b) Of use and of some significance, indicating similarities in the ways that both biological species and languages come into being, cease to exist and relate to each other

c) Unhelpful and misleading, given that languages are neither living organisms nor related to each other by genes

d) Other?

Here I would opt stronger against the use of these terms, precisely for the reason given in (c). But, again, a term like "genetically related" is of some use in describing the similarities we find among certain linguistic resources ('languages', 'dialects'). It is, again, a metaphor, as practically all things in linguistics are – and must be, because 'language' is an essentially abstract phenomenon, and we can deal with abstract things linguistically only by making use of metaphors and similar techniques (consider other abstract terms like 'freedom', 'peace', 'love' etc.).

Question 4: The term '**biocultural diversity**' has been defined as "*the diversity of life in all its manifestations: biological, cultural, and linguistic*". All three types of diversity are often noted as facing similar threats. Do you consider these common threats to be:

a) Clearly linked, there is a knock-on effect between all three

b) Environmentally determined. Biological, cultural and linguistic diversity are similar in certain areas simply because they share the same kind of biome (e.g. dense rainforest versus arctic tundra)

c) Entirely coincidental, they are not interrelated

d) Other?

They are linked not so much environmentally, but metaphorically. Some things happening in biological environments have *some parallels* in social and cultural environments. But other than that: there is no direct link between the two fields: people adopt the linguistic habits of other people, they invent new ones and sort out others. All of this has (almost) no consequence on their *biological* life. In turn, the 'well-being' (meaning nothing else but a relative *stasis*) of biological diversity is of huge concern to all cultural and social issues, it is their prerequisite!

Question 5: In your opinion, which of the following definitions best explains the term 'ecology' as applied to **languages**:

- a) Linguistic ecology refers to the interaction of languages within their wider linguistic environment, and is an exclusive process which applies to languages alone
- b) Linguistic ecology is part of the wider process of cultural ecology which includes other aspects of culture, but is separate from biological ecology
- c) Linguistic ecology is part of the wider process of biological ecology, as are all other aspects of human culture
- c) Other?

If you would like to expand on the above response, please do so here:

Question 6: **Binomial nomenclature** (e.g. *Canis lupus*) is applied to biological species, often alongside a common name (e.g. *wolf*). In your opinion, would the application of binomial nomenclature to the world's languages in similar fashion be:

- a) Of no practical purpose
- b) A useful means of distinguishing languages from each other, especially in the more linguistically diverse parts of the world
- c) Another example of blurring the distinction between biological organisms and languages
- d) Other?

If you would like to expand on the above response, please do so here:

Question 7: In your opinion, is collaborative research between biological and linguistic ecologists:

- a) Unnecessary
- b) Desirable
- c) Essential
- d) **Other?**

It depends on the (linguistic) theory behind this collaboration. If this theory maintains a clear distinction between linguistic resources (as social products) and biological (i.e. non-social) entities and searches for the correspondences between the realms of the social and the biological, it can be very desirably. But if this theory sees a clear link between entity-like languages and biological entities, as it has been done so often since the 19th century, it is, I think, of no use, because there is, in my opinion, so much convincing evidence that the social and the biological do not work along the same lines.

Question 8: Do you use methods from both biological and linguistic ecology in your personal research?

- a) Regularly
- b) Often
- r) Sometimes
- d) Rarely
- e) **Only in very specific cases**
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 9: To the best of your knowledge, do linguistic ecologists in general make use of findings from the field of biological ecology?

- a) Regularly
- b) Often
- s) **Sometimes**
- d) Rarely

- e) Only in very specific cases
- f) Never
- g) Other

I have a problem with the term “in general” here, and I don’t know who counts as a “linguistic ecologist”. But “sometimes” is equally vague, so I chose this answer.

Question 10: To the best of your knowledge, do biological ecologists in general make use of findings from the field of linguistic ecology?

- a) Regularly
- b) Often
- t) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

As far as I know, the form of illustrating genealogical trees in biology was adopted from illustrations from linguistics; Haeckel saw them in the work of A. Schleicher, who was a colleague of his at Jena University and already a famous man when Haeckel began his career.

Question 11: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

- a) Facilitate collaboration between biological and linguistic ecology
- b) Inhibit collaboration between evolutionary biological and linguistic ecology
- c) Neither facilitate nor inhibit collaboration between biological and linguistic ecology
- d) Other?

If you would like to expand on the above response, please do so here:

Question 12: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

a) Yes, of course

b) No, unfortunately not

c) Possibly, if a convenient time can be arranged

If you would like to expand on the above response, please do so here:

Thank you very much for your time

Andrew Currie

Questionnaire on links between linguistic and biological ecology QEL7

Background information:

The purpose of this questionnaire is to gather information which will help shed further light on the shared terms and concepts used in linguistic and biological ecology. Given the enormous scope of these fields, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would nevertheless be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: The term '**ecology**' is often used to describe interactions between not only biological organisms but also languages in their respective environments. Do you consider the application of the same term for these different phenomena to be:

- a) Of no consequence, both concepts are easily understood and separated
- b) Useful and of some significance, indicating the similar processes affecting both biodiversity and linguistic diversity**
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

If you would like to expand on the above response, please do so here:

Like most terms that are applied to different phenomena—particularly those applied to different phenomena in different “disciplines”—it can be confusing when you are first encountering “ecology” used to describe biological and lingual phenomena. However, I believe the potential confusion is a site of productive struggle. Language may not be living the way a biological organism is, but language is *of* a biological organism—humans—and how we make the world through our words has consequence far beyond our species.

Question 2: The terms '**vulnerable**', '**critically endangered**' and '**extinct**' are used to classify levels of endangerment not only of biological species (IUCN) but also of languages (UNESCO). Do you consider the application of the same terms for these different phenomena to be:

- a) Of no consequence, both are easily understood and separated
- b) Of use and of some significance, indicating the similar dangers facing both biodiversity and linguistic diversity**
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

If you would like to expand on the above response, please do so here:

Much research has been done on cognitive benefits of being multilingual. We broaden our thoughts when we have new words, new concepts to “label” phenomena. The United States has 165 languages registered with the Endangered Languages Project. These are the languages of the indigenous people of what-we-now-call America. What are we losing as we lose those languages, those thoughts, those stories, those ways of constructing and understanding the world? Just as we do not know all of the consequences of the loss of a species in area, we do not know all the ramifications of losing alternative constructions of the world.

Question 3: Terms such as ‘**living**’, ‘**dead**’ and ‘**genetically related**’ are frequently used to describe languages. Do you consider the application of such terms to languages to be:

- a) Of no consequence, their meaning is easily understood
- b) Of use and of some significance, indicating similarities in the ways that both biological species and languages come into being, cease to exist and relate to each other**
- c) Unhelpful and misleading, given that languages are neither living organisms nor related to each other by genes
- d) Other?

If you would like to expand on the above response, please do so here:

“Genetically related” is a hard one. Of course, language does not possess sequences of nucleotides. However, there is a genealogy to language, and words have “roots” and “stems.” They grow; they modify; they die.

Question 4: The term ‘**biocultural diversity**’ has been defined as “*the diversity of life in all its manifestations: biological, cultural, and linguistic*”. All three types of diversity are often noted as facing similar threats. Do you consider these common threats to be:

- a) Clearly linked, there is a knock-on effect between all three**
- b) Environmentally determined. Biological, cultural and linguistic diversity are similar in certain areas simply because they share the same kind of biome (e.g. dense rainforest versus arctic tundra)
- c) Entirely coincidental, they are not interrelated
- d) Other?

If you would like to expand on the above response, please do so here:

Question 5: In your opinion, which of the following definitions best explains the term ‘ecology’ as applied to **languages**:

a) Linguistic ecology refers to the interaction of languages within their wider linguistic environment, and is an exclusive process which applies to languages alone

b) Linguistic ecology is part of the wider process of cultural ecology which includes other aspects of culture, but is separate from biological ecology

c) Linguistic ecology is part of the wider process of biological ecology, as are all other aspects of human culture

c) Other?

If you would like to expand on the above response, please do so here:

Question 6: **Binomial nomenclature** (e.g. *Canis lupus*) is applied to biological species, often alongside a common name (e.g. *wolf*). In your opinion, would the application of binomial nomenclature to the world's languages in similar fashion be:

a) Of no practical purpose

b) A useful means of distinguishing languages from each other, especially in the more linguistically diverse parts of the world

c) Another example of blurring the distinction between biological organisms and languages

d) Other?

If you would like to expand on the above response, please do so here:

I have mused for this for a couple of weeks now, and I still do not know how I feel about applying binomial nomenclature on languages. It is not that I think it is wrong, per se; I am simply unsure what it would add. That is, I am not sure that the "common names" of languages need "scientific names" to be successfully distinguished. That being said, I think there is an interesting possibility here, as well. Applying binomial nomenclature would get that the idea that languages are alive and would apply levels of grouping and differentia that could be productive.

Question 7: In your opinion, is collaborative research between biological and linguistic ecologists:

a) Unnecessary

b) Desirable

c) Essential

d) Other?

If you would like to expand on the above response, please do so here:

Question 8: Do you use methods from both biological and linguistic ecology in your personal research?

- a) Regularly
- b) Often**
- u) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 9: To the best of your knowledge, do linguistic ecologists in general make use of findings from the field of biological ecology?

- a) Regularly
- b) Often**
- v) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

Question 10: To the best of your knowledge, do biological ecologists in general make use of findings from the field of linguistic ecology?

- a) Regularly
- b) Often**
- w) Sometimes
- d) Rarely
- e) Only in very specific cases

f) Never

g) Other

If you would like to expand on the above response, please do so here:

Question 11: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

a) Facilitate collaboration between biological and linguistic ecology

b) Inhibit collaboration between evolutionary biological and linguistic ecology

c) Neither facilitate nor inhibit collaboration between biological and linguistic ecology

d) Other?

If you would like to expand on the above response, please do so here:

Question 12: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

a) Yes, of course

b) No, unfortunately not

c) Possibly, if a convenient time can be arranged

If you would like to expand on the above response, please do so here:

Thank you very much for your time

Andrew Currie

Questionnaire on links between linguistic and biological ecology QEL8

Background information:

The purpose of this questionnaire is to gather information which will help shed further light on the shared terms and concepts used in linguistic and biological ecology. Given the enormous scope of these fields, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would nevertheless be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: The term '**ecology**' is often used to describe interactions between not only biological organisms but also languages in their respective environments. Do you consider the application of the same term for these different phenomena to be:

- a) Of no consequence, both concepts are easily understood and separated
- b) Useful and of some significance**, indicating the similar processes affecting both biodiversity and linguistic diversity
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

If you would like to expand on the above response, please do so here:

First of all, we tend to forget that there are different kinds of "ecologies." From the standpoint of human and other-than-human communication, semiosis occurs within given ecologies or *Umwelten*. Moreover, as researchers like Todd Freeberg demonstrate, linguistic diversity is analogous to social diversity. In this regard, the "social complexity hypothesis" represents an important theoretical framework for broaching this subject.

Question 2: The terms '**vulnerable**', '**critically endangered**' and '**extinct**' are used to classify levels of endangerment not only of biological species (IUCN) but also of languages (UNESCO). Do you consider the application of the same terms for these different phenomena to be:

- a) Of no consequence, both are easily understood and separated
- b) Of use and of some significance**, indicating the similar dangers facing both biodiversity and linguistic diversity
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

If you would like to expand on the above response, please do so here:

In addition to preserving the cultural heritage of humanity, I find these terms to be useful because they serve as a stern reminder. In the Anthropocene, life itself is on the brink of collapse owing to our myopic, parasitic rapport with the remainder of the biosphere. Given that diversity in general is quickly disappearing at an alarming rate, I would contend that this kind of terminology is quite appropriate.

Question 3: Terms such as **‘living’**, **‘dead’** and **‘genetically related’** are frequently used to describe languages. Do you consider the application of such terms to languages to be:

- a) Of no consequence, their meaning is easily understood
- b) Of use and of some significance**, indicating similarities in the ways that both biological species and languages come into being, cease to exist and relate to each other
- c) Unhelpful and misleading, given that languages are neither living organisms nor related to each other by genes
- d) Other?

If you would like to expand on the above response, please do so here:

I also find these terms to be useful because they represent a biocentric worldview. Additionally, these sorts of metaphors remind us that communication is emblematic of life itself. From the most basic unicellular organism all the way up, species communicate with each other in meaningful and purposeful ways. Although some people might object to the usage of these biological metaphors in the linguistic domain, this terminology reminds us that communication is ubiquitous throughout the universe at all biological levels of organization.

Question 4: The term **‘biocultural diversity’** has been defined as *“the diversity of life in all its manifestations: biological, cultural, and linguistic”*. All three types of diversity are often noted as facing similar threats. Do you consider these common threats to be:

- a) Clearly linked**, there is a knock-on effect between all three
- b) Environmentally determined. Biological, cultural and linguistic diversity are similar in certain areas simply because they share the same kind of biome (e.g. dense rainforest versus arctic tundra)
- c) Entirely coincidental, they are not interrelated
- d) Other?

If you would like to expand on the above response, please do so here:

The term “biocultural diversity” deconstructs the anthropocentric fallacy that we are the only species that possesses certain faculties including language. In *Les origines animales de la culture*, the French philosopher and ethologist persuasively posits that other organisms have rich cultures

as well. Moreover, this term contests the binary logic that lies at the heart of the nature-culture split in Western civilization.

Question 5: In your opinion, which of the following definitions best explains the term 'ecology' as applied to **languages**:

- a) Linguistic ecology refers to the interaction of languages within their wider linguistic environment, and is an exclusive process which applies to languages alone
- b) Linguistic ecology is part of the wider process of cultural ecology which includes other aspects of culture, but is separate from biological ecology
- c) Linguistic ecology is part of the wider process of biological ecology**, as are all other aspects of human culture
- c) Other?

If you would like to expand on the above response, please do so here:

On an interconnected and interdependent planet, nothing exists in a vacuum including various forms of semiosis. As I mention above, the nature-culture split is a by-product of the fragmented human imagination stemming from anthropocentric delusions of grandeur.

Question 6: **Binomial nomenclature** (e.g. *Canis lupus*) is applied to biological species, often alongside a common name (e.g. *wolf*). In your opinion, would the application of binomial nomenclature to the world's languages in similar fashion be:

- a) Of no practical purpose
- b) A useful means of distinguishing languages from each other**, especially in the more linguistically diverse parts of the world
- c) Another example of blurring the distinction between biological organisms and languages
- d) Other?

If you would like to expand on the above response, please do so here:

I am very intrigued by the concept of binominal nomenclature and what it has to offer both linguists and environmental humanists. The evident downside is that this sort of terminology is only useful to researchers. In other words, it would not resonate with the general public at all. In this same vein, phonetic transcription is only utilized by academicians.

Question 7: In your opinion, is collaborative research between biological and linguistic ecologists:

a) Unnecessary

b) Desirable

c) Essential

d) Other?

If you would like to expand on the above response, please do so here:

In an academic landscape epitomized by insularity and overspecialization, collaboration between the hard sciences and other disciplines is vital. Specifically, the hard sciences help us to understand the varying complexity of the types of semiosis that occur throughout the planet. Moreover, researchers within the humanities should be collaborating with each other on a regular basis as well.

Question 8: Do you use methods from both biological and linguistic ecology in your personal research?

a) **Regularly**

b) Often

x) Sometimes

d) Rarely

e) Only in very specific cases

f) Never

g) Other

If you would like to expand on the above response, please do so here:

I have published quite a bit of material related to Ecolinguistics and Biosemiotics the last few years. I am currently teaching a graduate seminar dedicated to Ecolinguistics for the first time.

Question 9: To the best of your knowledge, do linguistic ecologists in general make use of findings from the field of biological ecology?

a) Regularly

b) Often

y) Sometimes

d) Rarely

e) Only in very specific cases

f) Never

g) Other

If you would like to expand on the above response, please do so here:

This is a difficult and tricky question, because it depends on the researcher. There are some extremely innovative scholars who take advantage of many different ways of knowing. On the other end of the spectrum, many professors adhere strictly to traditional research methods from their field.

Question 10: To the best of your knowledge, do biological ecologists in general make use of findings from the field of linguistic ecology?

- a) Regularly
- b) Often
- z) Sometimes**
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

This is the same problem that I underscore above. Although some academicians stay in their tiny epistemological box throughout their entire career, other researchers are more innovative in the ways in which they try to weave connections between different kinds of epistemological discourses.

Question 11: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

- a) Facilitate collaboration between biological and linguistic ecology
- b) Inhibit collaboration between evolutionary biological and linguistic ecology**
- c) Neither facilitate nor inhibit collaboration between biological and linguistic ecology
- d) Other?

If you would like to expand on the above response, please do so here:

This is one of the most pervasive problems within the academic institution. I have spent much of my career acting as if this division does not exist at all. This is a form of reductionistic thinking that reduces knowledge to a little box. Knowledge is like water; it flows in all different directions. It cannot be compartmentalized into pre-existing mental categories that are useful but misleading cognitive structures. The first law of ecology applies to knowledge as well. Given that “everything

is connected to everything else,” I wish that more countries would imitate Finland by adopting phenomenon-based learning.

Question 12: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

a) Yes, of course

b) No, unfortunately not

c) Possibly, if a convenient time can be arranged

If you would like to expand on the above response, please do so here:

Owing to the time difference and my rather heavy teaching load (the result of a growing, successful program) this semester, it would probably be easier for me to answer written questions via email. If my perspectives contribute something meaningful to your research, I would be willing to help. Regardless, your research has a tremendous amount of potential.

Thank you very much for your time

Andrew Currie

Questionnaire on links between linguistic and biological ecology QEL9

Background information:

The purpose of this questionnaire is to gather information which will help shed further light on the shared terms and concepts used in linguistic and biological ecology. Given the enormous scope of these fields, some of the questions may seem rather broad or not directly relevant to your personal area of expertise. However, your view on as many questions as you would care to answer would nevertheless be welcome. A box is provided under every question for you to give (or expand upon) an answer. In the case of multiple choice questions, I would be grateful if you could highlight the answer(s) closest to your own view in colour or bold type.

The Questions:

Question 1: The term **'ecology'** is often used to describe interactions between not only biological organisms but also languages in their respective environments. Do you consider the application of the same term for these different phenomena to be:

- a) Of no consequence, both concepts are easily understood and separated
- b) Useful and of some significance, indicating the similar processes affecting both biodiversity and linguistic diversity
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

If you would like to expand on the above response, please do so here:

The term 'language ecology' is confusing to biologists, natural scientists in general and laymen informed about biology. I would have preferred a different, distinct term for the matters pursued in linguistics. (Some of my reservations can be discerned in my articles on Haugen's conception of language 'ecology'.)

Question 2: The terms **'vulnerable'**, **'critically endangered'** and **'extinct'** are used to classify levels of endangerment not only of biological species (IUCN) but also of languages (UNESCO). Do you consider the application of the same terms for these different phenomena to be:

- a) Of no consequence, both are easily understood and separated
- b) Of use and of some significance, indicating the similar dangers facing both biodiversity and linguistic diversity
- c) Unhelpful and misleading, giving the impression that languages are living organisms
- d) Other?

If you would like to expand on the above response, please do so here:

I view the terms 'vulnerable', 'critically endangered' and 'extinct' as more neutral than the term 'language ecology'. The former terms do not necessarily make you think of biological organisms.

Question 3: Terms such as ‘**living**’, ‘**dead**’ and ‘**genetically related**’ are frequently used to describe languages. Do you consider the application of such terms to languages to be:

- a) Of no consequence, their meaning is easily understood
- b) Of use and of some significance, indicating similarities in the ways that both biological species and languages come into being, cease to exist and relate to each other
- c) Unhelpful and misleading, given that languages are neither living organisms nor related to each other by genes
- d) Other?

If you would like to expand on the above response, please do so here:
Especially the term ‘genetically related’ is gravely misleading and should be replaced. The other two terms are, however, less innocuous and so well entrenched that they will have to be kept.

Question 4: The term ‘**biocultural diversity**’ has been defined as “*the diversity of life in all its manifestations: biological, cultural, and linguistic*”. All three types of diversity are often noted as facing similar threats. Do you consider these common threats to be:

- a) Clearly linked, there is a knock-on effect between all three
- b) Environmentally determined. Biological, cultural and linguistic diversity are similar in certain areas simply because they share the same kind of biome (e.g. dense rainforest versus arctic tundra)
- c) Entirely coincidental, they are not interrelated
- d) Other?

If you would like to expand on the above response, please do so here:
I think the notions ‘biological diversity’ and ‘cultural and/or linguistic diversity’ should be kept apart. For instance, ‘biological diversity’ could in principle be maintained, while ‘linguistic diversity’ totally disappears.

Question 5: In your opinion, which of the following definitions best explains the term ‘ecology’ as applied to **languages**:

- a) Linguistic ecology refers to the interaction of languages within their wider linguistic environment, and is an exclusive process which applies to languages alone
- b) Linguistic ecology is part of the wider process of cultural ecology which includes other aspects of culture, but is separate from biological ecology
- c) Linguistic ecology is part of the wider process of biological ecology, as are all other aspects of human culture
- c) Other?

If you would like to expand on the above response, please do so here:

Question 6: **Binomial nomenclature** (e.g. *Canis lupus*) is applied to biological species, often alongside a common name (e.g. *wolf*). In your opinion, would the application of binomial nomenclature to the world’s languages in similar fashion be:

- a) Of no practical purpose
- b) A useful means of distinguishing languages from each other, especially in the more linguistically diverse parts of the world
- c) Another example of blurring the distinction between biological organisms and languages
- d) Other?

If you would like to expand on the above response, please do so here:

Question 7: In your opinion, is collaborative research between biological and linguistic ecologists:

- a) Unnecessary
- b) Desirable
- c) Essential
- d) Other?

If you would like to expand on the above response, please do so here:

Collaboration at the level of the theory of science (theory formation, model construction, etc.) might be interesting to linguists.

Question 8: Do you use methods from both biological and linguistic ecology in your personal research?

- a) Regularly
- b) Often
- a) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

The uncritical adoption of biological models in linguistics may sometimes lead to questionable research results (cf., e.g., Pereltsvaig & Lewis, *The Indo-European controversy: Facts and fallacies in historical linguistics*, 2015).

Question 9: To the best of your knowledge, do linguistic ecologists in general make use of findings from the field of biological ecology?

- a) Regularly
- b) Often
- b) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:

The answer will depend on how you define 'linguistic ecologists'.

Question 10: To the best of your knowledge, do biological ecologists in general make use of findings from the field of linguistic ecology?

- a) Regularly
- b) Often
- c) Sometimes
- d) Rarely
- e) Only in very specific cases
- f) Never
- g) Other

If you would like to expand on the above response, please do so here:
Hardly ever. Biologists are usually quite puzzled over the linguistic term 'language ecology'.

Question 11: In your opinion, does the division of academic disciplines into natural sciences on the one hand and social sciences/humanities on the other:

- a) Facilitate collaboration between biological and linguistic ecology
- b) Inhibit collaboration between evolutionary biological and linguistic ecology
- c) Neither facilitate nor inhibit collaboration between biological and linguistic ecology
- d) Other?

If you would like to expand on the above response, please do so here:

Question 12: Would you be interested in participating in a brief semi-structured interview to expand on the subject matter raised in this questionnaire? (this would require permission to include your name)

- a) Yes, of course
- b) No, unfortunately not
- c) Possibly, if a convenient time can be arranged

If you would like to expand on the above response, please do so here:

Thank you very much for your time

Andrew Currie

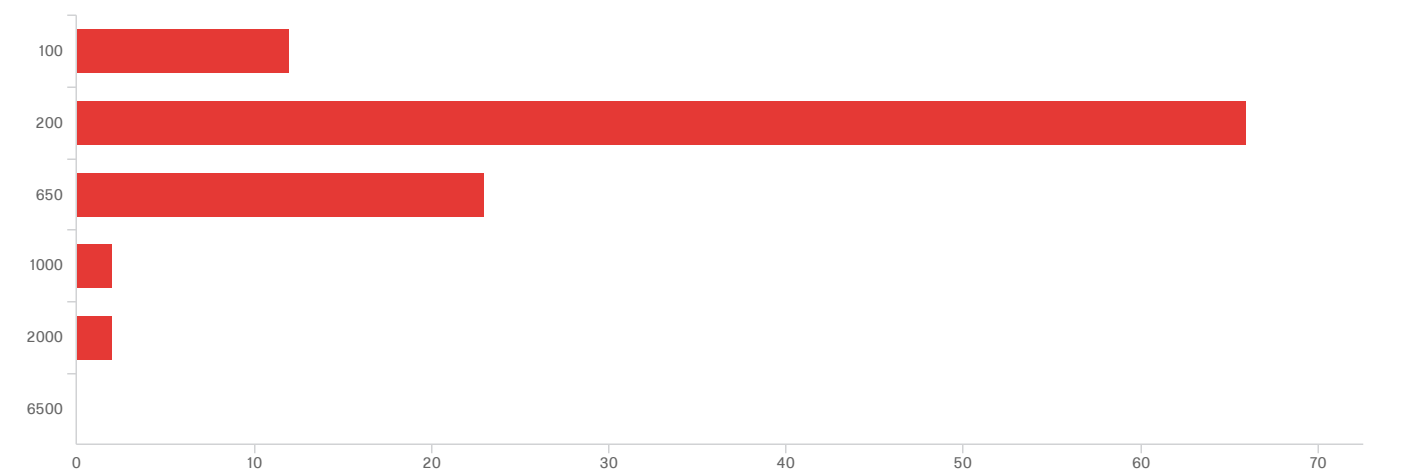
Default Report

Biocultural Diversity Questionnaire / Holiadur ar Amrywiaeth Fio-ddiwyllynnol

July 23, 2019 6:00 AM MDT

Q1 - Please select the answer which you think is closest to the correct figure:

Approximately how many member states of the United Nations are there in total?



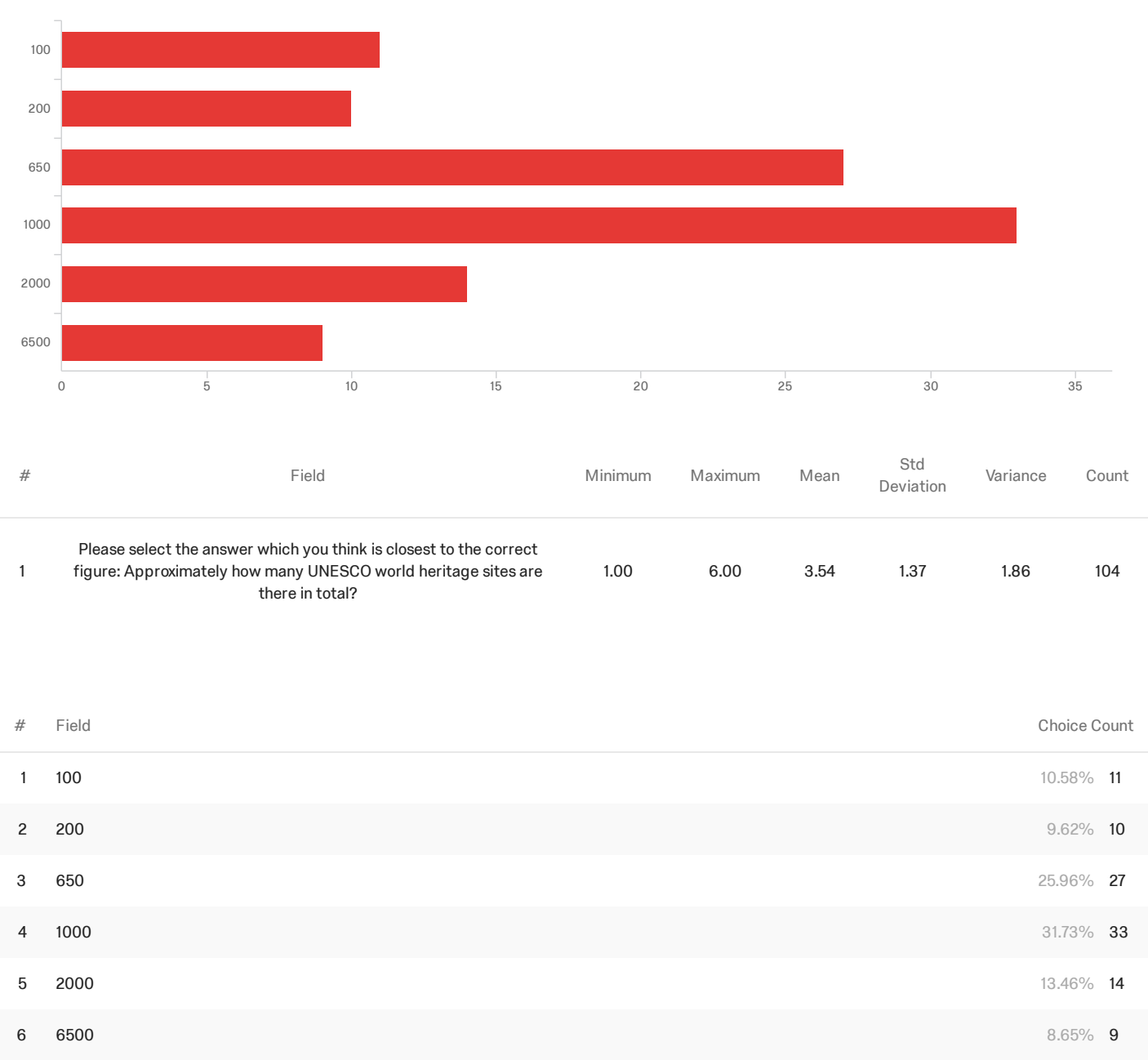
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Please select the answer which you think is closest to the correct figure: Approximately how many member states of the United Nations are there in total?	1.00	5.00	2.20	0.74	0.54	105

#	Field	Choice Count
1	100	11.43% 12
2	200	62.86% 66
3	650	21.90% 23
4	1000	1.90% 2
5	2000	1.90% 2
6	6500	0.00% 0

105

Q2 - Please select the answer which you think is closest to the correct figure:

Approximately how many UNESCO world heritage sites are there in total?

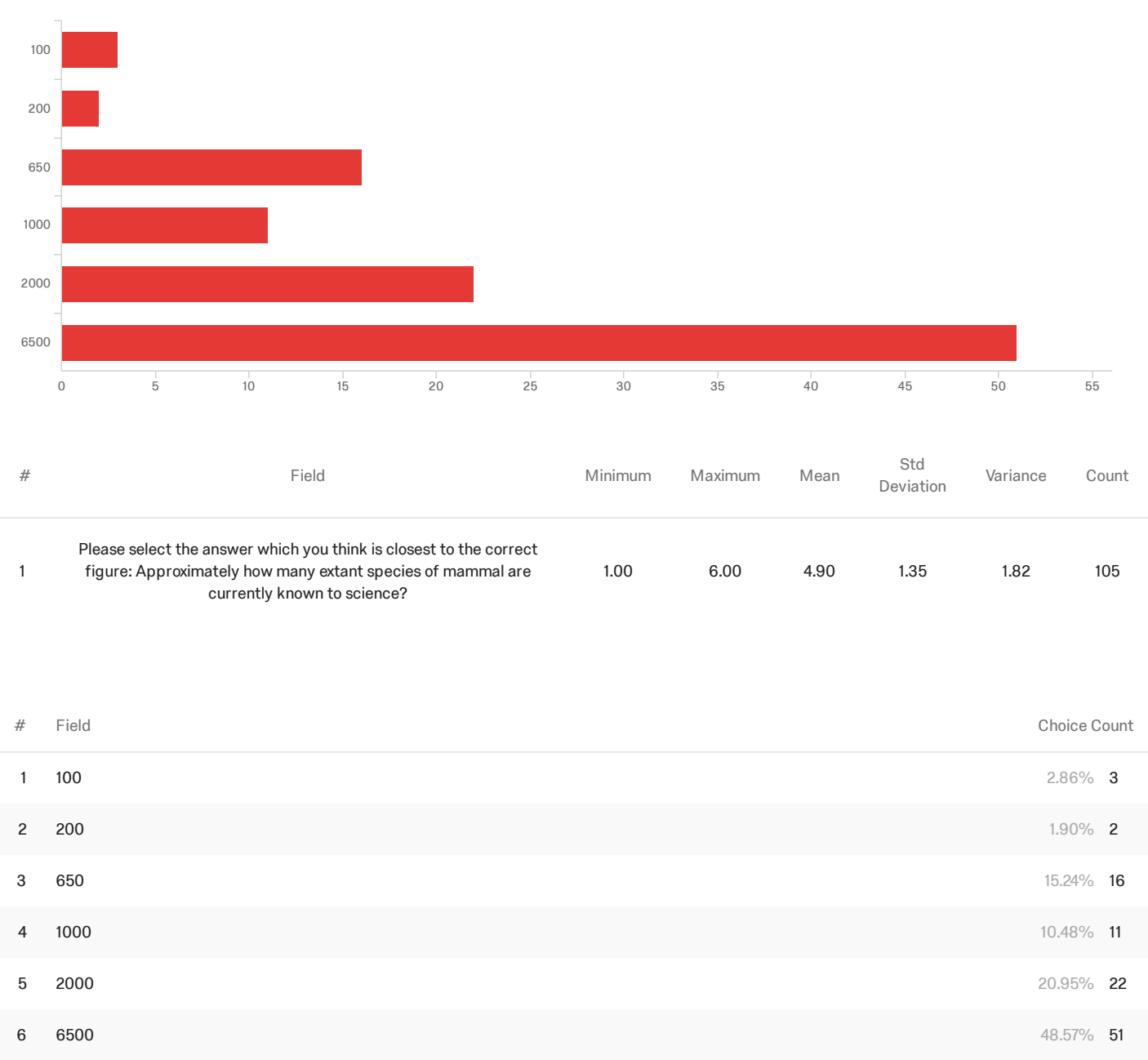


104

Showing rows 1 - 7 of 7

Q3 - Please select the answer which you think is closest to the correct figure:

Approximately how many extant species of mammal are currently known to science?

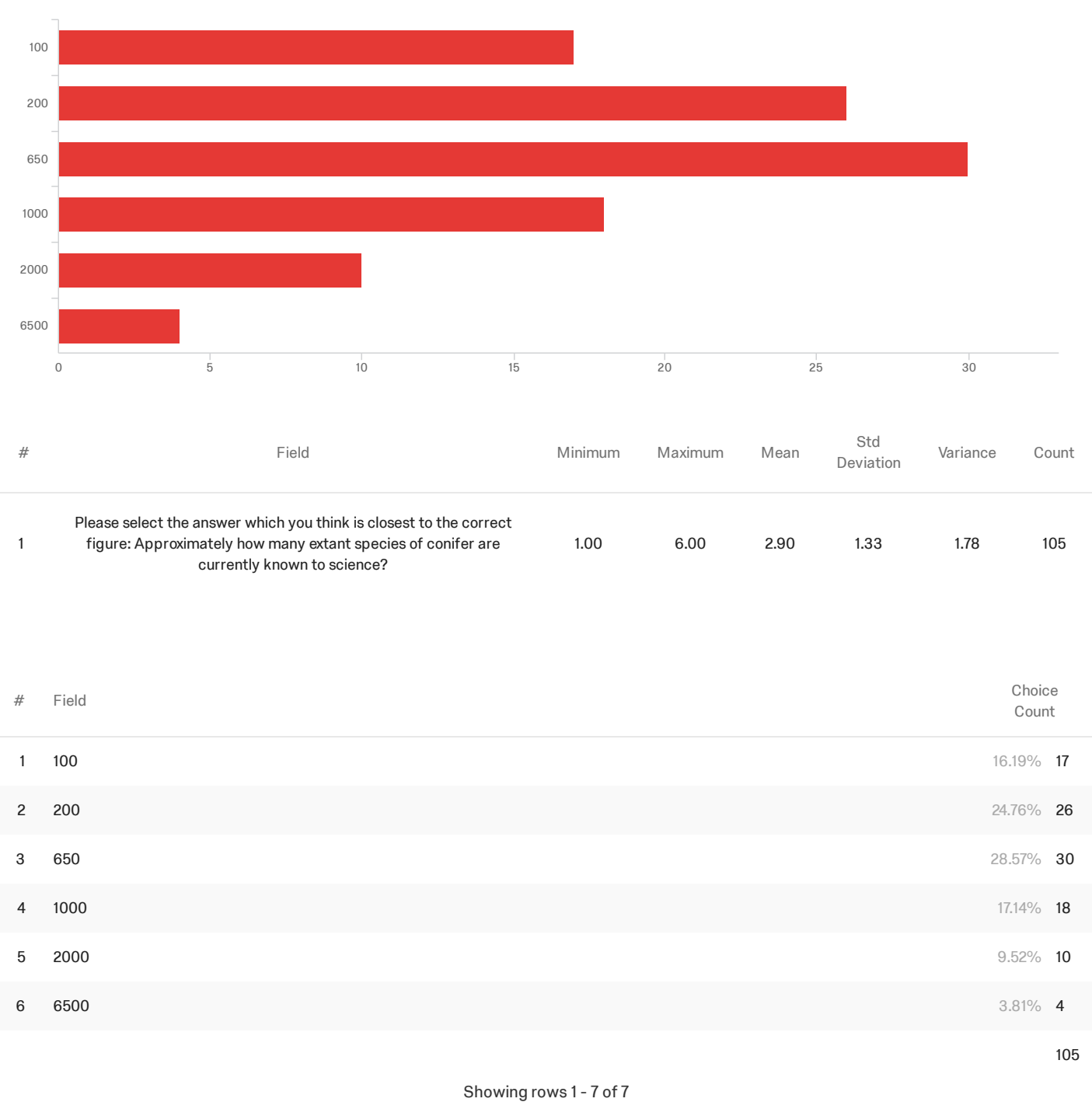


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Showing rows 1 - 7 of 7

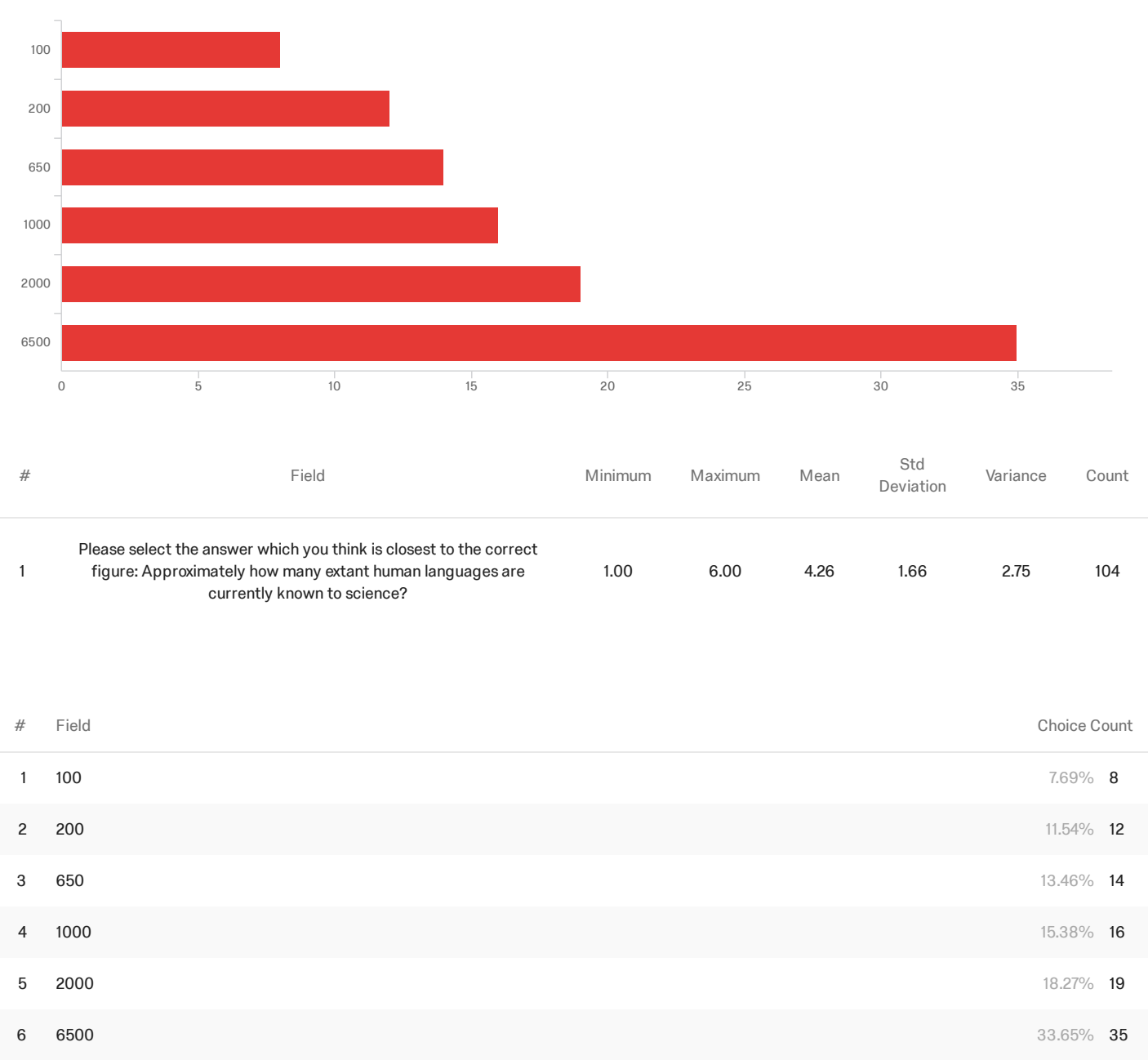
Q4 - Please select the answer which you think is closest to the correct figure:

Approximately how many extant species of conifer are currently known to science?



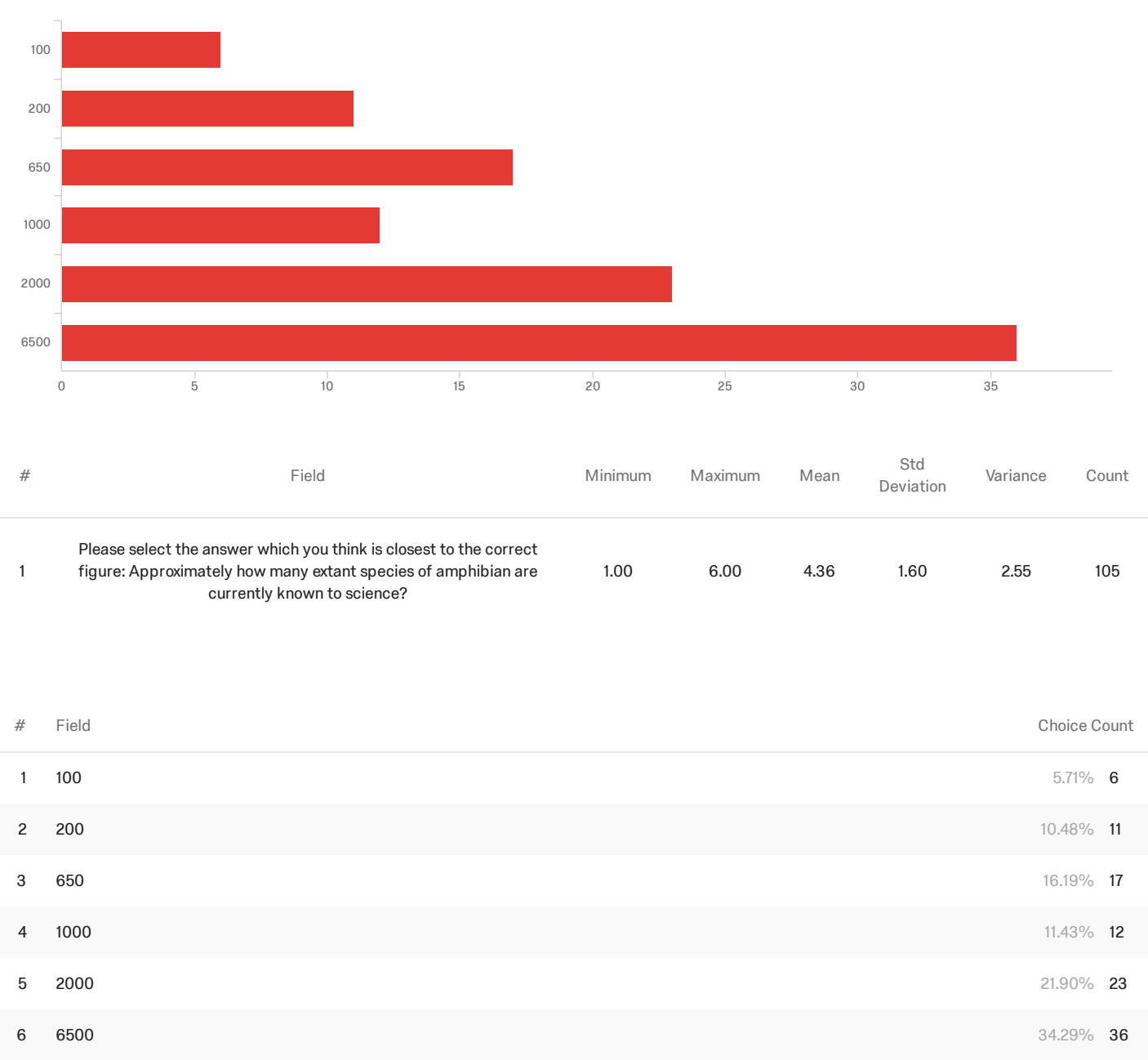
Q5 - Please select the answer which you think is closest to the correct figure:

Approximately how many extant human languages are currently known to science?



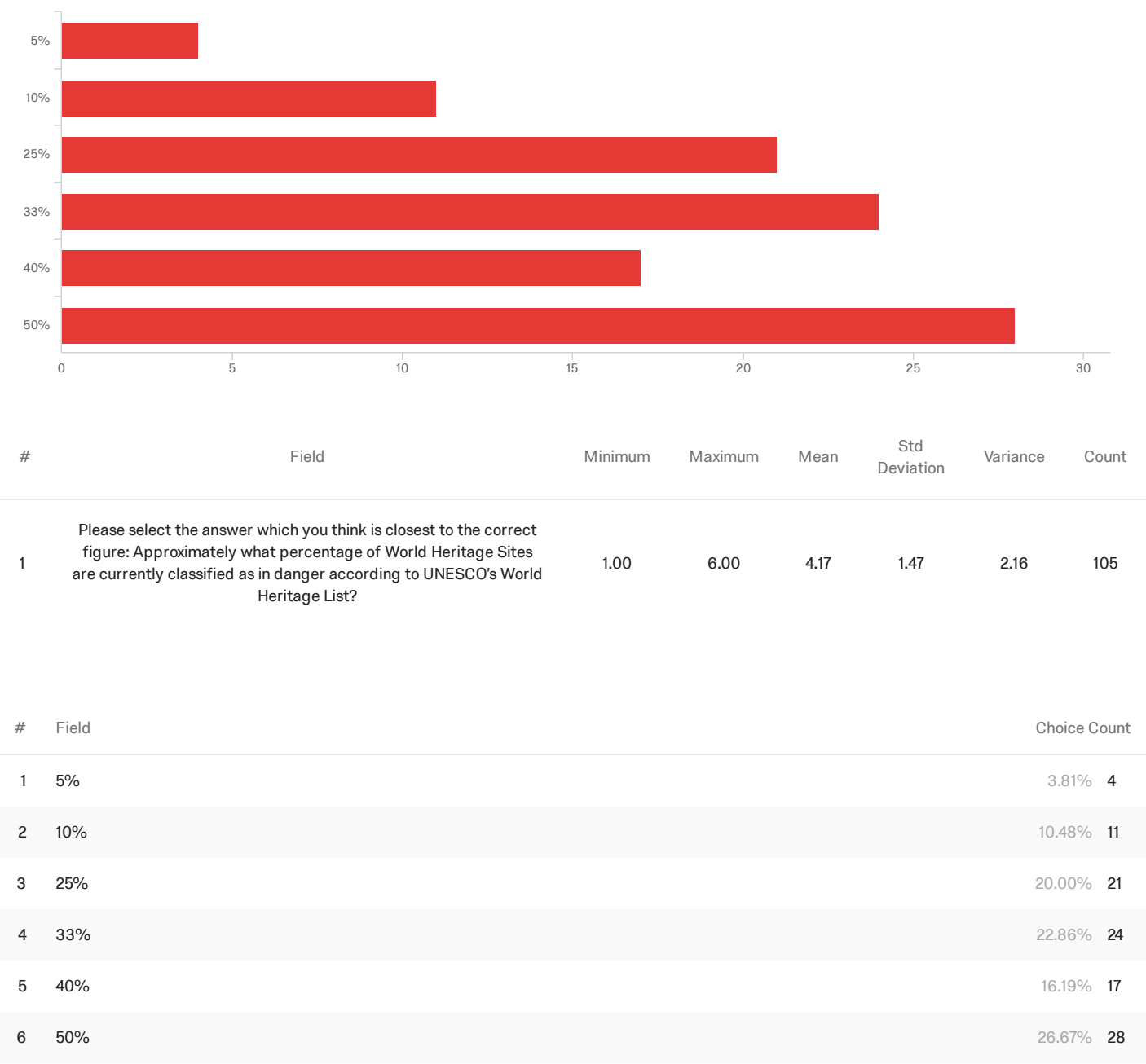
Q6 - Please select the answer which you think is closest to the correct figure:

Approximately how many extant species of amphibian are currently known to science?



Q7 - Please select the answer which you think is closest to the correct figure:

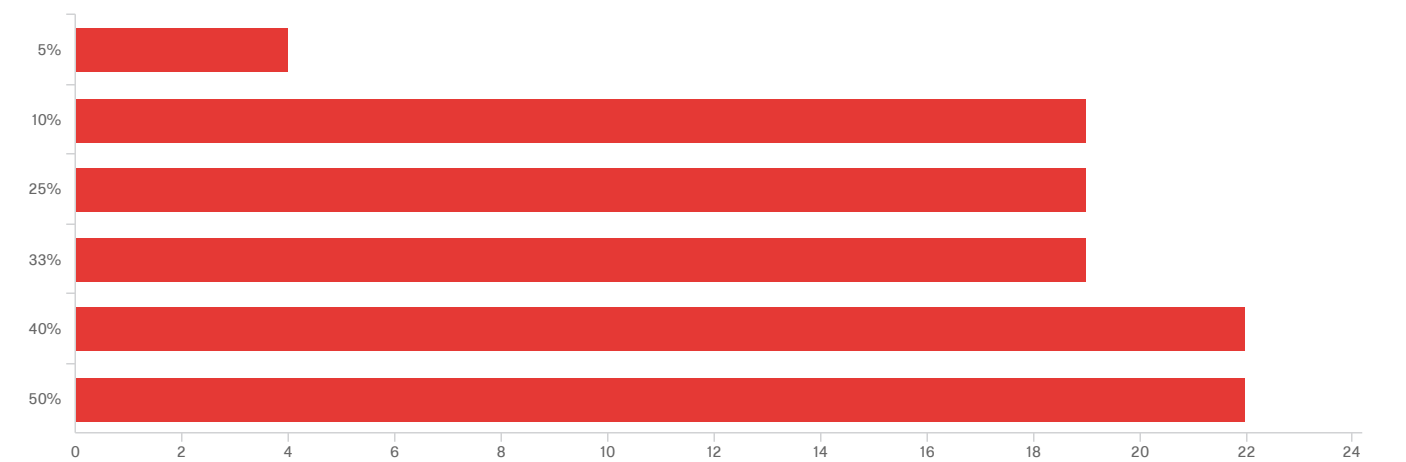
Approximately what percentage of World Heritage Sites are currently classified as in danger according to UNESCO’s World Heritage List?



105

Q8 - Please select the answer which you think is closest to the correct figure:

Approximately what percentage of the world’s mammal species are currently classified as threatened according to the IUCN Red List?

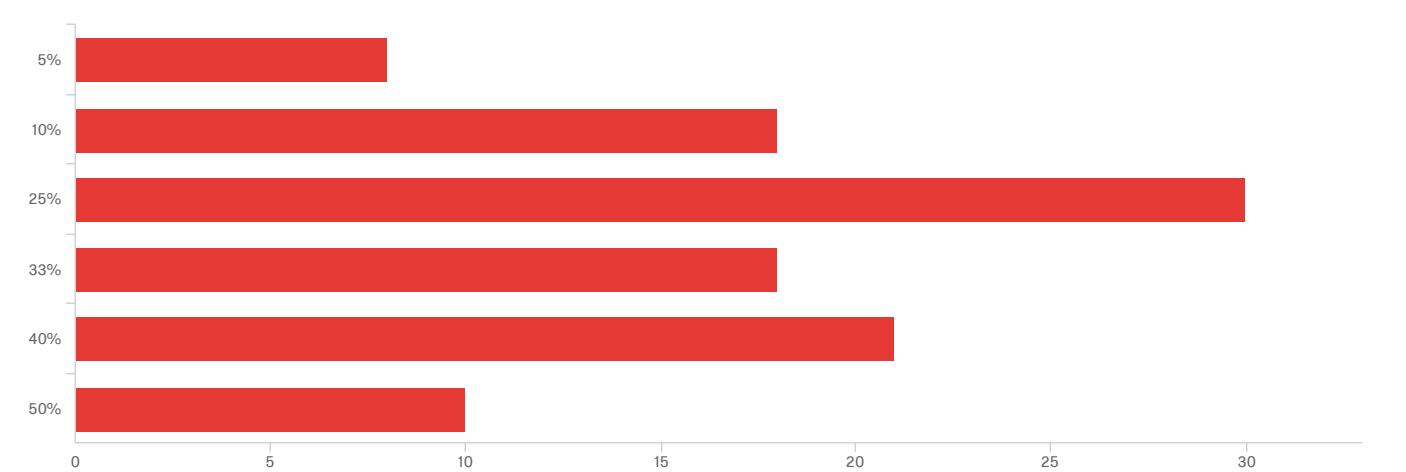


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Please select the answer which you think is closest to the correct figure: Approximately what percentage of the world’s mammal species are currently classified as threatened according to the IUCN Red List?	1.00	6.00	3.97	1.51	2.29	105

#	Field	Choice Count
1	5%	3.81% 4
2	10%	18.10% 19
3	25%	18.10% 19
4	33%	18.10% 19
5	40%	20.95% 22
6	50%	20.95% 22

Q9 - Please select the answer which you think is closest to the correct figure:

Approximately what percentage of the world’s conifer species are currently classified as threatened according to the IUCN Red List?

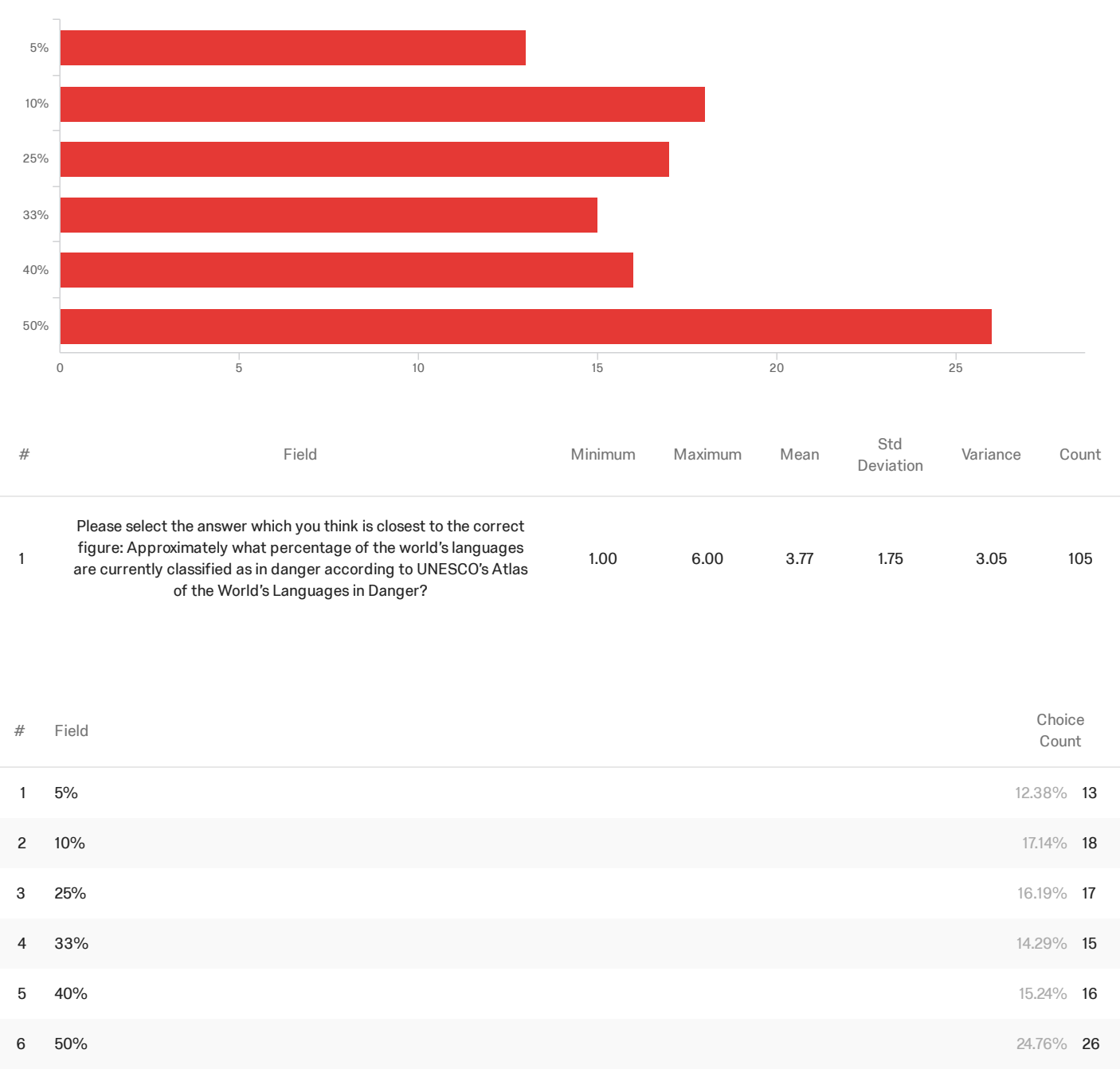


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Please select the answer which you think is closest to the correct figure: Approximately what percentage of the world's conifer species are currently classified as threatened according to the IUCN Red List?	1.00	6.00	3.53	1.42	2.02	105

#	Field	Choice Count
1	5%	7.62% 8
2	10%	17.14% 18
3	25%	28.57% 30
4	33%	17.14% 18
5	40%	20.00% 21
6	50%	9.52% 10

Q10 - Please select the answer which you think is closest to the correct figure:

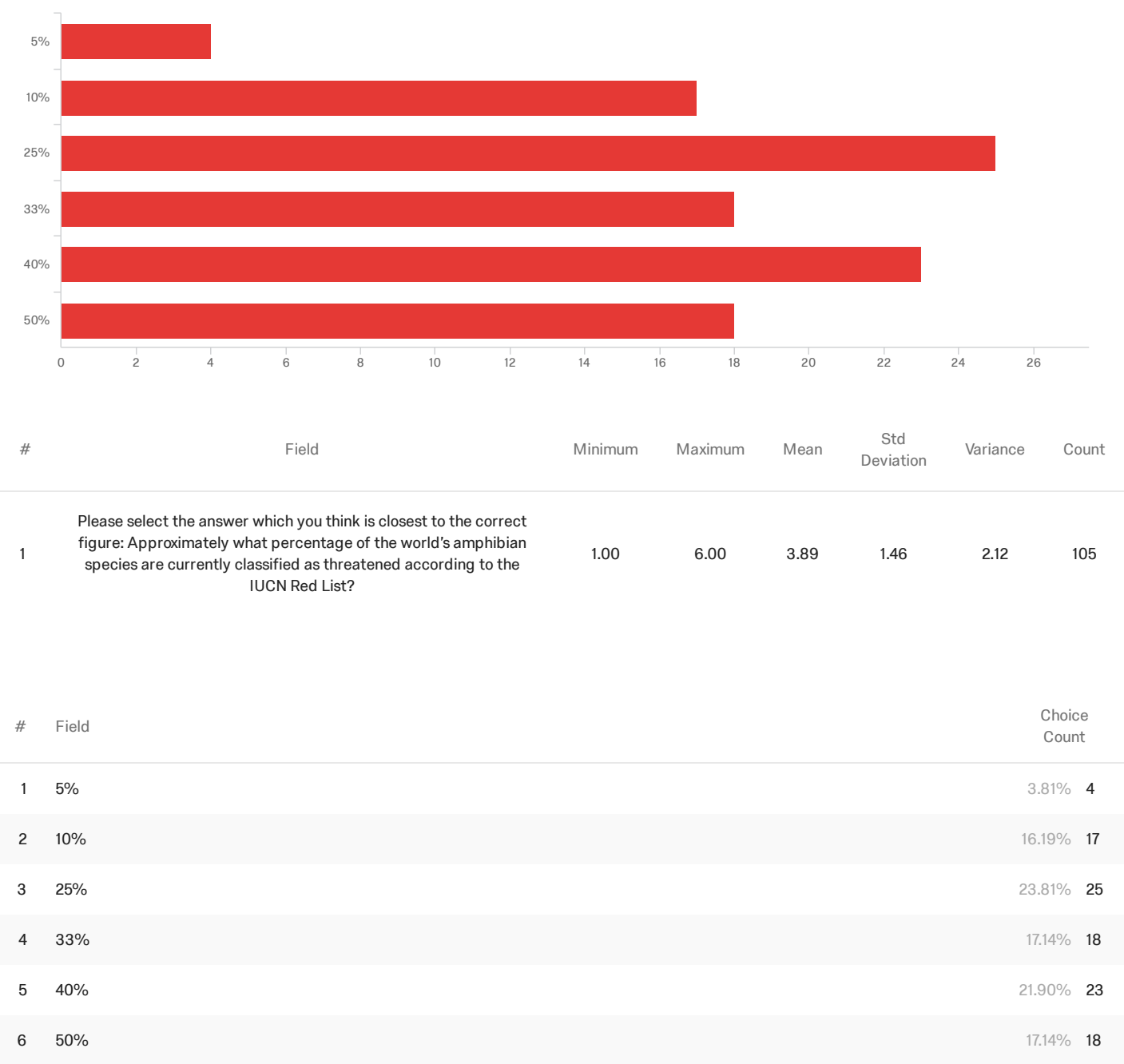
Approximately what percentage of the world’s languages are currently classified as in danger according to UNESCO’s Atlas of the World’s Languages in Danger?



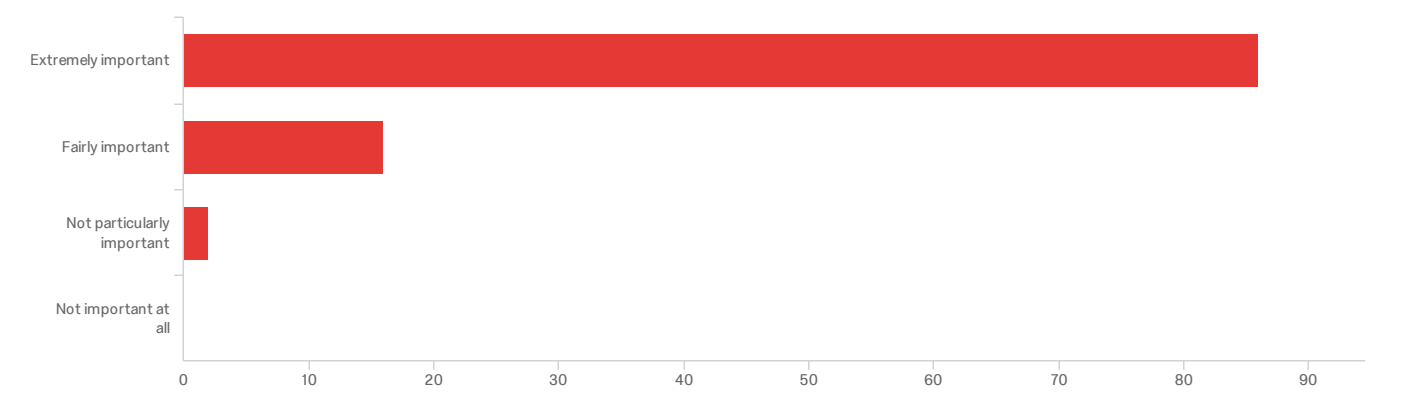
105

Q11 - Please select the answer which you think is closest to the correct figure:

Approximately what percentage of the world’s amphibian species are currently classified as threatened according to the IUCN Red List?



Q12 - Please select the answer which is closest to your personal opinion: How important is it to preserve sites which reflect the world's cultural diversity?



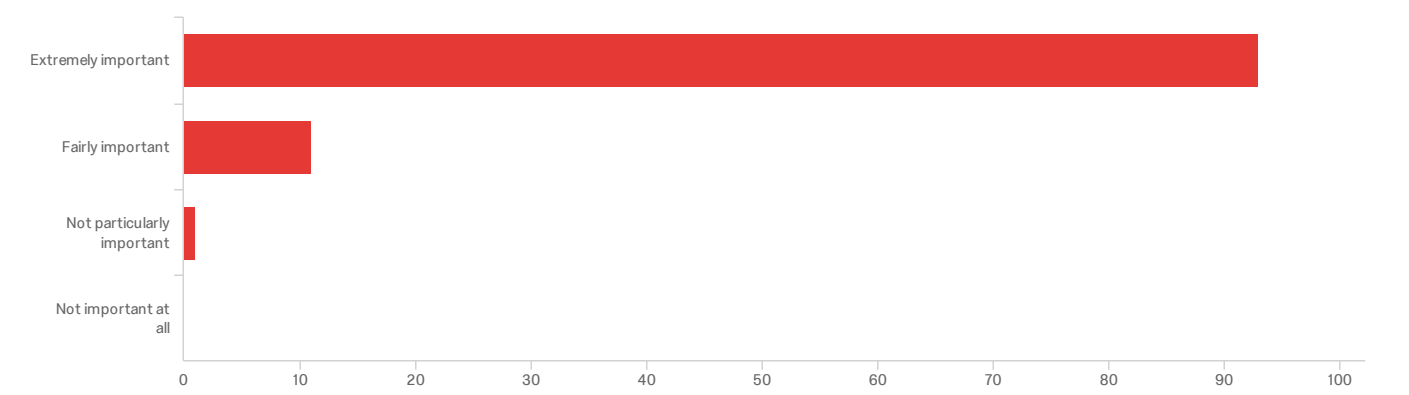
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Please select the answer which is closest to your personal opinion: How important is it to preserve sites which reflect the world's cultural diversity?	1.00	3.00	1.19	0.44	0.19	104

#	Field	Choice Count
1	Extremely important	82.69% 86
2	Fairly important	15.38% 16
3	Not particularly important	1.92% 2
4	Not important at all	0.00% 0

104

Showing rows 1 - 5 of 5

Q13 - Please select the answer which is closest to your personal opinion: How important is it to preserve the world's diversity of mammal species?



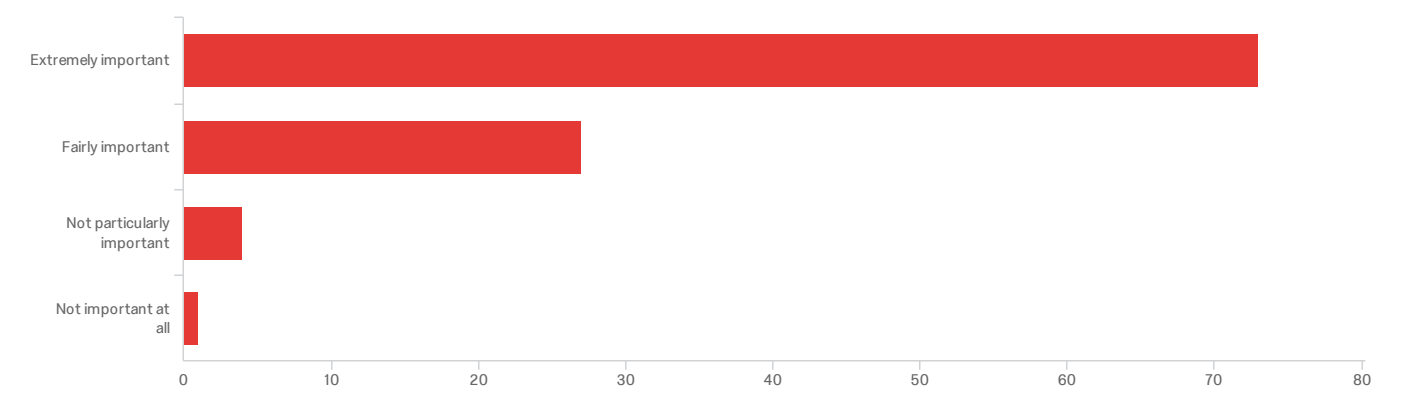
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Please select the answer which is closest to your personal opinion: How important is it to preserve the world's diversity of mammal species?	1.00	3.00	1.12	0.36	0.13	105

#	Field	Choice Count
1	Extremely important	88.57% 93
2	Fairly important	10.48% 11
3	Not particularly important	0.95% 1
4	Not important at all	0.00% 0

105

Showing rows 1 - 5 of 5

Q14 - Please select the answer which is closest to your personal opinion: How important is it to preserve the world's diversity of conifer species?



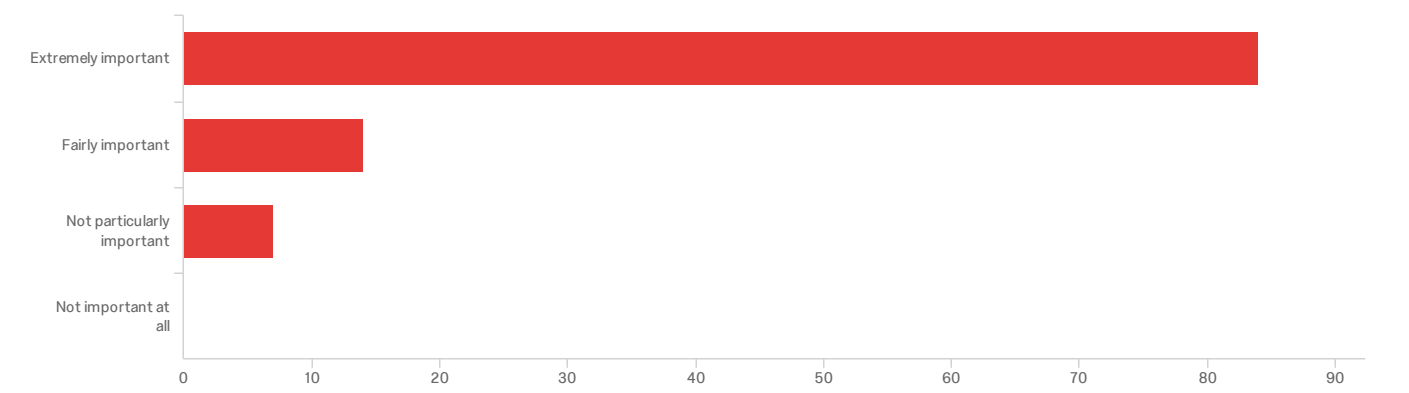
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Please select the answer which is closest to your personal opinion: How important is it to preserve the world's diversity of conifer species?	1.00	4.00	1.36	0.60	0.36	105

#	Field	Choice Count
1	Extremely important	69.52% 73
2	Fairly important	25.71% 27
3	Not particularly important	3.81% 4
4	Not important at all	0.95% 1

105

Showing rows 1 - 5 of 5

Q15 - Please select the answer which is closest to your personal opinion: How important is it to preserve the world's diversity of human languages?



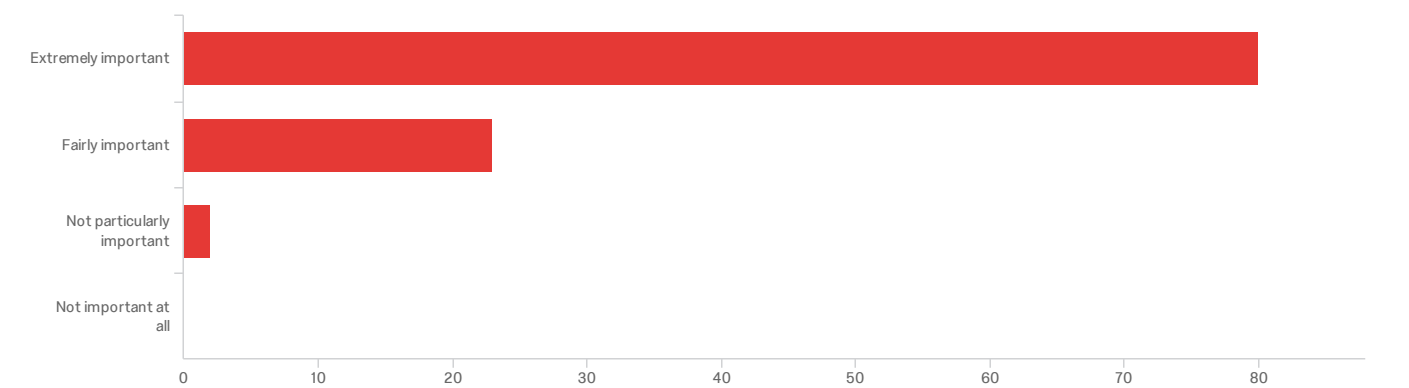
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Please select the answer which is closest to your personal opinion: How important is it to preserve the world's diversity of human languages?	1.00	3.00	1.27	0.57	0.33	105

#	Field	Choice Count
1	Extremely important	80.00% 84
2	Fairly important	13.33% 14
3	Not particularly important	6.67% 7
4	Not important at all	0.00% 0

105

Showing rows 1 - 5 of 5

Q16 - Please select the answer which is closest to your personal opinion: How important is it to preserve the world's diversity of amphibian species?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Please select the answer which is closest to your personal opinion: How important is it to preserve the world's diversity of amphibian species?	1.00	3.00	1.26	0.48	0.23	105

#	Field	Choice Count
1	Extremely important	76.19% 80
2	Fairly important	21.90% 23
3	Not particularly important	1.90% 2
4	Not important at all	0.00% 0

105

Showing rows 1 - 5 of 5

End of Report