

When Grasshopper Means Lightning

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HOW ECOLOGICAL KNOWLEDGE IS ENCODED IN ENDANGERED LANGUAGES

Endangered Languages and Biocultural Diversity Conservation

Just over twenty years ago, many linguists were shocked into a new sense of urgency when Michael Krauss wrote his classic short article on the status of the world's languages, in which he lamented that linguistics was about to "go down in history as the only science that presided obliviously over the disappearance of 90% of the very field to which it is dedicated". A few years later, Krauss played a role in the founding of Terralingua with Luisa Maffi and David Harmon, and during the last two decades, there has been a welcome surge of involvement by linguists in the movement to support endangered traditional communities as they strive to maintain their ancestral languages. Just as the field of biodiversity conservation has shifted focus from the protection of individual species to the protection of ecosystems, more linguists are coming to realize that the revitalization of languages is intimately bound up with the preservation of the environments in which they are spoken, and are starting to share in a more unified vision of biocultural diversity conservation.

The current mass extinction of both languages and species has given rise to a vibrant, interdisciplinary movement with the goal of maintaining and revitalizing linguistic, cultural, and biological diversity on the only planet we will ever call home. One key question in this endeavor, from a global perspective, is how ecological knowledge is encoded in endangered languages. Secrets of local ecosystems can often be unlocked if communities are supported in their efforts to maintain their languages, as traditional ecological knowledge (TEK) has been shown time and again to be linguistically shaped and organized. It is worth pausing to consider how exactly this is achieved, so that we may meaningfully ask what is lost when a language is lost, and what is gained when language use is rekindled. Pursuing these questions leads us to appreciate the beauty and ingenuity of human language, as a finite set of tools gives rise to an almost infinite range of expressions of biocultural knowledge.

The Mental Lexicon as a Storehouse of Traditional Ecological Knowledge

In mainstream linguistics, the mental lexicon is generally considered to be more than just a list of vocabulary in memory: it contains free morphemes (both content words like *book* and function words like *some*), bound morphemes (elements like *un-* or *-able* in *unbelievable*), constructions (*the more [I read], the more [I understand]*), and idioms (*to spill the beans*). The most obvious linguistic



encoding of TEK is in vocabulary that refers to objects, substances, events, processes, and states in the natural world. For example, the Kayapó of Brazil distinguish 56 types of bees, grouped in 15 families, as described by ethnobiologist Darrell Posey. Following scientific examination, these 56 types were subsequently divided into 66 species, in terms of genetic taxonomy. However,

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in many ways the Kayapó folk classification system is richer in ecological information. While scientific taxonomy gives us broad anatomical description and information about species relatedness, Kayapó classification tells us much more about how different bees behave, about their role in the local environment, and about human interaction with them. This kind of system, which all languages have in one form or another, is called a folk taxonomy. In this case, names can depend on behavioral characteristics (e.g., flight

patterns, aggression, sound in flight, places typically visited), nest geometry and ecological niche (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 typology.

Less evident to non-linguists is the fact that ecological knowledge can also be encoded in grammatical morphemes that often cannot stand alone as vocabulary items. For example, languages use various kinds of functional morphemes to classify nouns referring to things in the world. In English, objects and substances can be differentiated by articles, quantifiers, and plural marking (e.g., *I saw {chicken / a chicken / some chicken / chickens} on the table*).

Above: Kayapó women in the Amazon rainforest.
Photo: Cristina Mittermeier, 2007

This system does not even approach the complexity of noun classification that some languages display. As documented by Laurence Krute and Stanford Zent, the Piaroa language (Venezuela) has over 100 noun classifiers, about 75 of which are used with nouns referring to plants or plant parts, specifying botanical or ecological information. Immediately following the noun there is a classifier position that must be obligatorily filled, with few exceptions. For example, the addition of *-ræ* classifies the object as a kind of hanging, branching-stemmed fruit bunch; if *-k'æ* 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.

Sometimes the classification of nouns is not marked directly on the noun itself, but on numerals only when things are counted, or on possessives when ownership comes into play. Thus 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. The linguistics of possession can also be revealing. In the Tinrin language (New Caledonia), we cannot simply say “my” or “your”, but must specify the type of thing possessed, e.g., my-plantable thing, my-burnable thing, my-chewable thing, or my-edible-fruit thing. In Hawaiian,

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classifiers of possession indicate whether the noun is alienable (separable from the speaker, possessed by choice) or inalienable (inseparable). Thus parents and body parts are inalienable because we do not choose to be born or to have a nose; however, we do choose whether or not to have a spouse or children, so these are alienable. Interestingly, land, as in many other Pacific languages, is inalienable.



Which other components of the language faculty might be relevant for the encoding and transmission of TEK? While the notion that TEK can be encoded in the grammar of languages is quite widespread, many linguists consider syntax and phonology to be largely independent of culture and environment. For example, so-called V2-languages (which require the second constituent of a sentence to be a finite verb) are found in both the cities of the Netherlands and the high mountain villages of Kashmir. Serial verb constructions (e.g., *Jojo take flowers give Ama*, meaning something like *Jojo gives Ama flowers*) can be found in the forests of Upper Amazonia, the sands of the Kalahari Desert, and the busy streets of Beijing. Similarly in phonology, use of paired, or “geminate”, consonants is found from Italy to Japan; stress-timed languages are found from the Faroe Islands to Thailand; and attempts to tie tone languages to climate have foundered when examined more closely. As linguist John McWhorter puts it, grammar is like a slow-moving, ever-changing lava lamp, with grammatical phenomena from the same universal language faculty disappearing and emerging in particular languages over time. From this perspective, biocultural knowledge is encoded not in the rules of grammar, but in free and bound morphemes in the mental lexicon.

Transmission of TEK Through Myth, Story, and Song

As we have seen, the mental lexicon can be extremely culture-specific and incredibly sophisticated. However, equally important in many cultures for the linguistic transmission of ecological knowledge are the narratives found in stories, myths and ceremonial recitation. Children often begin developing TEK even before they actually participate in hunting, fishing, or gathering sustenance, through immersion in oral culture. David Harrison discusses several examples drawn from anthropological research in his book *When Languages Die*. According to a transcription by Katherin van Winkle Palmer, the god Honné told the Chehalis people of Washington State USA, exactly how far up the river different types of salmon would swim, and when they would spawn. All those listening to the creation myth would hear how Squawahee, the steelhead salmon, would swim the furthest up the river



and live longer than other species; he would ascend in fall, stay all winter, and then spawn in springtime when the drumming of the pheasant could be heard.

The Wayampi people of the Upper Amazon encode ecological knowledge in song. As related by Allen Jensen, in the course of festivals held at specific times of year, participants evoke in great detail, through dance, music, and recitation, the behavior of particular birds, mammals, fish, insects, reptiles, and plants, sometimes tying such observations to their agricultural calendar. In the festival of the *tarutaru* (Dark-billed Cuckoo), when a breeze blows at the beginning of the dry season, and the stars of the Pleiades appear in the early morning, the *tarutaru* drinks fermented manioc and

Facing Page: Ramly, a Minangkabau man, gazing high into the forest canopy. Photo: J.J. Kohler, 2015

Above: The White-Throated Toucan, chief of the toucans (and of one fruit-eating falcon). Photo: Ingrid Macedo, 2010

starts to sing; he continues singing until the sweet potatoes begin to sprout, and the Pleiades appear in the evening sky. Bird families in the Wayampi language may diverge from scientific groupings, but just as in the case of Kayapó bee classification, folk taxonomy encodes information that might otherwise slip through the net. For example, the White-throated Toucan is the chief, or prototypical member, of a group that includes not only other toucans, but also a certain type of falcon. This bird differs from the others in appearance, but corresponds in terms of shared behavior, because, unusually for a falcon, it is a fruit-eater, or frugivore.

An example fusing both lexical and narrative encoding of ecological knowledge is found in the Bininj Gunwok group of languages in Western

rains, at the time of year when wild red apples, green plums and black plums can be gathered. In this case, the lexicon encodes the relationship between the insect, the plant, and the weather; the ancient lore provides a sign for the changing seasons; and the appearance of the grasshoppers is linked to the availability of a reliable food source.

While the encoding of ecological knowledge in the mental lexicon of a given language is obviously crucial in understanding the relationship between peoples and places, the oral transmission of biocultural knowledge through story and song appears to be of equal importance in many cultures.

The Biocultural Diversity Community of Practice as a Folk Taxonomy



Arnhem Land (Australia), as described by Nicholas Evans. In these languages, the term *alyurr* is used to describe beautiful orange and blue grasshoppers, known as the children of the lightning; the term is also used for the bush where the creatures can be found, and sometimes for the lightning itself. They come out to seek their father, *Namarrgon*, the Lightning Man, thus heralding the coming of the

As more linguists answer the call to participate in efforts to stem the tide of language death and shore up biocultural diversity, it is worth asking what contribution newcomers can make to this interdisciplinary undertaking. Clearly, fieldwork is paramount. Secondly, linguistic analysis can supplement primary fieldwork. Thirdly, most indigenous languages are found in multilingual contexts, and where schools are involved, bilingual education programs must be carefully managed so as to preserve original languages and respect linguistic human

rights. A further educational challenge is to cultivate consciousness in society in general, especially in younger generations.

A community outreach project of this type was initiated last year at Indiana University, as undergraduate students presented slides and interacted with over 600 elementary school children, mostly aged between eight and ten years old. Some children expressed wonder at the beauty of diversity: “I’m so happy... I didn’t know about all these animals and people. The world is so colorful. I’m too amazed.” Others expressed horror at

Above: *Alyurr*, child of the lightning, whose appearance signals the coming of the rains and the availability of several kinds of wild fruit. Photo: Jutta Pryor, 2010



the wholesale destruction of habitat: “If people know that cutting down the forest means they will kill all these animals and force the people to leave, why do they do it anyway... Why don't they care? Why?” They recognized the need for global support of indigenous communities: “I never really thought about this, but humans are endangering humans”; and many felt motivated to action: “Maybe we could fund a project for replanting so many trees and eventually grow a forest.” That these children readily understood supposedly complex issues of biocultural diversity was evident from their heartfelt comments, and gives reason for hope that current social apathy can be overcome.

A final consideration for linguists entering this growing community of practice is that we must all be prepared to step out of the narrow confines of our particular fields and adopt an interdisciplinary mindset, being open to new ideas and allowing for different perspectives. In order to be maximally effective, the biocultural diversity movement must be welcoming. Like Wayampi birds, we should define ourselves not only in terms of (intellectual) ancestry, but also in terms of contemporary behavior and ecological niches, with perches in the tree for both toucans and fruit-eating falcons.

Further Reading

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Above: David Stringer's students from Indiana University discuss biocultural diversity with 10-year old elementary school children in November 2015. Photo: David Stringer, 2015