10. Folkbiology in Endangered Languages: The Cultural Classification of Living Kinds

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Introduction

There is a long tradition in linguistics of emphasizing the arbitrariness of the sign, such that there is no intrinsic link between the sounds chosen in a particular language for a particular word, and the thing, event, or state in the world that the word represents. As Juliet intoned on her moonlit balcony, with Romeo hidden below in the shadows, “What's in a name? that which we call a rose / By any other name would smell as sweet” (Shakespeare, Romeo and Juliet, 2.2.43-44). This perception of lexical form as not directly related to the referent has been the dominant view in studies of language at least since Aristotle (Modrak 2001). In the early twentieth century, this perspective was rearticulated by Saussure (1983 [1916]), and in recent years has largely gone unquestioned. In an important sense, Juliet is correct. The name of this genus of flower does not affect our perception of its smell; similarly, our perception of its physical shape, usually comprising five petals, each divided into two lobes, and its thorny stem, with sickle-shaped hooks, is entirely independent of the linguistic label we attach, whether it be *rosa* in Italian, *méiguī* in Mandarin, or *gül* in Turkish. From this perspective, it does not matter which language we speak, and any object name should be translatable into any language: at first glance, it would seem names in different languages are interchangeable.

However, as Rosaldo (1972, 83) observes, “words often signify a good deal more than the objects designated as their referents.” “What’s in a name?” remains a prickly question in part because our perception of a thing is only part of how we conceptualize it in terms of its social or cultural meaning, and how we categorize it in terms of other entities. The name at issue in
Juliet’s soliloquy is that of Romeo’s family--Montague--and the reality is that both characters are doomed precisely because of what their names imply. Moreover, contrary to Juliet’s conjecture, many names of plants and animals across cultures actually do explicitly or implicitly contain information as to the nature of the thing itself, whether it be the shape, the edibility, the medicinal value, the domesticity, or some other noteworthy characteristic. If Juliet were to have left her home in Verona to wander in the hills of Northern Luzon, in the Philippines, she might have been impressed with the many varieties of sweet-smelling orchids, but she would surely have been confused by the names bestowed upon them by the Ilongot people. As documented in fieldwork by Rosaldo (1972), the general name corresponding to ‘orchid’ is *lampuy*, though that is, properly speaking, the name of the “spirits of high places” invoked in magic spells to cure certain kinds of sickness. Types of orchids have names such as *quduudede* (their thighs), *lukipe* (their fingernails), *sinayakde* (their braids), *gamaqamade* (their thumbs), and *ge:lawagide* (their fingers), and as such are conceptualized as being body parts of the spirits. As part of a steaming cure, a patient sits under a blanket with a pot containing a boiling botanical mixture, to which particular orchids are added. Through steaming, the body of the spirit enters the body of the patient and is asked to lift the curse of sickness. Clearly, there is a tension between Juliet’s affirmation of the universality of human perception and the culturally modulated onomastics of the Ilingot. An orchid by any other name would not be part of the same cultural world.

In this chapter, I consider the prevailing emphasis on universals in the lexical encoding of folkbiology, before delineating the contrasting concept of lexical relativity. I then present a range of culture-specific examples of the classification of living kinds through both language and ritual which resist translation into dominant majority languages, and I propose an analysis by which universalist and relativist perspectives are not in conflict. Implications are drawn out for
biocultural diversity conservation programs in which bilingualism is seen as the key to traditional language maintenance.

Cognitive Universals in Language and Folkbiology

To advance arguments for the value of diversity involves emphasizing differences between languages, but it is not to deny the existence of cognitive universals in linguistics and folkbiology. Despite oft-repeated claims that “grammars are shaped by culture and environment” (Harrison, 2007, 211), most linguists remain convinced that, in fact, syntax and phonology are entirely independent of belief systems and geographical context (Stringer, 2016). Much current linguistic research focuses on the syntactic and phonological universals that characterize all human languages, such that any human child is born with the capacity to learn any human language, with ease, within the first few years of life. From this perspective, variation lies in the lexicon rather than in grammar.

That said, to the extent that there are conceptual features associated with lexical items that interact with grammar, how particular cultures conceptualize things in world can affect what may be expressed through syntax. For example, the grammatically relevant features like HUMAN and ANIMATE may play a role in the grammars of all languages. The presence or absence of the feature HUMAN on a noun can determine possible relative pronouns in English, e.g., *the book who I read last week. Similarly, only entities classified as ANIMATE can be selected by the Japanese existential verb *uru (to be), e.g., *heya ni onna ga *uru (there is a woman in the room); *heya ni hon ga *uru (there is a book in the room). But while such grammatically relevant concepts appear to be universally available, what actually counts as human or animate may vary from culture to culture. People have considerable choice in how they conceptualize the
outside world: whether there is a separation between humans and other animals, between animals and plants, or between culture and nature.

There have been parallel discussions in the realm of folkbiology. After years of fieldwork investigating folk taxonomies, a consensus among anthropologists began to emerge in the 1960s that there was an unmistakable unity in the various naming systems of plants and animals, based on perceptual universals and a basic, shared hierarchy of classification. This cross-cultural, “general-purpose” taxonomy (Berlin et al. 1973) classifies living kinds in terms of the same three basic levels of organization, as follows: 1) unique beginner/folk kingdom (e.g., animal, plant); 2) life form (e.g., bird, fish, mammal, tree, shrub); and 3) generic species (e.g., goose, trout, fox, willow, honeysuckle); with the possible addition of more specific names for subtypes of generic species, involving binomial and then trinomial compound nouns: 4) folk-specific (e.g., snow goose, rainbow trout, red fox, pussy willow, trumpet honeysuckle); and 5) folk-varietal (e.g., lesser snow goose, coastal rainbow trout, Cascade red fox, rosegold pussy willow, sulphurea trumpet honeysuckle). As argued at length by Berlin (1992), the striking universality of the taxonomic hierarchy itself, as well as the typological regularity in the recognition of particular life forms and generic species, across so many different cultures and environments can be most convincingly explained by commonalities in human perceptual cognition, entirely independently of usefulness or cultural significance to humans.

All cultures recognize, for example, the broad classes of fish, reptile, and bird, though the specific boundaries of the groupings may vary. It is worth noting that modern scientific taxonomy, which focuses exclusively on genetics and heredity at the expense of form, behavior, and ecology, no longer recognizes these classes. For example, a lungfish, which looks very much like a fish, turns out to be more closely related to a cow than a salmon, such that lungfish and
cows belong to the same evolutionary grouping (Yoon 2009, 252-257). There is no longer any scientific grouping called “fish” to which both lungfish and salmon belong, although the concept of fish remains immutably part of Western folkbiology. However, it is noteworthy that at the generic-species level, there is high correspondence between indigenous naming systems and scientific classification (e.g., Berlin 1990; Diamond and Bishop 1999).

The universal folk ordering has implications for both generalization about the environment and the treatment of genericity in language. Atran (1990, 1998) notes how robust the entailment relation is between nested classes of living kinds. Folk taxonomies provide the foundation for systematic reasoning about living kinds relevant to human survival, so that, for example, if a disease is found in one bird species, we know that it is more likely to be found in other bird species than among mammals or reptiles (Atran 1998, 548). The distinction between the upper and lower regions of this hierarchy of living kinds also appears to be reflected in grammar, in that kind reference to generic species may be expressed in English using either a plural or a definite article, while higher orderings such as kingdoms, life forms, or groupings intermediate between life form and species disallow the definite article when reference is to the entire kind, e.g., After the meteorite hit the earth, the Tyrannosaurus Rex went extinct but (*the mammal → mammals) survived; The teacher asked the children to do a project about {the eastern bluebird / *the bird → birds}. This particular constraint on generic article use is tied to how individual speakers conceive of the hierarchy of natural kinds, so variation is to be expected according to familiarity with genera, species, and subspecies.

That a universal ranking system underlies our classification of living things is also supported by evidence from language development. Children appear to have an inborn enthusiasm for classifying living kinds. In Gershkoff-Stowe and Smith’s (2004) study of the first
twenty-five words learned by English-acquiring children, on average five were for non-human animals, five were for humans, and three were for foods such as fruit. Studies have shown that even children born in urban environments, somewhat disconnected from animals and plants in the natural world, will often seek out populations of creatures to classify with eagerness, determination, and precision, whether they be dinosaurs (Yoon 2009, 164-165) or artificial characters in card-trading games such as Pokémon (Balmford et al. 2002). The development of this domain of vocabulary also appears to unfold in similar ways across languages. For example, as discussed by Brown (1984, 92-96), both English and Tzeltal-learning children generally acquire words for “tree” and grerb (a term subsuming small, leafy, non-woody plants: labelled “plant” in English) before adding “grass,” “bush,” and “vine” to their inventory, such that the acquisitional sequence mirrors the distribution of these categories across languages.

If humans are born with an innate ability to classify animals and plants, then we might expect there to be evidence from research into the workings of the brain for a neural substrate underlying this capacity. In fact, through disease (specifically, herpes-induced encephalitis) or trauma (such as a head injury), patients can develop a domain-specific impairment for recognizing, ordering, and naming living things. While retaining the ability to distinguish inanimate objects, such patients seem completely stumped by things such as kangaroos, parrots, spiders, crocuses, or mushrooms (for a discussion of relevant studies, see Yoon 2009, 146-170). What is lost is not just the name--this is not just a problem of lexical retrieval--but the ability to categorize the organism in the hierarchy of living things. As the distinction between life and inanimacy underlies our knowledge of what is potential food versus what is inedible, the results of this condition can be catastrophic. While the patient J.B.R. was suffering from herpes-induced encephalitis, following a grand mal seizure, and unable to name camels or buttercups (while
being able to describe flashlights and compasses), he tried to eat soap, paper, and blankets, and drink shampoo (Greenwood et al. 1983); when the patient S.B., suffering from the same disease, tried to order food, she was utterly puzzled by cornflakes, honey, and soup (Sheridan and Humphries 1993); when the former biology student, L.A., who in tests labelled a cricket as a lion and a fish as a bird, tried to order food, she referred to omelet as cake and to bread as fruit (Silveri and Gainotti 1988). All such patients suffered lesions in the temporal lobe, and brain-imaging research on object-naming in healthy patients has revealed more precisely the location of our capacity to recognize, order, and name living kinds: the superior temporal sulcus and the lateral fusiform gyrus (Martin et al. 1996; van Schie et al. 2005).

In these various studies of linguistic and folkbiological universals, whether in terms of classification, child language acquisition, or pathology, mainstream research has generally emphasized commonalities over differences, and has been in many ways successful in gaining insights into shared human cognition.

**Lexical Relativity**

The tragedy of the current crisis of annihilation affecting languages, cultures, and ecosystems lies not in the loss of instances of universals, but in the loss of what is particular in linguistic, cultural, and biological diversity. Languages currently under threat of extinction offer unique insights into the possibilities of the human condition not primarily through syntax or phonology, but in their encoding of information in the mental lexicon, and their expression of cultural understanding through texts in myth, ritual, and festival. Each endangered language is “a flash of the human spirit, the vehicle by which the soul of each particular culture comes into the material world” (Davis 2009, 3). The inner workings of this vehicle depend on a fundamental
organizing principle of human language, termed lexical relativity, by which the meanings of words are dependent on other words in the same lexicon, and are systematically different across languages (Stringer, 2010). When linguists create word-for-word literal translations, called glosses, to facilitate comparative syntax, this often leads to a “gloss trap,” as assumed equivalences fall apart on closer examination.

When comparing any two languages, it is apparent that words considered as lexical analogues are rarely, if ever, a perfect semantic match. A universal human activity such as drinking does not lead to universal verb semantics. The English verb “drink” is used only of liquids. In Turkish, one can drink smoke (as in drink a cigarette) as well as liquids; in Japanese, one can drink medicine, even in solid form; and in Kazak, one can drink both liquids and solids, in contexts where English would require the verb “eat.” Young and Morgan (1987) list fifteen verbs of consumption in Navajo, corresponding to either “eat” or “drink,” which differ according to such criteria as whether the thing to be consumed is hard, mushy, leafy, liquid, solid but dunked in liquid, or meat, or whether it is consumed from an open or closed container.

Common nouns similarly splinter in translation: English “rice” corresponds to both Japanese kome (uncooked rice) and gohan (cooked rice). In English, “grape” is a count noun (and grapes are conceptualized as small bounded objects) while in French, raisin (grape) is a mass noun (and conceptualized as a substance). In French one must refer to a grain of grape, just as in English one must refer to a grain of rice. Such lexical relativity bears directly on the nature of second language acquisition. A learner’s initial assumptions about word meaning in a second language stem largely from previous linguistic knowledge. That is, on hearing a new word such as gohan (rice) in Japanese or raisin (grape) in French, an English-speaking learner will incorrectly assume that the former refers also to uncooked rice, while the latter is a count noun
referring to small, bounded objects. In terms of Sprouse’s (2006) theory of Full Lexical Transfer, the syntax and semantics of a given word will simply be relabeled with new phonological representations. With further exposure to linguistic input, these syntactic, semantic, and phonological representations may gradually converge on the target word in the second language, but as one acquires an entire vocabulary system, mismatches between first- and second-language lexicons almost invariably remain. A shift from one lexicon to another entails thousands of subtle shifts in how we conceptualize the world in order to talk about it.

It is worth considering what lexical relativity might entail in cases of attrition as well as acquisition, and when attrition is not just individual but community-wide. While learning a new lexicon means gaining new perspectives on reality, it is also true that losing a lexicon means losing a particular way of conceptualizing the world through language. When speakers of endangered languages shift to a new language, lexically encoded aspects of cultural and ecological knowledge are at risk of losing their linguistic moorings. In the following section, we consider a range of examples of folkbiological classification, all instances of conceptual systems that risk being lost when traditional communities shift to a dominant language. Such systems may be understood in terms of 1) the linguistic encoding of ecological and utilitarian knowledge; 2) parallel systems of classification; 3) fluidity in naming systems; and 4) classification modulated by belief systems.

**The Cultural Classification of Living Kinds**

The ample evidence of lexical relativity in the examples that follow illustrates how language can act as a window on cultural and environmental diversity. In advance of this discussion, an important caveat is in order. Given the fact that all cultures change over time, we
cannot always assume conceptual transparency in contemporary linguistic forms. What once might have been a clear indicator of environmental knowledge or cultural significance may have become bleached of meaning. In Tzeltal, the use of the verb –ti’ (eat-meat) with ich (chili pepper) classifies the latter as an animal, which makes sense only in the light of the mythical origin of chilies as birds (Berlin, 1992). However, for many speakers this may be a fossilized part of the language, as the mythical origin of chilies as birds is far from being ever-present in modern consciousness. Similarly, the tropical cedar known as k’u~che’ (god-tree) in Itzaj Maya was indeed once a sacred tree, but while the name remains, according to Atran (1999, 131), it no longer invokes the spiritual connotation. The maintenance of such forms with bleached semantics gives us an insight into linguistic and cultural history, rather than an understanding of contemporary thought. In contrast, the cases discussed below involve classification systems that are at least to some degree still conceptually relevant, despite their fragility in the context of the current crisis of language endangerment.

Linguistic Encoding of Ecological and Utilitarian Knowledge

The first aspect of culturally determined folkbiological classification to be considered concerns the environmental associations and utilitarian import of animals and plants. Such lexical encodings rarely if ever transfer to the dominant language in cases of language shift, partly because the dominant language lacks the linguistic resources, and partly because shifts in language are inevitably accompanied by changes in lifestyle and increasing reliance on manufactured products (Zent 2009). Somewhat obviously, when animals or plants have high cultural significance in a particular community, this can result in sophisticated folk classification. Posey (2002) documents how the Kayapó of Brazil distinguish fifty-six types of bees, grouped in
fifteen families. Names for bees can depend on behavioral characteristics (e.g., flight patterns, aggression, sound in flight, places typically visited), nest geometry and ecological niche (e.g., preferred nest site, position of entrance, characteristics of the entrance structure, whether found in flood forest, humid forest, or savannah), physical characteristics (e.g., shape, color, smell, markings, type of wings, secretions), or use to humans (e.g., quality and quantity of honey, quality of resins or wax, edibility of pollen or larvae). Such classification, based on observation in ecological context, is arguably more relevant to conservation efforts than scientific nomenclature.

Similar examples of naming according to utilitarian value or environmental location are found across languages. Utilitarian classification is found with butterfly and moth larvae in Tzeltal, Mexico (Hunn 1977, 280-285, 301-306), and reindeer-naming in Todzhu, Siberia (Harrison 2007, 30). Environmental location is encoded in plant-naming by the Cherokee of North Carolina (Cozzo 2002). In this case, folk-specific varieties are often realized as secondary lexemes, including words such as igatenehi (swamp-growing), gutluta (living on hillside), and kutlaehi (growing under beech trees). Names may also incorporate environment even when the location is not fixed. The hay-scented fern is known in Cherokee as yana utsestu usdi-ga (the bear lies on it, small) (143-144). While any human language has the capacity to encode detailed utilitarian or environmental information--consider specialized folk terminology in horse-breeding or falconry in English--the fact remains that such naming systems are culture-specific. As such, the loss of a language may entail the loss of vital traditional ecological knowledge.

Environmental information may also be carried on grammatical morphemes attached to vocabulary items (examples of bound morphemes in English include past tense –ed and plural –s). One such system is found in Piaroa, spoken in Venezuela. Immediately following the noun
there is a classifier position that must be obligatorily filled, with few exceptions. There are over
one hundred noun classifiers, about seventy-five of which specify botanical or ecological
information about the noun to which they are attached. For example, the addition of –roe
classifies the object as a kind of hanging, branching-stemmed fruit bunch; if –k’oe is used, the
object is understood to be a rosette-shaped herbaceous plant; and if –ya is added, the substance is
categorized as a thin, free-flowing sap (Zent 2009, 106-107). Sometimes the classification of
nouns is not marked directly on the noun itself, but on numbers when nouns are counted (see
Aikhenvald 2003), and such classifiers may also encode ecological information. In Minangkabau
(Indonesia), numerical classifiers are used to differentiate between seed-like objects (marked
with incek), flowers or leaves with stalks (tangkai), and clumps of plants (kalupah), while
Baniwa (Northwest Amazonia) has a special numerical classifier (-fa) for types of excrement,
because of the importance of identifying animal droppings when hunting game. Such systems are
lost when speakers switch to languages less rooted in the local environment.

Yet another type of ecological information encoded in endangered languages concerns
the changing of the seasons. While English has inherited names for months from Latin, whose
original meanings referred to gods (e.g., January), festivals (e.g., February), god-emperors (e.g.,
August) or simply ordinal numbers (e.g., September), many Native American tribes have their
own set of full moon names related to hunting, fishing, gathering, or planting activities in
particular ecosystems. The equivalent of April is iskigamizige-giizis (Maple Sugar Moon) in
Ojibwe, wahsakayu:tè:se’ (Thundering Moon) in Oneida, maġá okáda wi (Geese Laying Eggs
Moon) in Dakota, hash bissi (Blackberry Moon) in Choctaw, and guwoni (Duck Hunting Moon)
in Cherokee. In some cultures, particular species play a dominant role as food and in mythology,
and may be associated with various months throughout the year. The Karajá people of Brazil
place special cultural importance on turtles, and the behavior of two of the six local species is used to define seasonal cycles (Fortune 1990). When animals or plants play a defining role in culture in this way, knowledge of the species is often encoded not only in the lexicon but at the textual level, in the retelling of myths and in the lyrics of songs performed as part of seasonal festivals, which is true in this case. Another striking set of examples of transmission of calendar knowledge through festival is given by Jensen (1990), in his discussion of Wayampi culture in northern Brazil. He lists twenty-one annual celebrations of specific birds, mammals, fish, invertebrates, reptiles, and plants. In the festival of the tarutaru (dark-billed cuckoo), one song tells us that when this bird drinks fermented manioc and starts to sing, it heralds the breeze that blows at the beginning of the dry season, and the stars of the Pleiades will appear in the early morning. The tarutaru continues singing through the season until the sweet potatoes begin to sprout and the Pleiades appear in the evening sky.

While the arguments given earlier for universal systems of animal and plant classification are based upon substantial empirical evidence and ring true in terms of shared human properties of visual cognition, it is evident from these culturally modulated examples of names and narratives that universals are not the whole story. The literature of folkbiology over the last half-century has been to a large extent characterized by a debate between those exploring universalist approaches (e.g., Atran 1990, Berlin 1992, Brown 1984) versus those emphasizing cultural relativity (e.g., Ellen 1993, Hunn 1982). Yet it seems clear that the choice between universalism and relativism must be based on a false dichotomy. The resolution to this apparent paradox lies in understanding that humans are not restricted to a single system of classification of living kinds. The following two subsections consider in turn the phenomena of parallel taxonomies and fluidity in classification within a single system.
Parallel Systems of Classification

It is important to consider the limitations of comparing classification systems only in terms of visual perception. In an interesting, informal classroom experiment discussed by Berlin (1992, 9-10), students were asked to sort out a pile of museum skins of unfamiliar, colorful birds from the Peruvian Amazon, including two or three examples of each species. They instinctively and reliably reproduced the groupings used by both biologists and the Huambisa and Aguaruna Jivaro peoples who were the source of specimens. It is true that this is almost certainly indicative of universals in human visual cognition. However, students could not possibly have classified these unknown species in any of the other ways that traditional societies group living kinds: in terms of their ecosystemic significance (the food they eat, their association with other species, the seasonal changes they herald), or utilitarian value to the community (the uses of their feathers, their edibility, their ability to indicate other sources of food), or the sounds they make. That traditional peoples have naming systems based on visual perception that correspond to those of ornithologists does not preclude the possibility of parallel systems of classification. In English, animals may be also classified in parallel groupings, whether in terms of use, such as pets (guinea pigs, goldfish) or farm animals (chickens, cows); or location, such as sea creatures (shark, octopus). This is particularly evident in food practices: tomatoes and avocados are usually conceptualized as vegetables while technically considered as fruit; the term “berries” subsumes strawberries and raspberries, which are not, botanically speaking, berries, and usually excludes botanically defined berries such as chili peppers and watermelons.

In Feld’s (2012) classic account of his fieldwork with Kaluli people in Papua New Guinea in the 1970s, he documents how there is, as expected, a bird classification system based
largely on appearance, including familiar groupings (46-60). But there is an intellectual and emotional epiphany in the course of his narrative when he realizes that the system of bird classification he was originally seeking to uncover was not the most culturally meaningful way that the community classified birds. At one point, Feld’s informant, Jubi, became frustrated and exclaimed, “Listen--to you they are birds, to me they are voices in the forest” (45). The emphasis on sound is relevant not only because people perceive and recognize birds in the forest primarily through this medium, but also because these may actually be the voices of human ancestors: when villagers die, their souls enter the bodies of birds, and the sounds themselves have an “outside,” which can be used to identify the species, and an “inside,” which can be understood as spirit communication. The Kaluli in fact distinguish seven groupings based on sound: those that “say their names” (*ene wi salan*); those that “make a lot of noise” (*mada ganafodan*); those that “only sound” (*imilisi ganalan*); those that “speak the Bosavi language” (*Bosavi to salan*); those that “whistle” (*holan*); those that “weep” (*yelan*); and those that “sing gisalo song” (*gisalo molan*).

Systems of animal and plant classification that run parallel to taxonomies based on visual cognition often crosscut biological genera. Cozzo (2002, 141-142) notes how in Cherokee plant taxonomy, intermediate taxa include the grouping *gawsuki* (smeller), which are strong-smelling plants, including mints, spicy scented herbs, and muskmelons (fourteen species, ten genera, four families). Another is *gunigwaliski* (becomes discolored when bruised), which are plants whose stalks change color when damaged (eight species, five genera, five families). Yet another is *unistiluisti* (stick flat to hairy substance), which are all plants with burrs (fifteen species, thirteen genera, eight families). Many languages make utilitarian distinctions between wild, cultivated, or useless plants. For example, Conklin (1954, 94-95) recognized in his fieldwork in the Philippines
that the Hanunóo not only have the familiar three-way classification of trees vs. herbaceous plants vs. vines, but that plants were cross-classified in terms of *halaman* (domesticated plants) as opposed to wild flora. Posey (1990, 50-51) discusses how such cross-classifications can sometimes be misunderstood by anthropologists: the Kayapó in Brazil plant certain species they consider as wild even when planted. They define planted species as those that cannot grow without the help of humans, as opposed to natural species that can grow by themselves in the forest. English classifications such as crops, flowers, and weeds are also examples of variable systems of folkbiology depending on cultural evaluations of what is considered plantable, beautiful, or useless.

*Fluidity Within Naming Systems*

In addition to switching between alternative taxonomic systems, languages allow for fluidity in classification *within a single naming system*, for at least two reasons: first, because entities in the world may be conceptualized in different ways; and second, due to naming taboos. Alternative conceptualization in the same naming system is arguably found in all languages in one way or another. For example, the English language allows for the same turkey displayed on a table to be linguistically encoded as either *a turkey* or *some turkey* depending on whether the speaker conceptualizes it as an object or a substance. This kind of choice in how we classify is found not only in grammatical function words but also in open-class vocabulary. As noted by Atran (1999, 194-195), English speakers use the term animal to refer to at least three different classes of living kinds: animals including humans, animals not including humans, and mammals as prototypical animals (for instance when people contrast animals with birds). In similar
fashion, the term plant can refer to the whole plant kingdom, or just to smaller leafy plants that are not trees.

Fluidity in reference to folk species can also arise due to taboos associated with naming people whose personal names derive from animals or plants, as discussed by Clark (2007). Many Australian aboriginal tribes consider as taboo the naming of a deceased person for a period of time, and in such cases it is also taboo to use related names referring to animals, plants, or the environment. If a man is named Yab-woorack (leaf of the woorack), because he was born under a woorack (banksia), then after he dies not only should his name not be pronounced, but the plant itself must be referred to temporarily by a different name. It was once reported that in the Maraura community of New South Wales, as eight men died who all carried the name of water, the name for water itself changed nine times in five years (17-18).

As many cultures extend the concept of the soul to animals and plants, this kind of pronunciation taboo can also be found in direct dealings with other species, even without the sharing of names across life forms. The Pälawan people of the Philippines greatly value honey, the collecting of which involves complex negotiations with the spirit world (Novellino 2002). Humans are understood to inhabit the middle realm of a universe with three levels. Bees are said to be creatures of the upper world, seasonally descending to gather pollen from flowering trees. In order to attract bees, people must enter into negotiation with the Master of Flowers and perform appropriate ceremonies, so that the trees welcome the bees. When the relevant trees are in flower, there is a prohibition on using their normal names, such that these trees all have an alternative name. For example, the natuq tree becomes bābāqālān, the kālasa tree becomes kārurungān, the dipanga becomes kārān kārān, the rimārāw becomes gamang, and the gīnuqu becomes pagibutān. This is parallel to the practice of avoiding names for old people in this
community, in which elders must be respectfully referred to as grandfather or grandmother.

Novellino (2002) argues convincingly that all living entities may be endowed with personhood in Pälawan culture, which underlies the shared fluidity in naming systems.

*Classification Modulated by Belief Systems*

The bestowing of personhood on birds in Kaluli culture and on trees by speakers of Pälawan, as discussed above, reveals not only parallelism and fluidity in naming systems but also how belief systems are intertwined with taxonomy. Tracing classification through beliefs allows us to understand more about the relations between people and their environment, as well as links between culture and language. Arguably, research in both linguistics and folkbiology has a tendency to overemphasize universals and underplay the importance of diversity in worldviews. Grammatical distinctions, such as human vs. animal or animate vs. inanimate, are often understood by linguists to be universally applied. Similarly, traditional ecosystem knowledge is often discussed in terms of Western environmental science. For example, Reichel-Dolmatoff (1997) discusses shamanism and associated linguistic expression in the Tukano languages of the Colombian Amazon in terms of the “control and management of natural resources” (7), and argues that religious practices can be understood in terms of “one single problem--the maintenance of a balanced ecosystem” (15). In his dealings with the spirits, the shaman can be thought of as an “ecological broker” whose “book-keeping shows the general system inputs and outputs” (18). Descola (2013, 12-13) questions the validity of this kind of analogy, because the Tukano ascribe to both animals and plants the psychological and social attributes of humans. In their dealings with the natural world, people negotiate with animals and plants as social partners, and do not see them as units of accounting.
In fact, this sense of nature as lacking clear psychological and social boundaries between humans, animals, and plants, is typical of rainforest peoples with animist belief systems. In Ecuador, Achuar hunters understand certain prey, such as toucans and howler monkeys, to be brothers-in-law, subject to similar rules concerning killing in-laws in the course of a vendetta (Descola 2013, 4). Achuar women, whose domain is the village garden, talk to their plants using a language of address otherwise reserved for children. Whether relatives by marriage or blood relatives, the souls of animals and plants become real social partners in an environment not distinct from human society (5-6). In Colombia, the Makuna believe that certain mammals and fish have their own longhouses, gardens, and ritual dances, in which they appear in human form, and their visible non-human forms are just a disguise (9). In certain cultures, plants are also understood to have human-like souls and to engage in social life. Dogon healers in Mali consult trees to ask them about their knowledge of the forest, and some trees, such as the kapok, are believed to move around at night, having conversations with other trees in the forest (27).

Personhood in animals and plants may also be linked to communion between the living and the dead. As mentioned earlier, the Kaluli of New Guinea hear the voices of their ancestors speaking to them through birds: a kala bird (pinkspotted fruitdove) may be heard as the voice of a boy who died in childhood (Feld 2012, 30); the ghosts of men may appear in birds such as hornbills, and women in birds of paradise (53). Spirit reflections of humans also exist for Kaluli people who are still alive: in the social world of the forest, the soul of each man is reflected in a wild pig, and that of a woman in a cassowary on the mountainside. If a person’s animal aspect should die, the human form will also die, after which the soul will usually inhabit a bird (30-31). In Secoya communities in Ecuador and Peru, the living might see the dead who have returned in the form of animals or plants, but in turn the dead are thought to see the living in alternative...
shapes--Secoya men are perceived by the dead as oropendola birds, and women as parrots
(Descola 2013, 10). Interestingly, it is the soul of a person/animal/plant that is seen as an
objective reality, while the outward form is perceived subjectively.

The literal personification of an animal or plant not only has linguistic repercussions (as
humanness and animacy play roles in all known grammars), but also sheds light on performative
expression, whether in festivals or more discreet rituals involving hunting or gathering. When a
Pälawan gatherer needs to fell a gumbja sago palm, he must enter into ritual battle (Novellino
2003). He wears a warrior’s headband, and first must go through the motions of a duel, using a
bush knife to fight the tree, whom he addresses as käläng taw (Big Man). After the tree has been
felled, he takes up a spear, and thrusts it into the trunk while shouting that the Big Man is
finished. In Bulmer’s (1967) classic fieldwork with the Karam people of New Guinea, he
documented how kobtiy (cassowaries) are traditionally classed not as birds, but as female cross-
cousins of human origin, with associations that shed light on the conceptual divide between
village civilization and the forest. The killing of a cassowary involves highly prescribed
behavior: a hunter must practice a language of avoidance, using alternative names for many
types of objects and activities; he must use a blunt instrument rather than an arrow or spear, so as
not to shed blood (a taboo which holds for the killing of humans); after killing the cassowary, he
must ritually eat its heart (after killing a human, the killer must eat the substitute heart of a pig);
and he must then avoid going near taro crops for one month. Similar prescription of behavior can
be found when humans deal with plant spirits, if particular plants or even whole forests are
personified. In various cultures in Siberia, a hunter must forge an alliance with the Spirit of the
Forest before venturing on an expedition, by having sex with the Spirit’s daughter in dreams
(Descola, 2013, 18). The belief that the soul can actually travel during sleep means that this
relationship is not just imaginary for the hunter, who must also refrain from intercourse with his wife during this period (a kind of non-performative expression).

The belief among many traditional peoples in animal or plant souls, blurring distinctions between conceptual and linguistic categories, might seem alien or quaint to many Western linguists or biologists. However, the belief systems of rainforest peoples may serve to remind us of similar categorization in two ancient cultures that have exerted cultural influence on many modern societies. As discussed by Trumper (2003, 69), the Ancient Greeks believed that plants had a vegetative soul, animals had a sentient soul, and humans had a thinking, or rational soul. In almost perfect parallelism, the Ancient Chinese believed that plant souls consisted of spirit + life, animal souls contained spirit + life + perception, while human souls were composed of spirit + life + perception + justice/morality. In modern science, we have no such equations: researchers have no unified theory of either animacy or consciousness. Most linguists would assign the grammatically relevant feature of animacy to animals but not plants, yet as we have seen, selective brain damage following herpes-induced encephalitis affects the animacy feature, resulting in naming problems not only for humans and animal referents, but also for plants (and plant products, such as food). The nature of consciousness and sensation are no less problematic for current scientific approaches to brain activity. A recent study by Yokawa et al. (2017), found that certain anesthetics which cause numbness and loss of consciousness in humans also appear to work on plants. When they applied the drug licodaine to garden cress seedlings and Venus flytraps, the seedlings became dormant, and the Venus flytraps stopped reacting to the stimulus of bugs walking across their leaves. When the drug wore off, the plants “woke up,”and resumed growing and trapping prey. If such drugs work via the same kind of disruption in electrical activity--between neurons in humans and perhaps between cell membranes in plants--this would
seem to indicate a closer relationship between animal and plant internal messaging systems than previously assumed. At the very least, these results highlight the sobering fact that after more than a century of using a variety of general anesthetics with different chemical structures that interrupt activity in plants and animals (and even bacteria), we still do not know precisely what is suppressed when human consciousness is held in check, or what exactly we might have in common in this regard with the plant kingdom.

**Conclusions and some implications**

Currently dominant theories of cognitive universals in folkbiology have furnished valuable insights into how we perceive and mentally organize lexical concepts for living kinds. That said, the many examples of alternative classification assembled here from sources in linguistics, anthropology, and folkbiology illustrate how lexicalization in the domain of animals and plants can nevertheless be culture-specific and ecosystem-dependent. The categorization of living kinds as either human or nonhuman, animate or inanimate, blood relatives or in-laws, spirit-possessing or soulless, can affect not only the organization of the mental lexicon or syntactic processes governed by semantic features, but also performative expression in rituals involving hunting, gathering, and farming. Rather than launch another salvo in support of either universalist or utilitarian approaches to folkbiology, I argue that these approaches are not mutually exclusive if one recognizes the possibility of parallel systems of classification and the fluidity of classification within systems. Moreover, the degree of cultural modulation of supposedly universal features across the range of human societies serves to reaffirm the concept of lexical relativity (Stringer 2010). The ubiquity of lexical relativity in human language systems
helps to explain how lesser-studied languages can enrich our awareness of the sophistication and variety in the lexical encoding of concepts across cultures.

In extending the model of lexical relativity into the realm of folkbiology in endangered languages, and recognizing the societal bilingualism that appears inescapable for all cultures cited in this study, several implications for language maintenance efforts are apparent. First, attempts to salvage ethnobiological knowledge simply by creating word lists of supposedly equivalent vocabulary may in fact be counterproductive, as this encourages people to see words for animal and plants as having universal reference. While this approach remains an easy option for those focused on biodiversity conservation, more recent initiatives have embraced a biocultural perspective, embedding lexical information in cultural contexts. Maffi and Woodley (2010) provide an excellent survey of biocultural diversity projects underway in the first decade of the millennium, several of which document traditional knowledge of plants, birds, mammals, insects, or fish. For example, the Kimberley Language Resource Centre in Australia has gone beyond “just a list of words in publications” (62), by creating audio and visual materials in local languages such as Jaru, and fostering intergenerational transmission by involving younger people in the creation of a digital library and on bush trips that encourage language immersion.

Second, while many government-sanctioned education initiatives for indigenous peoples advocate transitional or subtractive bilingualism with the goal of making sure the majority language becomes the dominant language (García 2009, 221-231; Skutnabb-Kangas 2009), more enlightened approaches to education must recognize that functional bilingualism (in which different languages are used in different domains) is the more desirable outcome. One of several reasons to support this approach is that loss of the first language entails loss of the linguistic underpinnings of environmental understanding: only the traditional language is likely to be able
to fully encode traditional ecological knowledge. Examples of biocultural approaches informing bilingual education can be seen in the Support Project for the Ngäbe Indigenous People in Costa Rica and the Andean Project for Peasant Technologies (PRATEC) in Peru (Maffi and Woodley 2010, 99-100; 112-116).

Third, while many official education policies involve the transporting of children outside of their communities, either by bus to a school in an urban environment, or in more extreme cases to boarding schools, it seems clear that intergenerational transmission of knowledge in traditionally managed ecosystems must occur *in situ*. If a country pursues a compulsory education policy, education must be brought to the children rather than the other way around. The encoding of ecological knowledge in the mental lexicon can only remain relevant within the environment that supports the community. One initiative that has provided a model for the pursuit of these various goals is that of the Shuar of Ecuador, who established bilingual schools in rainforest villages with lessons broadcast by radio in order to balance state-mandated education in Spanish, local education in Shuar, and traditional means of learning from elders in each community. By the year 2000, there were almost 300 such schools supporting over 7000 students, with teachers from both inside and outside the communities (Grenoble and Whaley 2006, 78-86). More recent reports suggest that the project is struggling with pressure from some parents to place greater emphasis on Spanish and undue cultural influence from Salesian missions (Katz and Chumpi Natip 2014), yet it remains a model of how balance can be achieved in promoting traditional language maintenance in the context of broader societal bilingualism.

Finally, all such considerations must be embedded in an acute awareness of the current global crisis of mass extinction of languages and species. Geographical regions with extremely high linguistic diversity overlap significantly with regions of high biodiversity, and these areas
contain a multiplicity of threatened cultures and ecosystems. According to the most conservative estimates by linguists, at least half of the world’s 7000 languages will disappear by the end of the century (Harrison 2007, 3). This cultural catastrophe is happening in large part due to state and corporate expansion into indigenous territory, involving environmental degradation in the name of agro-industry, unregulated forestry, and the extraction of minerals and fossil fuels. The maintenance of folkbiological knowledge in endangered languages is intimately bound up with the continued existence not only of cultural practices and performative expression, but of the natural environment that supports the community. This realization serves to bring into focus a more unified vision of biocultural diversity conservation and illuminates possibilities for interdisciplinary efforts to promote the sustainability of traditional languages and cultures.

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