Chapter 19

Linguistic Ethnobiology

Eugene S. Hunn
Department of Anthropology, University of Washington, Washington
Cecil H. Brown
Department of Anthropology, University of Northern Illinois, DeKalb, IL

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There are some 6000 languages spoken across the globe. Language is a complex code integrating sounds, words, and meanings so that perception, memory, intention, and imagination can be communicated among a people. In addition, through language humans manage their relationships with the cultural and natural things they encounter. In this chapter, we consider how people use language to *name* the culturally important biological elements of the world they inhabit. The study of the naming of plants and animals is called linguistic ethnobiology.

NAMES, THE FOUNDATION OF LINGUISTIC ETHNOBIOLOGY

Fieldwork in linguistic ethnobiology typically commences with questions directed toward learning the names people use to talk about plants and animals. This can be done by

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simply pointing at an example of a plant or animal and asking, "What is this?" Very rapidly, using this simple method, a fieldworker can collect many words for biological organisms in an unfamiliar language. However, this approach is problematic. For example, in Zapotec—the language of a people of Mexico studied by Hunn (2008)—one might ask, pointing to a tall prickly-pear cactus, *Zha lë ri?* "What is the name of this one?" The answer might be *yag-biaa-nquits*. From this response one could draw several different conclusions: *yag-biaa-nquits* designates (1) cactus, or (2) prickly-pear cactus, or (3) tree, or (4) thorny plant. The fieldworker must then proceed carefully, through more detailed questioning, to determine the precise referent. This, hopefully, will lead to the correct understanding that the Zapotec reply is best translated as "white prickly-pear cactus tree/shrub" and that this name refers specifically to *Opuntia robusta* x *O. ficus-indica*, a domesticated hybrid of two Mexican species of the prickly-pear genus *Opuntia*, one genus among many of the cactus family.

Opuntia robusta x *O. ficus-indica* is a name for the Zapotec plant from the scientific naming system developed in the eighteenth century by Linnaeus. Ideally, all plant and animal species around the world have scientific names. While not perfect, Linnaean names constitute the best available system for accurately referring to species of plants and animals regardless of how these are named in individual human languages.

The fieldworker should not assume that a people will have a specific name for every living thing in their environment. The great majority of beetles—of which there exists an impressively large variety in virtually every terrestrial environment—will go unnamed in most languages, as is the case in both English and Zapotec. When a name for a species does not pertain to a language, a speaker, for whatever reason, may nonetheless provide a fieldworker with an *ad hoc* designation. Consequently, investigators must learn to differentiate made-up, often descriptive terms from true, widely acknowledged names.

This can be fairly straightforward for English. For example, a blue bird (primary stress on bird) is typically something quite different than a Bluebird (primary stress on blue). An Indigo Bunting, by virtue of its coloration, is a blue bird, but not a Bluebird, while *Sialia sialis* (Eastern Bluebird), by virtue of its kind, is a Bluebird, though the female is more gray than blue. In contrast, the Zapotec situation is more difficult. For example, *guiee-nquits* "white flower," *guiee-nguets* "yellow flower," and *guiee-morad* "purple flower" are each sometimes simple descriptions and, thus, applicable to any flower of the appropriate color, but in other contexts are true names for individual species. In Zapotec these usages are not differentiated by stress or some other linguistic feature as they are in English.

Ethnobiological systems of peoples of traditional agricultural societies typically show names for several hundred species of plants and several hundred species of animals. This was first noted by the cultural anthropologist Claude Lévi-Strauss (1966: 153–154), who suggests that 300–600 terms may represent a "threshold corresponding roughly to the capacity of memory . . . ." Later, Brent Berlin (1994: 96–101) dubbed this "nature's Fortune 500."

What Names Tell Us

In theory, words are arbitrary signs, which mean what they mean by virtue of social consensus (Saussure 1983). The meanings of words, unlike sentences, cannot be inferred from the meanings of their constituent elements. However, some words, typically compound ones, may exhibit *descriptive force*, hinting at the nature of the thing named, without being entirely semantically transparent. For example, a White Oak is in some sense white, but exactly how?

Most likely the attributive "white" alludes to the pale color of the wood of the prototypical White Oak (*Quercus alba*). The term has since been extended to refer to a subgenus of oaks, *Leucobalanus*, the species of which share certain technical features, usually but not necessarily including whitish wood. The name *white oak* also implies that it refers to a kind of oak.

Harold Conklin (1962) and Brent Berlin (Berlin et al. 1974: 28–29) suggest typologies of biological names as useful starting points for understanding details of nomenclature applied to plants and animals. Conklin distinguishes *unitary* and *composite* biological lexemes or labels. Composite labels are also called *binomial* terms (or polynomial if generalized), these being compound words that include as a head term the name of a category superordinate to that named by the label plus an attributive that qualifies the head, for example, White Oak, a kind of oak. Unitary lexemes may be *simple* or *compound*. Cobra is a simple unitary lexeme. Copperhead is a compound unitary lexeme. A Copperhead (snake) is not a kind of head, thus the name is compound but not composite, in Conklin's terminology.

Berlin refines Conklin's system to distinguish two types of composite lexemes. The first are *productive primary* lexemes, such as *tulip tree* and *mockingbird*, with head terms that designate the more inclusive categories tree and bird respectively. Such names contrast directly with unitary labels (i.e., *primary* lexemes in Berlin's scheme) such as *oak* and *robin*. These compound terms might be called *generic binomials*, since they label what Berlin defines as *folk generic taxa*. (*Taxon* is another word for category, plural *taxa*.) Berlin's *secondary* lexemes (what might be called *specific* or *varietal binomials*) denote *folk-specific taxa*. White Oak contrasts with Black Oak, Red Oak, and Pin Oak, all kinds of the folk generic taxon oak that are folk-specific taxa. Great Horned Owl contrasts with Snowy Owl, Screech Owl, and Saw-whet Owl, all kinds of the folk generic taxon owl that labels folk-specific taxa. Secondary lexemes, according to Berlin, provide reliable evidence that the categories so-named are members of the *folk-specific rank* (see discussion of ranks below).

Languages vary a great deal in how they form names for plants and animals. Binomials may be abbreviated in certain contexts, or the head terms may be optional. For example, the Swallowtail Butterfly might more often be called simply a *swallowtail*. In such cases it may be difficult to decide if *butterfly* is a label for a folk genus or a more inclusive life-form class like those categories labeled by *tree* or *fish* in English. In any case, we know for certain that a butterfly is not a kind of fly. Such *pseudo-binomials* set traps for the unwary linguistic ethnobiologist. A second common pattern is for the *prototypical* species of a folk genus to be known simply by the genus name. Only less typical members of the genus are specifically differentiated. We speak of *cats*, understanding the name to apply to the domestic house cat, not to a wild cat such as the Bobcat. The word *cat* names two quite distinct concepts, the house cat and a more general category of felines that includes bobcats, lynxes, and lions. For clarity in linguistic ethnobiology we can distinguish these as cat_1 and cat_2. The former category is "nested" in the latter since cat_1 is necessarily a kind of cat_2.

Even the simplest names may have descriptive force. Many bird names, for example, are *onomatopoetic*, that is, they imitate a characteristic sound of the bird named. *Owl* is an example, although this name is so familiar we may not think of it as descriptive. Other onomatopoetic names are complex, with analyzable constituents, such as *killdeer* or *whip-poor-will*. If one were to encounter such names in an unfamiliar language, these might not be thought to be onomatopoetic at all. For example, the Tzeltal Mayan name for the great horned owl (*Bubo virginianus*) is *tuh-kulum-pukuh*, literally "stink of the devil" (Hunn 1977: 161), but despite its analyzability it is nonetheless clearly a rendition of this owl's call.

What Names Name

Names for biological things differ from personal names and names for pets such as *John* and *Rover* since they do not designate just a unique individual or entity. Rather, these names denote exemplars of categories of organisms. For example, the word *tree* can be used to refer to a specific tree, for example, a particular White Oak. This identified tree is not the only biological entity in the world to which the word *tree* is appropriately applied, since the word can be used to designate not only any one of all White Oaks, or any one of all oaks, but also all other botanical organisms people generally think of as being trees, such as pines, firs, and maples. Such names, then, not only serve to refer to things, but also flag those organisms considered to be similar (or, perhaps, even the same) by people who use the words. In linguistic ethnobiology, organisms sharing a name, such as *tree*, *oak*, or *white oak*, respectively constitute a biological category or taxon.

When two or more names refer to things of the same category, these names are *synonyms*. For example, Cottonmouth and Water Moccasin are synonyms since both names refer to the same species of snake, *Agkistrodon piscivorus. Polysemy* (a special case of *homonymy*) is the opposite of synonymy, where a single name is associated with to two or more distinct categories or concepts that are nonetheless related in some manner. An extreme example is the English word *man*. Depending on context, this may refer to any individual of the species *Homo sapiens*. More typically it refers to the male of that species, although it might be used to single out adult males, that is, "men from boys." Finally, *man* may refer to "real men," that is, those exhibiting certain exemplary masculine qualities of strength or assertiveness. These four polysemous uses of the word can be identified as man_1, man_2, man_3, or man_4.

Polysemous usage may reflect idiosyncratic or dialectical variation. For example, many English speakers call wasps *bees*, applying that term more broadly than speakers who consider bees to be quite different from wasps, although perhaps closely related. Some American English-speakers use the term *pine* to refer exclusively to trees of the genus *Pinus*; others apply the term more widely to include various trees of the family Pinaceae, including firs, spruce, and hemlocks. These variants might be distinguished as bee_1 and bee_2 or pine_1 and pine_2. Polysemy need not implicate just nested concepts such as the latter, but suggest metaphorical associations. For example, *dolphin*, which is most widely understood as denoting a small cetacean much like a porpoise, also designates a kind of tropical sport fish one often encounters on a restaurant menu. Apparently, these two marine creatures demonstrate some superficial resemblance to one another. (However, this usage may be fast disappearing since people are not inclined to order dolphin as a meal; consequently, *dolphin* apparently is being replaced by a less discomforting term for this seafood item, i.e., by *mahi-mahi*).

Polysemy also includes cases such as *poison oak* and *silverfish*. These are what Hunn calls *pseudo-binomials*. Taken literally, one might presume that *poison oak* designates a kind of oak, or *silverfish*, a kind of fish. Poison oak is not a kind of oak, such as is a White Oak, and a silverfish is not kind of fish, such as is an Ocean Sunfish. The associations between oak and poison oak and between fish and silverfish are metaphorical, implying that poison oaks are somehow like oaks, although not really oaks, and that silverfish are somehow like fish, although not really fish. The leaf of a poison oak plant resembles the leaves of certain species of oak. The silverfish is a primitive insect (*Lepisma saccharina*, order Thysanura), a household pest of cool, damp situations. The creature apparently is reminiscent of a tiny slithery fish.

Linguistic ethnobiologists have identified biological categories that are not named in languages but nevertheless are of significance to people. These have been dubbed *covert categories.* Apparently, people who speak the same language can all share a category without sharing a name for exemplars of that category. Researchers have demonstrated the existence of covert categories by having people sort plant or animal names written on cards into piles based on the similarity of the things named. When different names are consistently sorted together in a single pile, this can be taken as evidence of a covert category when the names designate organisms that do not have some name in common. Covert categories can also become evident when locals occasionally misapply a name to a plant or animal, but do so in patterned ways. Terence Hays observed such patterns in naming plants by the Ndumba people of Papua New Guinea (Hays 1974). An example of a covert category familiar to speakers of English is that of dogs, coyotes, and wolves. Creatures of these three categories "go together" for many speakers. While there is an English word that groups these together, that is, *canine*, it is not an everyday word known and used by all speakers (rather it is a specialist or educated term). Berlin writes of an *intermediate* taxonomic rank between his folk generic and life-form ranks (see below). Most such intermediates are covert and discoverable only by special tasks such as the pile sort.

Names and Prehistory

Because plant and animal names of long-extinct languages can be reconstructed using the comparative method of historical linguistics, we can also appreciate perspectives on the natural world of peoples who lived in the prehistoric past. Tools of historical linguistics are used by Brown (2006a,b, 2010a) in a series of recent studies to reconstruct words for important plants occurring in proto-languages. Proto-languages are reconstructed codes inferred from modern languages, for example, Proto-Indo-European, the parent language to modern English, Spanish, Irish, Greek, and Hindi (among others). Reconstructed names for living things show which plants and animals were important to peoples of prehistory.

An early effort to integrate ethnobiology and historical linguistics is an important study by Berlin et al. (1973). In this work, plant names are collected from speakers of Tzeltal and Tzotzil, two Mayan languages of Chiapas, Mexico. These two languages are genetically related since both are directly descended from a common ancestral language, Proto-Tzeltalan. Plant names found in each of the two languages that refer to the same respective species are compared for phonological similarity. If two corresponding words for a species are phonologically similar, the two words may be cognate, meaning that both have developed from a single name in Proto-Tzeltalan that designated the plant in question. For example, Tzeltal *may* and Tzotzil *moy* both designate *Nicotiana tabacum* L. (tobacco) and are phonologically similar. Berlin et al. (1973: 155) regard these as cognates, both of which have developed from a Proto-Tzeltalan word for the species (which is reconstructed by them using the comparative method as **mAy*).

Plant species designated by pairs of names, one each from Tzeltal and Tzotzil respectively, are grouped by Berlin et al. (1973) into four categories delimiting their cultural significance (from high to low): (1) cultivated plants; (2) protected plants; (3) wild-useful plants; and (4) wild-insignificant plants. A total of 257 plant species have both Tzeltal and Tzotzil names (1973: 161). Of these, 111 are designated by pairs of cognate terms attesting to a plant term's pertinence to the Proto-Tzeltalan lexicon. Paired terms for 146 species are found not to be cognate: 14 pairs pertaining to cultivated plants are found cognate and 2 are non-cognate; 29 pairs pertaining to protected plants are cognate and 7 are non-cognate;

52 pairs pertaining to wild-useful plants are cognate and 63 are non-cognate; and 16 pairs pertaining to wild-insignificant plants are cognate and 74 non-cognate.

The correlation between cognation and cultural significance is extremely robust and statistically significant: gamma = 0.97 (on a scale from 0.00 to 1.00, where 0.00 indicates no association whatsoever and 1.00 is a perfect correlation), $p < .001$. Plant names of Proto-Tzeltalan have strongly tended to be retained by its offspring languages when the designated plants are high in cultural importance, and replaced when of lesser significance.

Brown's (2006a,b, 2010a) research focuses on the names of plants that reconstruct for proto-languages of the New World, especially those pertaining to the prehistory of North America (Mexico, USA, and Canada). Special attention is given to native plants that in historical times have traditionally been managed by Native American peoples.

The implication of the Berlin et al. (1973) study for Brown's work is that plants with names that can be reconstructed were of substantial cultural significance for speakers of those ancestral languages. Lack of a reconstructed name in a proto-language suggests that the organism was not sufficiently important for its name to have persisted.

Glottochronology is a method devised in the mid-twentieth century to calculate when a proto-language might have been spoken. In a study of the development of agriculture in prehistoric Mesoamerica, Brown (2010a) applies a glottochronological method that uses a computer-based, automated procedure to calculate dates for 30 Mesoamerican proto-languages. For example, Proto-Tzeltalan is calculated to have been last spoken some 795 years BP (before present). We may plausibly conclude that *Nicotiana tabacum* L. (tobacco) and other plants for which names reconstruct for Proto-Tzeltalan were of substantial cultural significance some 800 years ago.

Brown (2010a) is able to determine when certain managed plants first became significant to Mesoamerican groups. For example, he finds that terms for *Zea mays* (maize) reconstruct for all 30 Mesoamerican proto-languages. The glottochronological date for the oldest of these 30 ancestral languages, Proto-Otomanguean, is 7034 BP. This indicates that maize was of significance to at least one group of Mesoamerican people at least 7000 years ago. Brown's research focuses on 41 plants which are today widely cultivated or protected by Native Americans of Mesoamerica. Table 19.1 is a listing of 11 of the better known of

Table 19.1 Better-Known Managed Plants of Mesoamerica Ranked-Ordered by Glottochronological Date from Oldest to Youngest[1]

Common English name	Scientific identification	Oldest date (in years before present)
Maize	*Zea mays*	7034 BP
Squash	*Cucurbita* spp.	7034 BP
Chili pepper	*Capsicum* spp.	4868 BP
Sweet potato	*Ipomoea batatas*	4387 BP
Tobacco	*Nicotiana tabacum*	3712 BP
Cotton	*Gossypium hirsutum*	3612 BP
Chocolate (cacao)	*Theobroma cacao*	3350 BP
Common bean	*Phaseolus vulgaris*	3350 BP
Papaya	*Carica papaya*	2659 BP
Pineapple	*Ananas comosus*	2455 BP
Lima bean	*Phaseolus lunatus*	2400 BP

[1] Table adapted from Brown (2010a).

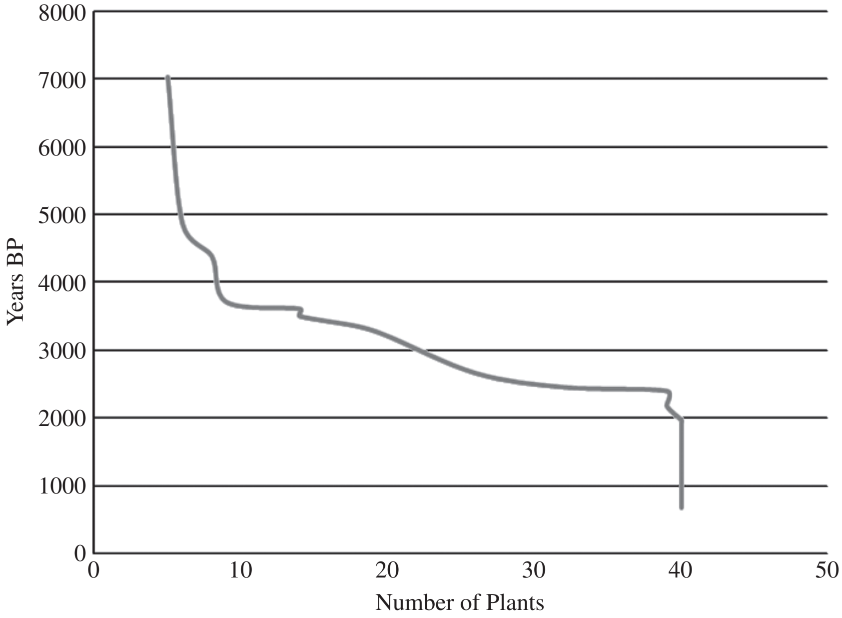

Figure 19.1 Association of the number of cultivated/protected plants named in Mesoamerican proto-languages in general with years before present. Photographs by Brown (2010a).

these 41 plants, ranked-ordered according to oldest glottochronological date, from earliest to latest.

Brown's linguistic results dovetail with findings from paleoethnobotanical studies undertaken by archaeologists. For example, it is now well established in the archaeological record and by plant geneticists as well that both maize and squash are among the earliest plants to have been domesticated in Mesoamerica. Names for these two plants reconstruct for the proto-language showing the oldest glottochronological date among ancestral languages of Mesoamerica.

Figure 19.1 graphically illustrates that from about 7000 BP to around 3500 BP there is a slow but steady increase in the number of different plant species for which names reconstruct for Mesoamerican proto-languages. At around 3500 BP we note an explosion in the number of plants for which names reconstruct. The date of 3500 BP corresponds with the archaeologically documented period when a village-farming way of life was becoming well established in prehistoric Mesoamerica.

CLASSIFICATIONS, FOLK AND SCIENTIFIC

The Perceptual-Taxonomic Theory

As noted earlier, ethnobiological inventories of human groups, as reflected by their names for organisms, can range into the hundreds for both plants and animals. While it is possible that these could be stored in the memory as simple lists, such a strategy seems improbable given the information management complications it would impose. Ethnobiologists have proposed instead that biological data is organized in the heads of people as a taxonomic hierarchy grounded in perceived relations of overall similarity and difference.

Scientific or Linnaean classification is the model for such a proposal. However, unlike the biological taxonomies of local groups, referred to as *folk-taxonomies*, scientific classification deals with all the living things of the world and must, therefore, accommodate millions of species organized within thousands of higher taxa related through "kind of" relations or relations of hierarchic inclusion. The Linnaean taxonomic hierarchy includes seven obligatory ranks (kingdom, phylum/division, class, order, family, genus, and species) plus many more intercalary optional ranks, as needed. Folkbiological taxonomies are, by comparison, very shallow.

A folk-taxonomic structure is a set of categories or taxa arranged so that every taxon is included within one and only one higher order class, up to the *unique beginner* or *kingdom* category, designated respectively by *plant* and *animal* in English folk-taxonomies. This structure resembles that of a tree (every twig is attached to one and only one branch, although each branch may give rise to numerous twigs) and may be called a *taxonomic tree*, although it is usually depicted upside-down, with the trunk above (the *kingdom*) and the twigs below (*terminal taxa*) (see Fig. 19.2). Each branching joint is a *node* in the taxonomic structure and constitutes a taxon that includes all subsidiary taxa. Unless covert, each such node is named. This formal structure requires one further specification. Taxa must be assigned to one and only one *taxonomic rank* (Kay 1971).

The most widely cited interpretation of taxonomic ranks is that provided by Berlin (1992: 13–20). He defines six universal ranks (see Fig. 19.2). The most basic rank is the *folk generic*. The least complex taxonomy would consist of an inventory of several hundred such generic taxa immediately included in a plant or animal kingdom (assuming that a language provides a name for the plant and/or animal as is often not the case). Generic taxa are defined as logically *general* and perceptually *salient*. Each generic taxon is *polythetic*, distinguished from all other generic taxa by several to many characteristics, and each is recognized by a distinct *gestalt*, meaning that exemplars of the category come to mind as a picture of the entire plant or animal. A corollary of these properties is that each generic taxon is likely to correspond with some phylogenetically recognized scientific

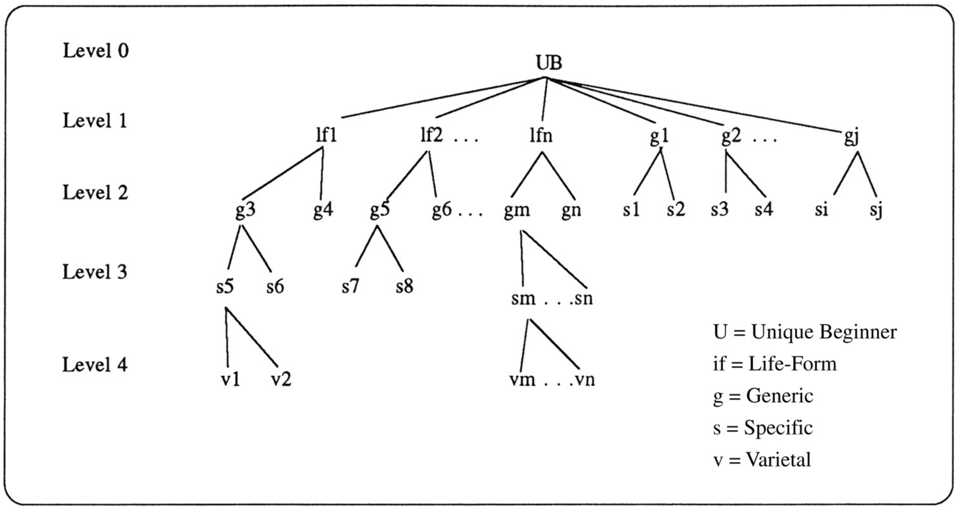

Figure 19.2 Schematic relationship of five of the six proposed universal ethnobiological ranks (née categories) and their relative hierarchic positions as shown in an idealized system of ethnobiological classification as proposed by Berlin et al. (1974: 26), without explicit permission.

taxon, often a single *species* (see discussion below). Generic taxa are typically understood as sets of living organisms that reproduce after their own kind, the traditional biological species concept of academic biology (Mayr 1957). Generic taxa are structurally basic. That is, they constitute the foundation on which is built the elaborated taxonomic hierarchy.

Between the ranks of *kingdom* and *generic* occur taxa of the *life-form* rank. Life-form taxa are few in number, typically less than ten, and include the majority of folk generics. For example, in English *bird* designates a life-form category that includes hawk, robin, sparrow, and all other avian species.

In any folkbiological taxonomy, a few generic taxa are found to be either *ambiguous* with respect to a life-form assignment or *unaffiliated* with any life form. Ambiguity may result from "fuzziness" in the boundaries recognized for categories, such as between tree and bush in English. Unaffiliated generic taxa may be considered of such extraordinary cultural significance or so morphologically different from other plants as to preclude incorporation as a "kind of" something else. Thus, maize (*Zea mays*) for many Mexican Indians is not a "kind of grass" but rather maize, pure and simple. English speakers do not consider a cactus to be either a tree or a bush but, rather, just a cactus, and therefore leave it unaffiliated. As a consequence, taxa of a given rank, such as, folk generic, may be found at different taxonomic *levels*. Such levels are defined by the number of nodes between a taxon and the unique beginner, as is illustrated in Figure 19.2 above.

Brown (1984a) presents cross-language evidence that some plant and animal life forms are given names by languages in relatively invariant orders, analogous to the lexical encoding sequence for basic color terms found universally for languages described by Berlin and Kay (1969). For example, languages universally tend to name life-form categories comparable in membership to, but not always exactly the same as, English bird, fish, and snake, before they assign labels to categories dubbed by Brown as mammal and wug (*worm* + *bug*). The latter two frequently named animal life forms respectively encompass all big creatures that are not birds, fish, and snakes, and all little creatures that are not birds, fish, and snakes, that is, all large (mammal) and small (wug) residual animals. Thus, after the naming of bird, fish, and snake, all three of which are robustly perceptually based categories, the remaining creatures are conceptualized in terms of binary opposition based on size (big/little) and named as contrasting groups of residual creatures. The validity of life-form encoding sequences has been questioned on the grounds that all life forms do not demonstrate the same common logical or perceptual basis, and that they may be impossible to distinguish from large, polytypic generics (Hunn 1982; Randall and Hunn 1984). Brown (1984b) vigorously challenges the latter point, but agrees with the former. For example, it is clear to him now, as it was decades ago (Brown 1984a: 107–113), that bird, fish, and snake are more grounded in perceptual reality than are mammal and wug. However, recognition of the ontological status of such categories in no manner invalidates the empirical finding that the naming of bird, fish, and snake typically precedes the naming of mammal and wug in most of the world's languages.

While life-form categories are always *polytypic*, that is, always immediately include at least two named taxa (ordinarily substantially more than two), folk generic taxa may be either *monotypic* or *polytypic*. If monotypic, the category includes just one type. For example, the generic category Coyote includes only the single species *Canis latrans*. Polytypic folk generics include two or more *folk-specific taxa*, the next rank below the generic in Berlin's scheme (see Fig. 19.2). White Oak and Black Oak are two folk specifics included in the English folk generic oak.

Berlin argues that folk-specific taxa are typically named through use of secondary lexemes such as *white oak* and *cutthroat trout*. However, some specific taxa are named with primary lexemes, as is often the case with *prototypical* folk specifics, that is, the most typical or best known species of a folk genus. Ultimately, a taxon is judged as folk specific by virtue of the fact that it is *immediately included* in a folk generic.

The statistical distribution of folk specifics exhibits a pattern known as the "Willis distribution" (Geoghegan 1976). Most generic taxa are monotypic, while the number of specific subdivisions of polytypic generics tails off along an inverse logarithmic curve. In traditional local systems, very large polytypic generics—those that include more than three or four specifics—are typically cultivated plants or domestic animals (Berlin 1992: 131).

Berlin defines an additional rank below the folk specific, that is, the *folk varietal* (see Fig. 19.2), which is nothing more than a structural replication of the folk specific. For example, in California there are several kinds of Live Oak (folk-specific taxon) such as the varietal taxa, Coast Live Oak and the Interior Live Oak. Typically, only a very few folk specifics will themselves be polytypic, including two or more folk varieties. Such cases are typically rare and usually limited to highly valued cultivars. Folk-varietal names are characteristically binomial or even multinomial, unless abbreviated, for example, Western Diamond-backed Rattlesnakes and Eastern Diamond-backed Rattlesnakes truncated respectively as Western Diamondback and Eastern Diamondback.

The psychological properties of folk-specific and folk-varietal taxa are not always clear cut. As a rule, specific and varietal taxa will be logically *monothetic*, that is, defined with respect to a simple feature contrast, such as color (black or white) or size (big or little). Such taxa will lack a distinctive *gestalt*, that is, a characteristic perceptual pattern. A "red rose," for example, is simply a rose that is red, and is not a particular variety of a rose for which a distinct gestalt can develop for people. However, folk-specific and even varietal taxa—defined structurally and nomenclaturally—may exhibit a range of logical and perceptual properties. Many folk-specific taxa correspond closely with biological species and are distinguished from congeners by a multiplicity of properties. For example, King or Chinook Salmon (*Onchorhynchus tschawytscha*) differ from Silver or Coho Salmon (*O. kisutch*) and from Dog or Chum Salmon (*O. keta*) in many details of shape, color, habitat, and life history, not to mention taste. Each is considered a distinct species not only by scientists but also by commercial and sport fishermen. In English we use binomial names, which are "secondary lexemes" in Berlin's typology, though Columbia River Indians give each species a distinct folk generic name (Hunn 1980). Such cases exhibit all the logical and perceptual criteria considered definitive of the folk genus. This suggests that Berlin's universal ranks do not represent fundamental cognitive contrasts. Hunn (1976) has proposed a "perceptual distance model" as an alternative to Berlin's taxonomic structural model to better account for the underlying psychological processes at play in folkbiological classification. This alternative accounts for the basic properties of taxonomic hierarchies but also explains phenomena that violate expectations of the taxonomic model.

Finally, Berlin defines an *intermediate* taxonomic rank between the folk generic and the life form. He notes that intermediate taxa are often covert (1992: 33–34; and see discussion above). Intermediate "taxa" sometimes are poorly delineated, representing not categorization properly speaking but rather the recognition of *taxonomic chains* generated from perceived similarities (Hunn 1975a; Hunn and French 1984), or simply *ad hoc* groupings (Brown 1974). For example, dolphins and whales for most English speakers "go together," despite their contrasting names. However, the Orca or Killer Whale may be seen as a link in a chain of resemblance that connects the smaller, toothed "Cetaceans" (to use the technical term), that is, the dolphins and porpoises, with the larger, mostly filter-feeding great whales.

Berlin's taxonomic proposal is imperfect but provides an essential common framework for comparative analysis. Future refinements might incorporate what Hunn terms *generic elevation* to account for taxonomic elaborations in treating domesticated species of special

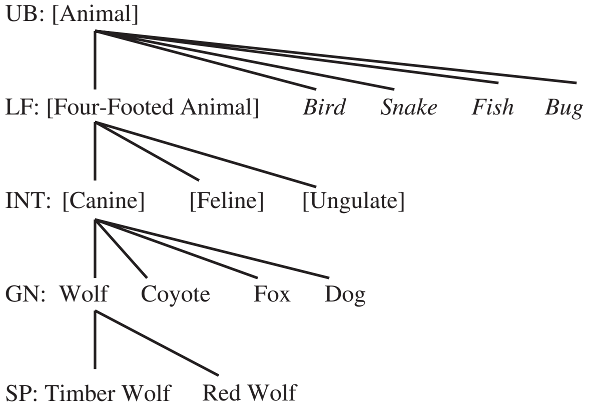

Figure 19.3 Standard taxonomic representation following Berlin (1992). Photographs by Hunn.

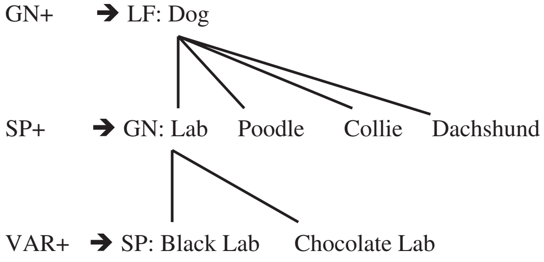

Figure 19.4 Elevation of dog to quasi-life-form status.

cultural salience in Western society (see Figs 19.3 and 19.4). In English, dog is a folk generic, although corresponding to a single biological species, *Canis familiaris*. Yet dogs have been bred to such a degree that variation within this single species mimics that within an entire life form. English nomenclature reflects this. The major breeds are named with primary lexemes, for example, *poodle, collie, retriever, great dane, dachshund*, and so on, as if they were folk generic taxa. These major breeds may then be further differentiated by means of binomial terms, such as, *toy poodle, border collie*, and *Labrador retriever*. Finally, Labrador retrievers may be called more simply *labs* and discriminated yet more finely as *black labs*, *chocolate labs*, and so on. These elaborations suggest that dog is first of all a folk generic but may also be "elevated" to quasi-life-form status. Consequently, major dog breeds are elevated to generic status (as the nomenclature suggests), some of which are polytypic, including "specifics" and "varietals" in turn. An alternative to this proposal is discussed by Brown (1987) wherein categories relating to major canine breeds would be recognized as *folk subgenerics*, that is, generic taxa that are immediately included in generic taxa (in this example, in a generic class labeled by *dog*). However this interesting phenomenon may be described, the nomenclatural elaborations in naming dogs, cats, horses, roses, and other highly salient species typical of Western cultures show that patterns recognized by Berlin still in general hold firm.

Differences in Folk Classification and Nomenclature Across Societal Types

In small-scale traditional societies, "mutts only" is generally the rule for dogs. Yet extensive classificatory elaboration may be found in traditional societies for biological domains that receive little embellishment in the folk classification of people of nation-states. For example, the Aguaruna Jívaro of Amazonian Peru recognize and name more than 60 varieties of manioc (*Manihot esculenta*) (Boster 1985). In contrast, how many speakers of American English can name but a single variety of this cultivar?

Agriculturalists use binomial labels, such as English *white oak* and *cutthroat trout*, substantially more frequently than do foragers. Collective generic terms such as *oak* and *trout* are common in vocabularies of many agrarians, but rare in those of hunter-gatherers for whom each species is more likely to be granted its own generic name. These societal differences were first recognized independently by Hunn and French (1984) and Brown (1985). Hunn and French (1984) report a dearth of binomial labels in the folkbiological classification of speakers of Sahaptin, a hunter-gatherer group of the Pacific Plateau (North America), and point out that this is in sharp contrast to the generous use of binomials in the classification systems of traditional agriculturalists (such as the Tzeltal of Mexico and the Hanunóo of the Philippines).

Brown (1985) is the first to attempt to quantify this difference by using large comparative samples. In his study, two language samples are used, one for botanical classification involving 36 globally distributed languages, and one for zoological classification involving 11 globally distributed languages. For Brown's botanical sample, 20 of the 36 languages pertain to non-farmers and the remaining 16 to farmers. For the zoological sample, 6 of the 11 languages pertain to non-farmers and the remaining 5 to farmers. Only 3.6% of plant classes and 7.6% of animal classes in the vocabularies of non-farmers are binomially labeled. In striking contrast, for farmers the comparable figures were 35% of all plant names and 31.6% of all animal names. These findings indicate that binomial labels are common in the folkbiological classifications of farmers, but rare in those of hunter-gatherers.

Brown (2001) considers possible explanations for the development of generic terms and binomial labels with the shift from a hunting-gathering way of life to one involving full reliance on agriculture. He notes an early Hunn and French (1984: 86–89) review of several possibilities. The explanation embraced by Hunn and French (1984) and originally by Brown (1985) as well, relates to the number of plant and animal classes pertaining to a folk system of biological classification. Data first assembled by Brown (1985) indicate that the size of such systems is positively correlated with the mode of subsistence: hunter-gatherers tend to have systems with considerably fewer biological classes than those of farmers. Also, the original data seem to indicate that the use of binomial labels is positively correlated with system size: the larger the system, the more binomial labels used. To explain this correlation, both Hunn and French (1984) and Brown (1985) note that binomial names may be especially useful in helping humans to store and recall large amounts of folkbiological knowledge. If so, this helps to explain the increase in binomial percentage with augmentation of the size of a system of biological classification. A problem with this explanation is that it is not clearly the case that the ethnobiological inventories of hunter-gatherers are always substantially smaller than those of farmers. Indeed, this was pointed out early by Headland (1985).

Brown (2010b) more recently favors an explanation offered by Berlin that emphasizes the role of domestication (1992: 286). With the development of farming, cultivars may have been the initial recipients of binomial names, a naming strategy that is generalized to wild relatives of cultivated plants and animals, then to closely similar sets of organisms both domesticated and wild. Another explanation offered by Eugene Anderson (pers. commun.) is that when societies become larger and more complex with the development of agriculture, people tend to move out of their smaller original habitats and encounter very similar, but nonetheless not the same plants and animals in new environments, this prompting them to employ primary lexemes for monotypic generic classes as head terms in binomial names for newly encountered similar species.

Comparing Folk with Linnaean (Scientific) Classification

Linguistic ethnobiology aspires to be a comparative science. Berlin's universal principles focus on cross-language patterns of classification and nomenclature which, according to Atran (1990), have been a primary source of inspiration in the development of the Linnaean classification of systematic biology. If both scientific taxonomists and folk classifiers view the biological world in the same way, then a 1:1 correspondence of basic folk taxa with scientific species is perhaps anticipated. Some investigators report a very high percentage of basic folk taxa in 1:1 correspondence with scientific species. Diamond (1966), for example, indicates that 85% of 110 Fore (Papua New Guinea) basic bird taxa correspond perfectly with locally resident bird species. However, Berlin reported that 61% of Tzeltal plant generics correspond 1:1 to scientific species, while Hunn tallied just 44% of animal generics in perfect correspondence (Hunn 1977: 82). Invertebrates weighed this statistic down, since many of these correspond closely to scientific taxa, but to genera, families, or orders rather than to species. Hunn (1975b) devised a more appropriate if somewhat clumsy index of this correspondence, which increases the agreement rate from just 44% to 92%.

The failure to achieve 1:1 correspondence may be due to a failure of the scientific taxonomist rather than that of the folkbiologist. For example, Columbia Plateau Indian elders distinguish *mam īn* from *sasamit'a*, both of which are considered to belong to a single Linnaean plant species, according to the definitive *Flora of the Pacific Northwest* (Hitchcock and Cronquist 1973: 329). However, the elders consider *mam īn* roots to be a favorite food, while those of *sasamit'a* are considered to be of interest only to "groundhogs." More recent laboratory analysis proved the elders were correct; the Indian names refer to two quite distinct species (Hunn and French 1981; Schlessman 1980).

In many cases correspondence is close but not perfect. These may be tallied as either *over-differentiation* or *under-differentiation* (Berlin et al. 1973). In the former instance, folk-taxonomists *split* a scientific species; in the latter they *lump* two or more such species. Over-differentiation is primarily encountered with cultivated varieties for which we often lack any corresponding scientific names, although such cultivated varieties may well be genetically distinct. One must be careful here not to misconstrue nomenclatural distinction of sex and age as over-differentiation. In English we may speak of a cow and a bull but, except for the collective noun *cattle*, we have no ready term for the species *Bos taurus*. Yet can there be any doubt that most adult Anglophones know perfectly well that we have but a single species here?

Under-differentiation may range from lumping together two closely allied species of a single genus to the use of catch-all residual categories such as the American English "bug." The Koyukon of the Alaskan interior are intimately familiar with their local bird life yet fail to distinguish Greater from Lesser Scaup, and Common from Hoary Redpolls (Nelson 1983: 269–270). These species pairs are notoriously difficult to distinguish. By contrast, Indigenous farming communities in the tropics often dismiss the multitude of migratory warblers and flycatchers in very general terms. *Yaj* in Yucatec Maya refers to "small dull-colored flycatchers, a catchall term with vague boundaries ..." that might include over a dozen species of several genera of the tyrant flycatcher family (Anderson and Medina Tzuc 2005: 173). When Hunn pestered his Sahaptin teachers for the names of various wild flowers blanketing the spring slopes of the Columbia Basin, he was told that they were *awtya ay latit*, that is, "just flowers" (Hunn and Selam 1990: 198–200). Patterns of over- and under-differentiation provide evidence for cultural focus. Elaboration of vocabulary as a rule is motivated by utilitarian biases, not limited to what is edible but including as well species of medicinal, technological, aesthetic, spiritual, and ecological value (Hunn 1982).

Hunn's (1999) Scientific Species Recognition Ratio (SSRR) calculates the degree of precision of the entire folk system of a human group in granting recognition to local biodiversity, measured in terms of local species richness as recognized by local versus Linnaean systems. If there were 100 Linnaean species of a particular class of organism known to occur within the experiential range of a community and that community were to recognize 65 corresponding basic categories, then the ratio in question would be 0.65. This index allows comparisons between basic categories such as plants versus animals, birds versus mammals, large versus small organisms, and aquatic versus terrestrial species within a cultural system, as well as cross-cultural comparisons, calibrated to the specific biogeographic reality. One positive result of using this index is the not entirely surprising finding that smaller organisms are recognized in folk systems with less precision than are larger organisms.

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