do life-forms evolve or do uses for life? some doubts about Brown's universals hypotheses

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In a series of important papers concerning the nature and evolution of folk biological categories, Cecil Brown (1977, 1979a, 1979b, 1981a, 1981b, 1982; Brown and Witkowski 1982) has attempted to show that Berlin and Kay's (1969) main observations regarding the domain of color are also applicable to "trees," "birds," and other so-called life-forms. Brown claims that a small set of highly inclusive plant and animal terms are like basic color terms both because they are linguistic universals and because they co-occur in such nonrandom patterns that one must assume they evolve as languages change. As with color, Brown concludes that the number of life-forms named is related to a society's cultural evolutionary development and that the content of life-form taxa reflects psycholinguistic principles (cf. Hays, Margolis, Naroll, and Perkins 1972; Kay and McDaniel 1977). Despite the sweeping nature of these claims, their publication in numerous widely read journals, and the obvious implications of findings parallel to the color-term discoveries for ethnosemantic research, Brown's studies have received little published criticism (but see Riley 1980).

Yet none of Brown's hypotheses apply very well to the field languages we have studied most carefully: Columbia River Sahaptin (Hunn), Southern Philippine Sinama (Randall), and Mayan Tenejapa Tzeltal (Hunn). In attempting to explain why his hypotheses differ so strikingly from our own observations, we have considered and rejected the possibility that we happen to have studied exceptional languages. Rather, we think (1) that Brown's sources are not sufficiently reliable nor detailed to prove or disprove his hypotheses; (2) that Brown's concept of "life-form" is too loosely defined to allow the evaluation of his hypotheses; and (3) that Brown's universal categories are not broadly comparable *life-forms* but instead represent a diverse set of concepts defined by function, habitat, morphology, or the lack of such attributes.

Standard hypotheses regarding folk biological life-form evolution are not confirmed by data from Sinama, Sahaptin, and Tzeltal. This is probably because such hypotheses have been developed from highly inadequate data. Empirical determination of the focus, range, and defining features of highly inclusive categories shows that such categories are not universal, as has been claimed. Frequently, such categories class what is useful or useless, and therefore reflect a closer correspondence between biological categories and socioeconomic factors than current theory admits. [cognitive anthropology, ethnobiology, folk classification, language universals, category exemplars]

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The languages we have studied label life-form concepts that (1) fail to correspond to the developmental sequence favored by Brown; (2) are defined by form criteria quite unlike those cited as criterial by Brown; and (3) are not included by Brown in his set of universal life-forms. In addition, these languages stress categories of plants and animals comparable in scope and function to life-forms but which conjoin morphological, functional, and other criteria, presumably because such concepts are of practical importance in everyday life. Thus, these highly inclusive categories violate Brown's view that the general plant and animal categories of a language can be partitioned between significant morphologically defined concepts and insignificant concepts defined by criteria other than morphology.

Brown's life-form hypotheses

Brown's arguments pertain to the evolution of folk biological life-forms. Following Berlin (1976), he argues that life-forms are highly inclusive categories designated by "a small number of distinctive features pertaining to the form of the whole" (Brown 1977:320). They contrast, therefore, with highly inclusive categories of plants and animals defined not by gross morphology but rather by uses (e.g., *farm animals, vegetables, weeds*), life cycle (e.g., *perennials*), stages of growth (e.g., *fingerlings, sprouts*), habitat (e.g., *flying creatures, tropical plants*), and mutual association (e.g., *herds, hedges*).

Life-forms are contained within the "plant kingdom" and "animal kingdom" categories and, as Conklin (1954:163) and Berlin, Breedlove, and Raven (1973) have shown, in turn, contain numerous *folk generic* subcategories. Cognitive psychologists have called such folk generics *basic* categories and over the last several decades have intensively studied basic categories such as *chair, carrot,* and *robin* (cf. Rosch and Mervis 1975). Generic names, according to Berlin, Breedlove, and Raven's apt description, are the usual names for things and are semantically unitary (primary lexemes). Contrasts among closely related generic categories are numerous and such categories are typically distinguished either by large numbers of distinctive features (Rosch and Mervis 1975) or by a gestalt pattern (Bruner, Goodnow, and Austin 1956), which is inductively learned (Hunn 1976).

In his plant study Brown (1977:320) says that there is "considerable richness in the variety of life-form categories" found in world languages. He cites "cacti," "palms," and "agave" as life-forms that occur in restricted ecological contexts and therefore could not be universals. By contrast, he says there are five life-forms that have global relevance and therefore are potential universals: *tree, grass, bush, vine,* and *herbaceous plant* (or the *herbaceous plant* and *grass* joint category *grerb*). Brown claims that these five categories have substantially the same meaning in all languages that categorize them. "Trees" are defined as relatively large and chiefly ligneous (woody); "herbs" or "grerbs" are smaller and nonwoody; "grasses" are herbaceous plants with narrow, bladelike leaves; "bushes" are woody plants intermediate between "trees" and "grerbs" in size; and "vines" creep, twine, or twist. Using dictionaries, ethnographic reports, and a few informant interviews to inventory life-form terms in world languages, Brown concludes that the category glossed above as "tree" will be given a name if any life-form is named; that "grerb" will also be labeled if two forms are named; that either "bush" or "vine" will be labeled if there are three terms; and that what remains of "bush," "vine," and the "grass" portion of the "grerb" category will be labeled if there are four terms.

In similar fashion, Brown (1979, 1981a; Brown and Witkowski 1982) has argued that there are universal animal life-forms. "Fish" are said to be creatures adapted to an aquatic environment, with fins, streamlined bodies, and usually gills. *Focally,* the category always includes what biologists consider true fish, and the category can be *extended* to cetaceans and

even crustaceans (Brown 1979a:793). "Birds" are large when compared with bugs, and they possess wings, are adapted to flying, and have feathers and bills or beaks; but the category can be extended to flying mammals such as bats. "Snakes" are featherless, furless, elongated creatures usually lacking appendages; in greatest extension, the category includes snakes, worms, eels, lizards, and occasionally reptilelike insects. "Worm-bugs" (or "wugs") are defined by Brown as *small* creatures other than birds, fish, and snakes. The category includes insects, spiders, frequently worms, and occasionally small lizards, tortoises, and frogs. "Mammals" are large creatures not classified as birds, fish, or snakes. The category always includes quadrupedal mammals but also may include large amphibians and reptiles.

Again, using a variety of data sources, Brown (1979a) concludes that these folk zoological life-forms are universal and that a language's inventory of named forms evolves. In one of his latest studies he has assembled nondictionary life-form data from 144 languages (Brown 1981a). He claims that all languages surveyed either name no life-forms, from one to three of the triple ("bird," "fish," "snake"), or if more than these three, either one or both of "wug" and "mammal" or a conjoined "wug-mammal" form.

For folk biological life-forms, Brown (1979a:805) argues that the observed evolutionary regularities may be explained primarily by "general principles of naming behavior" and secondarily by what Berlin (1972:83) has described as the tendency of urbanized people to need generic plant and animal terms less, and therefore general-purpose categories more. Brown (1977:331; 1981a) does not believe that the life-form inventory of a people is *in general* significantly related either to the main biological groupings found in a people's environment or to the uses people make of plants and animals.

The principles of naming behavior invoked by Brown to explain life-form inventories in a language include (1) criteria clustering, (2) binary opposition, (3) dimension salience, and (4) linguistic marking. Essentially, Brown holds that some biological categories are universal because major divisions of the plant and animal kingdoms (such as fishes, snakes, birds, and perhaps grasses) each exhibit a cluster of numerous highly distinctive perceptual features. Biological categories without criteria clustering, such as "tree," "vine," and "mammal," may also be universal, however. This is because attributes such as shape and size are universally useful in categorizing a wide range of objects and because these are salient in biological categorization as well. Due to a universal tendency to dichotomize attributes, some biological categories may be further differentiated as being big or small, tall or short, woody or nonwoody. Since there is, as well, a universal tendency for humans to "mark" extremes before intermediates, categories such as "bush" are not found in languages unless there are also tall "tree" and short "herb" botanical life-forms.

In addition to these claims about the substantive nature of life-form categories in all languages, and the psycholinguistic causes of this ordering, Brown makes the further claim that societies with high urbanization and complex stratification tend to have more life-forms than technologically more primitive societies. He ascribes this to the relative unimportance of specific knowledge of plants and animals among urban peoples.

problems with Brown's hypotheses: secondhand Sinama data

Brown is (and was) the first to admit that the sources he used in his initial studies (e.g., 1977, 1979a) were far less than ideal. He recognizes that dictionaries often employ very crude glosses and that lexicographers are more concerned with facilitating interlanguage communication than with testing universalist ethnosemantics. For this reason, Brown cor-

rectly prefers either the work of anthropologists and linguists who have reported particular biological categories for particular languages or direct studies (by himself or others) undertaken to test life-form hypotheses. In Brown's (1981c) recent work he has made extensive efforts to obtain these latter types of data.

Unfortunately, there are serious problems even with this more reliable type of second-hand data. Take for example, Brown's (1977:323) use of Randall (1976) as authority for his conclusions regarding Sinama (or Samal[1]) folk botanical life-forms. The article in question is not about life-forms, and, indeed, the term is not even mentioned. Rather, the article deals with whether taxonomies (and therefore, incidentally, taxonomic concepts such as life-forms) can be said to have cognitive status.

In the course of Randall's argument, several highly inclusive Sinama botanical categories are mentioned and are assigned English glosses. For example, *kayu* is glossed as "trees," *sagbot* is glossed "nonwoody vegetation," *bahan* is glossed "vines" and, further, is included with a grass species as a "type of" *sagbot*. The article neither suggests nor denies that Sinama has a category "bushes." From the context it should have been clear that no attempt was being made to provide an exact English equivalent of the Sinama terms. Rather, the glosses were meant to be rough approximations useful as mnemonics (Frake 1969:136). Brown mistook Randall's intention, however. He says Randall translates Sinama *sagbot* as "nonwoody vegetation" (Brown 1977:323) and therefore concludes that the Samal have two life-forms: "tree" and "herbaceous plant." "Vine" is considered absent presumably because it can be "a kind of *sagbot,*" and "bush," for unspecified reasons, is considered absent (1977:322).

Although this inference about "bush" is, as it happens, correct, Brown's other suppositions from very meager evidence are not. At the time the article was written, no in-depth studies had been undertaken on these categories. Glosses for them had been obtained in the usual way they are acquired while learning a language. Once acquired, they were casually tested in conversation and by observation. For example, informants typically pointed to what Americans would call *large trees* as good examples of *kayu,* and they insisted that *sagbot* could never be *kayu* because *kayu* makes good firewood and *sagbot* does not. Since others studying Philippine folk botany had found a similar dichotomy between woody and nonwoody plants (Conklin 1957:44; Frake 1969:134), the Sinama glosses seemed accurate enough. But no detailed study had been made, and there had certainly been no systematic attempt to assess the extent to which various Samal agreed with these ideas (cf. T. Hays 1976). There was, therefore, no good reason to decide that any of these categories was based on gross morphology or on any other membership criterion.

In subsequent research, 17 male and female Samal of diverse ages, degrees of education, wealth, and urbanization were interviewed in detail regarding their suprageneric plant and animal categories.[2] As we shall see, Sinama clearly has no "herbaceous plant" life-form, probably has no "tree" life-form, but very likely does have a "vine" life-form. There is, of course, no way Brown could have known this when he wrote his 1977 article, but he could have been more skeptical about the quality of his data. Mnemonic glosses—even those acquired by reasonably careful research—are not the same as translations developed by studies designed to determine precise semantic equivalence.

The finding that Sinama has a single life-form "vine" runs counter to Brown's central hypothesis that a language that labels only one or two life-forms will not label "vine." In Brown's 1977 survey, only four languages with one life-form were discovered: three had "tree" and one, an "exception," had "vine" (1977:324, 327). But if Sinama, too, has only "vine," then 40 percent of languages with one life-form have "vine" and the hypothesized evolutionary sequence breaks down.

Taylor (1982:personal communication) has remarked that Brown nowhere explains how

one determines whether a dictionary or ethnographic gloss fits a universal life-form definition. It seems to us, however, that the example above casts doubt not just on Brown's methods but on the very idea of using glosses to test universalist ethnosemantic hypotheses. Glosses often reflect an informant's satisfaction that an anthropologist has learned an approximate meaning. Unfortunately, even this partial understanding is often further eroded when an anthropologist ignores details in an attempt to communicate with English-speaking audiences. Mnemonic glosses should not be considered evidence for semantic universals hypotheses. They may be effectively used in the early stages of theory building, but to prove a semantic universal one must use translations which are plausibly claimed to be semantically precise descriptions.

firsthand data sources for Brown's generalizations

Attempts by Brown and others to use interviewing to directly test the hypotheses do not necessarily produce trustworthy data either. The reason is that in the early years of primary school, modern education teaches biological (or European) concepts such as *tree, bird, fish,* and *snake.* Children taking primary education in languages other than their native one quite probably obtain some of their earliest general ideas about living things in a European auxiliary language and therefore may borrow their highly inclusive biological categories from European languages influenced by Western scientific biology. Quite possibly, they search for "an identical word" in their native language, find the nearest equivalent, and then infer that the highly inclusive terms in both languages have identical meanings. In time, even monolinguals might conclude that schoolchildren know "what's right," and universallike equivalences between languages may be reported for reasons quite different from the ones Brown proposes.

Something of this sort has happened in Sinama. Informants who had several years of school, when asked to list kinds of *manuk-manuk* or kinds of *kayu,* frequently translated the categories into English *bird* and *tree.* Then they asked those listening who had knowledge of English whether, for example, *kabog* ("bat") is *a bird* or whether *saing* ("banana") is *a tree.* Some informants gave an obviously school-learned rationale for considering "bats" not to be *manuk-manuk* ("birds").

By contrast, several elderly, non-English-speaking informants with no formal schooling astonished Randall's educated field assistant by listing "moths" as "birds." The assistant was asked if he had heard such usage before, and he recalled:

> Once when I was a quasi adolescent, my father and I were night fishing (with the pressure lantern) and a moth flew under the glass, broke the mantle, and put out the lantern. I hadn't seen what happened, but my father said a *manuk-manuk* had flown into the lantern mantle. I remembered being very surprised because I thought at first, perhaps, an owl had somehow gotten under the glass.

It seems likely that he had hitherto assumed that the meaning of the term *bird* he had learned in school was identical to that of the *manuk-manuk* term he had heard villagers using.[3]

Interviews with bilingual, schooled informants may be used heuristically in the manner of Berlin and Kay (1969) and Brown (1977, 1979a) to develop universalist ethnosemantic hypotheses, but testing such hypotheses preferably involves both the interviewing of monolingual informants having as little formal education and European acculturation as possible and attention to lexical usage during everyday conversation. It is certainly more difficult to obtain such evidence than to consult dictionaries, ethnographic summaries, or university students. Still, it seems essential to seek such data if we are to avoid confusing semantic universals with semantic convergence.

Most of the data Brown cites demonstrate only rough approximations of meaning in an auxiliary language. In no case, to our knowledge, has Brown endeavored to replicate the Berlin and Kay procedure of rank ordering members of a category from exemplary to marginal. Nor does Brown cite direct evidence for his claims about the defining attributes of the alleged universal terms. His evidence for biological life-form universality is therefore not equivalent to the demonstration that color concepts are everywhere defined by hue, brightness, and saturation.[4] Brown also has not shown how the ranges of categories contract as life-forms are added, nor that life-form exemplars are everywhere the same, nor that intracultural variation replicates intercultural variation. His argument is thus by no means as compelling as the color hypothesis. What is clearly needed for each language used to prove such a hypothesis is a list of highly inclusive biological categories; examples of their use in spontaneous, culturally appropriate contexts; indications as to which members are exemplary, good, fair, or marginal, and why speakers think so; and a description of the informant sample on which the data are based.

Brown's operational definition of life-form is too vague

Both the Sahaptin data discussed later and the Sinama data confirm that Brown's definition of life-form is too vague in many cases to determine whether a category is or is not a life-form. Consider, for example, the difficulty of determining whether "snake" is a life-form category in Sinama. According to Brown (1979a:795), "snakes" are featherless, furless, elongated creatures adapted to crawling and usually lacking appendages. But the Samal have four such categories: *baat* ("sea cucumber"), *olet* ("worm"), *soa* ("snake"), and *endong* ("eel").

"Snakes" are well known to the Samal not only because Samal are Muslim and know about Adam and Eve but also because there are two types of snake found in the environment: the rare "land snake" *(soa ma tana)* and the very poisonous "sea snake" *(soa ma tahik)* commonly seen by night fishermen. "Snake" is a Sinama life-form only if forms that include numerous subtypes, such as *manuk* ("chickenoid"), *kagan* ("craboid"), and *olet* ("worm"), can be considered so as well. For the Samal, "snakes" are as well adapted for swimming as for crawling, so they do not meet Brown's universal criteria. There are, moreover, only two types of "snakes," and each is binomially labeled. The evidence thus suggests that *soa* is a folk generic, not a life-form.

Brown (1981a:309) concedes that "snakes" may be rare or absent in some ecosystems and "fish" rare or absent in others, and that this accounts for the total absence of expected life-forms in some languages. However, he fails to use analogous reasoning to reach a conclusion that contradicts his hypothesis of a language's life-form inventory being independent of local biological variation. We expect that environments with few natural species of "fish" or "snake" will have languages with generic rather than life-form-level fish and snake categories. We therefore support Riley's (1980) assertion that the inventory of life-forms in a language is heavily constrained by the species pool of an ecosystem.

Sinama botanical life-forms are not the ones Brown predicts

In Sinama there are five highly inclusive plant categories: *bahan, kayu, sagbot, sayul,* and *tumbu-tumbuhan.* All informants immediately recognized the name *bahan,* and when asked to give examples readily listed five to eight monotypic generics considered to be kinds of *bahan.* Every informant listed the *bahan*'s tendency to "crawl" and to "climb" as definitive,

but some also listed "for tying" as a criterion and excluded "snap beans" from exemplary *bahan* on this ground. Of the 13 kinds of *bahan* mentioned, 3 were listed by everyone near the beginning of their list (rattan, the fish poison vine *Anamirtis coculus,* and a common weed plant *kabula?-bula?*). Although no one included the snap bean as a type of *bahan,* one informant did claim that some tuber-bearing vines that lack the tough stems necessary for tying things are nevertheless *bahan.* We conclude that the range of *bahan* is approximately equivalent to English *vine* but that "real" *bahan* is more accurately glossed "lashing plant."

The Sinama (and Malayo-Polynesian) term *kayu* is usually glossed in English as "tree" or "wood" (cf. Witkowski, Brown, and Chase 1981:5; Brown 1982). But Samal interview data and free-recall lists of *kayu* clearly show that this gloss is erroneous for Sinama. All informants readily recognized the term *kayu* and, without being pressed, listed 7 to 44 examples (median = 18). Representative remarks on the attributes of *kayu*[5] were as follows: (1) "it's good as wood for cooking, for making houses, making canoe hulls; real *kayu* is strong enough for inboard canoe outrigger spreaders"; (2) "*kayu* is hard, is not easy to slice [with a bolo], doesn't exactly wave in the wind"; (3) "it has no use except for firewood or making houses, it cannot have fruit." No one mentioned Brown's "size universal" for "trees" except a schoolteacher, who said, "*kayu* grows big, is hard, and burns."

If one looks at the free-recall lists of *kayu,* considering those first mentioned as exemplars and the remainder as peripheral members, then it is possible to determine how important the above-mentioned attributes are. Every list contained numerous hard, rigid, large plants useful for the purposes mentioned. A large percentage of the plants mentioned obtain "circumferences greater than two arm spreads" and "heights greater than those of old coconut palms." Americans would therefore consider most *kayu* to be exemplary *trees.* The similarity in the categories is more apparent than real, however, since large, straight, rigid (i.e., woody) plants tend to be the most useful for burning, for making canoe hulls, for building houses, or for constructing outrigger spreaders. To test the equivalence of Sinama *kayu* and English *tree,* one must search the free-recall lists for plants that lack useful wood but have a "tree" shape, or for plants that have useful wood but lack the "tree" shape.

Three woody plants without tree form were found on the lists: a type of bamboo, manioc, and a mangrove species. The bamboo *kayawan* (possibly from *kayu* + *an*), though commonly used for house flooring, is much too weak for planks or outrigger spreaders, and its hollow interior makes it burn too quickly to be good cooking fuel. Only one person listed the plant as *kayu,* and that person did so toward the end of the list. The term for "manioc" derives historically from "the *kayu* sweet potato." However, it was mentioned on only a few lists, and only one person mentioned "manioc" near the beginning of the list. Although the plant may develop a fairly large and woody trunk, it is generally regarded only as "quasi *kayu*" *(kayu-kayu)* because it is only used for food. It might appear, then, that Samal *kayu* and English *tree* are comparable in extension. The Samal "mangrove" category disconfirms this hypothesis, however. The mangrove *bangkaw* is multistemmed, has very crooked branches, ranges from 1.8 to 4.5 m in height, but is one of the most common types of firewood found in the area. It was listed by nearly everyone interviewed—among the top five *kayu* by nearly half the informants and first by one person.

These differences are further confirmed if one looks for plants having tree shape but useless wood. Brown says that "woodiness" is a universal criterion for categorizing a plant as a "tree." In our experience, Americans routinely label as *tree* any plant, whether woody or not, that is tall, rigid, single-stemmed, and has a well-developed crown. *Banana trees,* for example, are not woody. By contrast, the Samal think it ludicrous to say "bananas," "papayas," and "coconuts" are *kayu.* Coconuts are a principal cash crop and all Samal in-

terviewed lived on coconut palm plantations. "Coconut palms" have fronds and husks which are a major source of firewood, and very old trunks may be used for low-quality lumber. But generally the trunks are useless and could never be used in the many ways *kayu* are used. Accordingly, only two informants listed "coconut palm" as a kind of *kayu*. Coconuts are thus marginal *kayu* for most Samal.[6]

What Americans would call *fruit trees* are not good *kayu* for the Samal either. This is because "jackfruit," "the sweet mango," and other common fruit-bearing plants are not normally useful for wood. Only the "sour mango" is useful because its roots are used for bolo handles. Nearly half the Samal interviewed failed to list a "fruit tree"; one said *buaʔ* (i.e., "fruit") *kayu* "possess *kayu* [i.e., "potentially burnable wood"], but are not *kayu* [i.e., "normally useful wood"]." The remainder placed such plants well down on their lists, and many felt constrained to spontaneously qualify inclusion on the list with "it's not really *kayu*."

In sum, most Samal think *kayu* should have hard trunks useful for boat and house construction and for cooking fuel, but some Samal think anything useful as firewood *(pagkayu)* is *kayu*. For most, the range of *kayu* is extended to potentially useful or marginally useful woody plants. There is no evidence, however, that "overall form" or "size" are as salient as "use" in defining *kayu*.

The remaining Sinama highly inclusive plant categories are clearly not life-forms. *Sinayul,* although highly salient for the Samal, encompasses virtually every conceivable plant form (mushrooms, bananas, coconuts, tree leaves). It is best translated as "things that sprout and are suitable as food to accompany the starchy staple." *Tumbu-tumbuhan,* by contrast, is a rarely used, somewhat archaic word which once meant roughly "things that sprout from the earth" but which in modern usage focally denotes either "terrestrial food plants" or "useful terrestrial plants."

Sagbot has a range of meanings pertaining to uselessness. Samal in some villages listed "waste paper," "dead leaves," "useless plants," and *sagit* ("trash") as prime examples of *sagbot*. Children are often told to clean up the *sagbot* and burn it. However, residents of one village expressed amazement at this definition and said *sagbot* were always living, or recently living. These informants described exemplary *sagbot* as self-sprouting (i.e., not planted) and useless. Some included plants such as "rattan" in the range of *sagbot* because rattan produces no food, and some extended the term to food plants with useless leaves such as "sugarcane." Others extended the term to "oregano" and other wild plants having leaves useful only for seasoning, and still others evidently considered any self-sprouting plant *sagbot* whether or not the leaves are eaten (e.g., a water spinach used as a green). By contrast, decorative houseplants are planted but many nevertheless considered them *sagbot* because they are inedible. It seems obvious that no single criterion defines the *sagbot* range. Rather, exemplary *sagbot* are useless and therefore not planted. Planted vegetation without much use, or wild vegetation of limited use, can be considered to fall within the periphery of the term's range of reference.

As one would expect, "vines" in Sinama can either be useless (and therefore *sagbot*) or useful for wood (and therefore *kayu*), for food (and therefore *tumbu-tumbuhan* and *sinayul*), or for lashing (and therefore *bahan*). Of the Sinama terms considered above, only "vine" was consistently defined by the form of the whole plant; even so, exemplary vines are useful for lashing as well. Of the remaining terms, only *kayu* meets the criteria Brown suggests for a life-form. But from the discussion, it is clear that both the range and focus of *kayu* differ from English *tree* because the criterial attributes are different. Depending on one's definition, then, Sinama has one or two botanical life-forms, but they are not the ones Brown predicts.

Sinama zoological life-forms are not the ones Brown predicts

There are no highly inclusive animal categories in Sinama that exactly correspond to Brown's hypothesized universal life-forms. There are, however, four categories that nearly qualify as life-forms: *daing* ("fishoid"), *tinebba* ("shelled molluskoid"), *manuk-manuk* ("bird-oid"), and *hinayop* ("quadrupedal mammaloid"). There are two other categories with some life-form characteristics—*sanam* ("antoids") and *binatang* ("large, forbidden animals")—but this last term is highly variable in meaning and is not considered here. In addition, there is a more inclusive "kingdom" category *satua?* ("creatures") and three intermediate classes of "fishoids" that could be considered life-forms in their own right if the "fishoid" term were disqualified.

The case for designating the fishoid category *daing* a life-form is strong only if one restricts consideration to exemplary *daing*. Most of the approximately 350 terminal taxa in this huge category are clearly what icthyologists consider *fish,* but for reasons that will become apparent shortly, the Sinama category does not fit Brown's definition perfectly. Free-recall lists of *daing* typically name 40 or more commonly eaten varieties. These are what Brown predicts, with the exception of a few cetaceans, sharks, rays, and occasional squid. They have the bones, fins, gills, and characteristic "bullet" streamlining that icthyologists classify as *true fish*. However, they also are free-swimmers and most of them are caught and either eaten or sold. There is evidence that in unmarked contexts all of the above characteristics are included in the *daing* focal definition.

Informants were interviewed to determine whether various sea creatures were "real" *daing,* "not exactly" *daing,* or "decidedly not" *daing*. There was complete agreement that classic food fishes (such as tuna, scad, and trevally) are *daing,* and that sea snakes, sea turtles, shelled mollusks, sea serpents, crustaceans, and cuttlefish are decidedly not *daing*. There was some variation regarding what are "not exactly" *daing*. Some informants said that rays, squid, and shark lack bones but are "not exactly" *daing* even though they are frequently caught with hook and line and are eaten; others denied that rays and squid are *daing* but claimed that a large number of true fishes are "not exactly" *daing* because for one reason or another they are not good food. Fish that are tasteless, tiny, smelly, or poisonous, such as flounder, coral fish, anchovies, surgeonfish, or puffers, were all said to be "not exactly" *daing*. For all informants, form *and* edibility together were used to distinguish focal from marginal *daing*.

Context also may be crucial. In everyday conversation cetaceans are frequently referred to as *daing*. Since they appear far down or not at all on free-recall lists of *daing,* either because they are nonfocal or because they are infrequently encountered and therefore not recalled easily from a list of 350, another tactic was adopted to test whether cetaceans are focal *daing*. Five unschooled informants provided lists of "large" *daing*. By comparing lists, averaging about 13, with each other and with the more comprehensive lists of *daing,* it is clear that Samal do not think that "large" *daing* need be either true fish—to use Brown's criteria—or edible. Although Samal are well aware that "inedible" cetaceans have hair, breasts, and lack gills, and that "sharkoids" and "rays" lack scales and bones, they still cited such beasts near the top of their lists of "large" *daing*.[7] The lists also suggest that cetaceans, sharkoids, rays, and even a giant octopus are included within the range of "large" *daing*. Focal "large" *daing* therefore do not have the same characteristics as focal *daing*.

In sum, there is reason to think that the Sinama category *daing,* when unmodified, is not focused on all "true fish" but only on edible true fish that are frequently captured with hook and line. The category may be extended to nonfish that are edible and regularly cap-

tured by hook and line, to true fish that are not good to eat and are rarely captured, and, in marked contexts, to creatures that are neither edible nor fish. The Sinama category *daing* matches Brown's "fish" neither in focus nor in range.

Brown never discusses the possibility that "shelled mollusk" could be a life-form, but such would seem to be the case in Sinama. Seashells are abundant on local beaches and, according to Edwards (1983:personal communication), the shelled mollusk category *tinebba* is divided into three polytypic generics, numerous monotypic generics, and over 30 binomially labeled specifics. Most are considered edible and they are frequently gathered by women and children and sold either for food or for shell export (Randall 1977:13).

The evidence that focal *tinebba* corresponds to a shared life-form "shelled mollusk" is good, but there is room for doubt since free-recall lists and definitions were not obtained. The main ambiguity is that the stem *tebba* appears in terms for "ebb tide" and "tidal life" as well. *Tinebba,* in one sense, includes "sea urchins," "goby," "eels," and other residents of the tidal zone. These *tinebba* are not "true" *tinebba* and would probably be placed well down on free-recall lists (Edwards 1983:personal communication). This is because "shelled mollusks" are by far the most typical and numerous *tinebba,* they are the only *tinebba* with "skin" (i.e., shell), and they are the only *tinebba* that are extensively subdivided. The other types of *tinebba* are either less visible or less plentiful and, more importantly, have diverse morphologies. By contrast, the shelled mollusks are grouped into very similar form and color categories by Samal, Americans, and malacologists (Edwards 1974). Thus, it seems likely that "shelled mollusk" is a Sinama life-form focally defined by "feature clustering."

"Mollusks" are no less widely distributed around the world than are "snakes," for example. Neither "snakes" nor "shelled mollusks" are represented by diverse species in all habitats, but in those habitats where they are plentiful, it seems likely that there would be far more species of mollusks than snakes, because organisms lower in the food chain tend to be both more numerous and more diverse. While shelled mollusks are uncommon or rare inland, snakes are progressively less common and less diverse beyond continental equatorial regions. Moreover, mollusks are easy to compare because their durable shells are often found in profusion on beaches. Snakes are mobile, often dangerous, and frequently nocturnal, so opportunities for observation are much more limited. One therefore would expect "shelled mollusk" to appear more frequently as a life-form in the world's languages than would "snake." However, neither Brown's arguments nor the counterarguments above resolve the issue. Only data gathered with sufficient care to distinguish generics from life-forms could do so, and to date no one has done that for a wide range of languages.

On the basis of informant free-recall lists, the Sinama category *manuk-manuk* ("birdoid") is focally very close to Brown's universal "bird." Samal recognize 60 or more kinds of birds, and the first named are nearly always creatures which, as Brown (1979a:793) puts it, possess "feathers, wings, a bill or beak," and are "adapted to flying." The Samal do not mention "feathers" in their definition, but in addition to "flying" and "having a beak and wings," they typically mention "laying eggs," "having two feet," and "being edible" as "birdoid" characteristics. Except for "chicken," "duck," and "eagle," all those animals zoologists would call "birds" are unanimously classed by Samal as *manuk-manuk,* and even these exceptions are so classified by most Samal. "Eagle" was near the top of several informants' lists, but one person said "eagles" weren't *manuk-manuk* because they couldn't be eaten. "Ducks" and "chickens" were said by some not to be *manuk-manuk* because they cannot fly,[8] but one elderly, unschooled male considered both to be exemplary *manuk-manuk.* If the Samal exclude chickens and ducks because, to use Brown's phrase, they are not "adapted to flying," then Brown's description of the focal universal "bird" category fits the Sinama case.

Brown's description of extensions does not fare so well, however. He says that the meaning of "bird" is frequently extended to include bats (1979a:793). Although it may be that "bats" are among focal *manuk-manuk,*[9] the likelihood is, as Brown predicts, that batlike animals are in the range. Recall lists suggest that a significant percentage of Samal also include "moths" and "dragonflies" but not "flies" or "mosquitoes" in the range of *manuk-manuk*. In greatest extension, *manuk-manuk* includes all creatures larger than flies that are adapted to flying. The Sinama category is thus somewhat different from the "bird" category Brown claims is universal. In particular, it includes an adaptation to flying which is not correlated with overall form.

The Sinama category *hinayop* refers focally to edible, domestic, quadrupedal animals zoologists classify as ruminant mammals. The category is extended: (1) to edible "forest" mammals such as the deer and the civet cat; (2) to inedible domestic mammals such as the horse, the dog, and the cat; (3) to inedible forest mammals such as the monkey and the tiger; and (4) to edible, domestic bipeds such as chickens, ducks, and geese. On lists averaging ten kinds, first-named *hinayop* were always one of these four: goat, sheep, cow, and water buffalo. Goat was listed no lower than fourth by anyone, and cow was listed no lower than fifth; more than two-thirds of the lists contained water buffalo within the first three animals recalled. The only inedible animals mentioned among the first three were "dog and cat," and these were mentioned only by a high school graduate. The only nondomestic animal listed in the first three was the deer, and it is considered the most edible of the forest animals. Every list contained some wild animals such as tigers, civet cats, and elephants; and all but one included some "inedible" animals. Bipedal domestic animals such as chickens occurred on slightly less than half the lists but never were found among the first three animals listed. Rats, bats, and dolphins were never mentioned.

Hinayop is thus defined partly by form and partly by use. The concept is clearly not equivalent to Brown's (1979a:793) "large creature other than those included in fish, bird and snake and typically restricted to mammals." Large animals such as "elephant," "horse," and "camel" would not be so low on recall lists, and size would be mentioned by Samal explaining their categorization process, if Brown's alleged universal were operative here.

The Sinama category *hinayop* clearly corresponds focally to forms that are quadrupedal and goatlike, so *hinayop* is as much a life-form category as Brown's (1981a:398) "large residual creatures." As such, Sinama again would appear to be an exception to Brown's universal scheme. However, appearances may be deceiving. There is evidence that *hinayop* is cognate with the Malay-Indonesian term meaning "domestic animal" (Taylor 1980:164); and more generally, it seems possible that the Samal typification of mammals as domestic, edible, and goatlike is characteristic of peasant populations. Brown's universal "mammal" term therefore may be an artifact of data-gathering procedures which, by overgeneralizing, mask economy-related differences in the way people think and therefore obscure evolutionary relationships between subsistence modes and folk biological concepts.

The remaining highly inclusive category *sanam* has highly variable meanings. Informants in one village argued that *sanam* is not a Sinama word but is the Tausug equivalent for the type of ant known as *summut* in Sinama. Informants from a second village routinely listed *summut* and two or three other generically named types of ant as *sanam*. One informant described *sanam* as "very small, bad, crawl, have dirty mouths, and bite"; others stressed the biting and crawling attributes. Other than "microbes" *(kagaw),* nothing else was considered exemplary. Many informants refused to extend the category, but "spiders," "millipedes," "cockroaches," and a lizard were mentioned by some as "not exactly *sanam*."

Sanam, for those who extended its range beyond "ants," has some similarity to Brown's (1979a:793) "wug" life-form. *Sanam* must be small, and they certainly are not fish, birds, or snakes. However, the category does not include all insects because many insects fly. Nor are nonbiting small creatures such as "worms," "coconut borers," and so forth considered *sanam.* If focal *sanam* is a life-form, it does not correspond to Brown's universal "wug."

In sum, Sinama highly inclusive animal terms are not what Brown predicts. There are discrepancies between Brown's hypothesized universal categories and those of the Samal, both for focal membership (e.g., fish, mammal, wug) and for extensions (fish, bird, mammal). There are life-forms predicted by Brown that do not appear (e.g., snake) and life-forms that do appear that are not predicted by Brown (e.g., shelled mollusk and ant). Clearly, then, Brown's hypotheses are off the mark for Sinama. But they are scarcely more persuasive for the other languages we have studied: Sahaptin and Tzeltal. Although we lack free-recall lists for these languages, there is still reason to doubt that Brown's hypotheses apply to them.

usage shows Sahaptin inclusive botanical terms are not life-forms

Sahaptin was spoken by some 15,000 Native American people occupying the Columbia River Basin east of the Cascade Mountains in what is now north-central Oregon and south-central Washington. In 1980, several hundred fluent speakers over 50 years old still lived in this area. As children and youths, these individuals participated to a greater or lesser degree in the seasonal pursuit of traditional plant and animal resources, especially salmon and other fishes, edible roots and bulbs, edible fruits, and game. Their ancestors practiced no agriculture prior to the Euro-American contacts that followed the Lewis and Clark expedition (1805–06). The Sahaptin ethnobiological data collected by Hunn since 1976 reflect this "traditional" hunting-gathering subsistence system, however, because it is generally possible to make allowance for memory lapses and for changes in subsistence strategies due to competition from and communication with Euro-Americans.

The contemporary Sahaptin inventory of folk generic taxa includes 236 animal and 213 plant categories. The animal-term inventory is 71 percent of that recorded for Tenejapa Tzeltal (Hunn 1977), while the plant-generic inventory is 45 percent of the Tzeltal (Berlin, Breedlove, and Raven 1974). The low number of plant generics most likely reflects the conspicuous reduction in floral diversity evident at the Sahaptin temperate latitude (44° N to 47° N), as opposed to the tropical latitude of the Tzeltal (17° N).

The most striking contrast between Sahaptin and Tzeltal taxonomic systems is the very low incidence in Sahaptin of binomial nomenclature and hence of folk-specific taxa. Less than 2 percent of Sahaptin folk generics are polytypic, versus 16 percent for Tzeltal plants and 17 percent for Tzeltal animals. The Tzeltal polytype figures are similar to those for other swidden agriculturalists, such as the Ndumba of New Guinea (Hays 1976) and the Aguaruna of Amazonian Peru (Berlin 1976). The near absence of hierarchic relations in the Sahaptin folk taxonomic system is also reflected in the restricted Sahaptin inventory of highly inclusive categories, such as Brown's life-forms.

Sahaptin plant generics were most readily grouped by informants into the following highly inclusive categories: *pátat* ("tree, or wood standing upright"), *patátuwi* ("coniferous tree or needled branch"), *c'ic'k* ("grass"), *latít* ("flower"), *xnit* ("edible root"), *tmaanít* ("edible fruit"). Each refers to a biologically heterogeneous collection of species. "Tree" and "grass" are the only categories that might fit Brown's (1977) universals hypothesis.

"Edible root" and "edible fruit" are highly salient categories for Sahaptin speakers. These are functionally defined, however, and thus are not what have been considered "tax-

onomic categories" in standard ethnobiology (Berlin 1973:261; Brown 1977:320). Both are transparently derived from verb stems descriptive of the food-harvesting action involved: *xni-* means "to dig roots" and *tmaaní-* means "to pick food." Sahaptin usage indicates that these harvesting actions are necessary attributes of the categories.

The category "tree" shares a similar etymological ambiguity. *Pátat* is a verbal noun derived from *páta-* ("to stand up, to be placed upright"). A minority of informants thus included nonliving objects such as poles and snags within the referential scope of *pátat*. "Coniferous tree" *(patátuwi)* seems to have been recently generalized from its archetype, the subalpine fir *Abies lasiocarpa,* but it now appears to have the status of an intermediate taxon (Berlin et al. 1973:225–226).

C'ic'k is inclusive of a wide range of grasses and grasslike plants. Included within the extended range of the term are such weedy nongrasses as red root (*Amaranthus cruentatus,* AMARANTHACEAE) and lamb's-quarter (*Chenopodium album,* CHENOPODIACEAE). These are like true grasses in lacking showy flowers, but they also lack such other definitive grass characteristics as linear, parallel veined, sheathing leaves. At greatest extension, *c'ic'k,* together with the flower category *latít,* appears to partition a residual "grerbaceous" category. This dichotomy has "true grass" at one pole but opposes "grass" to "flower" rather than to "herb," as Brown proposes.

Brown (1977:320) excludes "flower" as a potential universal life-form by asserting that the category "flower" is not based on the "form of the whole plant." However, his analysis is superficial. Sahaptin *latít* is not used to name just any plant with a "flower"; rather, the term is restricted to what English speakers call *wild flowers.* Flowering trees and shrubs are not "flowers" because there is, as in English, a clear if subtle distinction between plants that have flowers and those that are flowers (*áwa latít* ["it has a flower"] versus *iwá latít* ["it is a flower"]). The latter is a subset of the former, so "flower" is as well qualified for life-form status as is "grass." In any case, a criterion such as "has a flower" is not significantly different from criteria such as "has woody trunk" for a tree or "has climbing habit" for a vine. One is no more a characteristic of the "whole plant" than the other.

Even if it is conceded that "grass" and "flower" do categorize morphological forms, there is still reason to doubt that these may properly be called life-forms. Neither "grass" nor "flower" include any named generic subdivisions in Sahaptin. By Berlin's criteria, they are not life-forms, despite Brown's (1981c:34) recent ad hoc bending of the definitions to allow such cases. There are Sahaptin generic taxa that otherwise meet what we presume are the morphological criteria defining "grass" and "flower." For example, the giant wild rye *Elymus cinereus* and the common reed *Phragmites communis* are not considered *c'ic'k* ("grass"). Pressed for a reason, informants cited the utility of these plants. The full range of *c'ic'k* is thus more accurately translated as "useless flowerless plant." *C'ic'k* is most commonly heard in the phrase *áwtya ay c'ic'k* ("it's just a grass"). The implication is clear: a plant is *c'ic'k* by virtue of the fact that it is considered useless and therefore is unworthy of a name in its own right. Similarly, *latít* ("flower") is not used to denote all herbaceous plants with "flowers." In fact, a single plant genus such as *Lomatium* (UMBELLIFERAE) is split between several useful species, each carefully distinguished as a named generic (Hunn and French 1981), and a set of morphologically similar species that are useless and thus labeled "just flowers."

If we had consulted a Sahaptin-English dictionary, we would have found a native term glossed "grass" (Beavert and Rigsby 1975; Pandosy 1862). Without further analysis of actual word usage in context, we would have no way of knowing that this life-form: (1) contrasted with "flower" rather than with "herbaceous plant," (2) included no generic subdivisions, and (3) denoted plants that not only possess morphological features typical of grasses but also are "useless."

usage shows Sahaptin has few zoological life-forms

Potential animal life-forms are as follows: *kákya* ("bird," "animal," or "pet"), *waykáanaš* ("fish"; "fish or salmon as a sacred food"), *núsux* ("salmon and steelhead trout"), *xúl-xul* ("small fish," or "trout in general"), *ɬwínat ("ungulate," "meat of ungulates as sacred food"), pyuš* ("snake, except rattlesnake"), *sáy-say* ("maggots, caterpillars, and worms"). "Bird" is twice polysemous because it means "animal" and "pet," but it is otherwise an excellent life-form label. Several informants extended the category to include "night birds" (bats). By contrast, there are good reasons why neither "fish" nor "snake" should be so designated. To demonstrate this, we consider the issue of context more thoroughly.

Berlin and Kay (1969) define "basic color terms" by reference to four primary criteria: they should be (1) monolexemic, (2) in direct contrast with other basic color terms, (3) highly salient, as shown by wide recognition and consistent use, and (4) of general referential applicability. Thus, *blonde* and *bay* are not basic colors because they are appropriately descriptive of a narrow range of objects. Brown has modeled his analysis of life-forms very closely on this earlier color-term research, and his equation of life-forms with basic color terms is quite obvious. He explicitly requires criteria 1 to 3 for his life-form terms but does not explicitly require criterion 4.

Sahaptin "fish" clearly illustrates a contextual restriction on usage comparable to that of the nonbasic color terms *blonde* and *bay* in English. *Waykáanaš* means "fish" only in the context of the "thanksgiving feast." The "inedible" sturgeon and the Indian doctor sculpin are both true fishes but would never appear in such a context, so they are not *waykáanaš*. It therefore seems clear that "fish" *(waykáanaš)* is not equivalent to Brown's universal "fish" category. *ɬwínat* ("ungulate") is similarly restricted by context.

Núsux ("salmon") and *xúl-xul* ("small fish," or in some dialects "trout species") are named suprageneric taxa that include 8 and 20 terminal taxa, respectively. Thus, if "fish" is not considered a life-form, either of these could be so considered since they satisfy all four life-form criteria. If *núsux* and *xúl-xul* together partitioned the "fish" life-form, we might have what Brown refers to as a "split life-form." He cites Shoshone's "large bird"/"small bird" dichotomy as an exemplary case because the referential range normally encompassed by a life-form is covered by two terms contrasting on the dimension of size (Hage and Miller 1976; Brown and Witkowski 1982:99). Obviously, such dichotomies could occur in any highly inclusive category. The *núsux/xúl-xul* distinction fails to include some fishes (e.g., "sturgeon" and "lamprey"), and the distinction is not strictly one of size, since some *xúl-xul* may be larger than some *núsux* (Hunn 1979). The distinction appears to be motivated not by contrasts in overall morphology but by contrasts in the ecological relationship each type has to the fisherman: *núsux* is strictly equivalent to the anadromous salmon and steelhead trout during the upstream migrations, while *xúl-xul* are typically smaller resident fish caught by hook and line, including resident rainbow trout, of the same species as the anadromous steelhead.

With one exception, *pyuš* refers to all snakes; "rattlesnake" *(wáxpuš),* though etymologically derived from *pyuš,* is not considered a "snake." In some respects the category reflects the same cognitive process that gave rise to such "empty life-forms" (Turner 1974) as "grass" and "flower." The rattlesnake *Crotalis viridis* is the one snake species that contemporary Sahaptins consider important. It is both poisonous and construed as a "shaman," so it is excluded from the "snake" category. *Pyuš* thus means "unimportant snake." It is, moreover, a generic category since it includes no more than two binomially labeled subdivisions, "water snake" (*čuušpamá pyuš;* i.e., garter snakes *Thamnophis* spp.) and "big snake" (*nč'i pyuš;* i.e., gopher snake *Pituophis melanoleucus*).

Among Brown's life-form universals, the remaining categories of "mammal" and "wug" are not monolexemically labeled in Sahaptin. The closest approximation to the latter is *sáy-say* ("maggots, caterpillars and worms"), which is not further subdivided. Nor does the category's content correspond to that of Brown's (1979a) "wug." In sum, "bird" seems to be a Sahaptin life-form, but "wug," "fish," and "snake" are not. Nevertheless, bilingual Sahaptin dictionaries such as Beavert and Rigsby (1975) and Pandosy (1862) list terms for "fish" and "snake" as well as "bird." Only close scrutiny and systematic observation of the actual patterns of a term's usage can expose these semantic restrictions.

Sahaptin biological categories of importance are not monolexemic taxa

By Brown's standards, Sahaptin is a primitive system indeed. Simple reliance on dictionaries would have increased the Sahaptin life-form inventory from "tree" and "bird" to "tree" and "grass" among plants, and "bird," "fish," and "snake" among animals. Clearly, the more we learn of the system, the more "primitive" it appears. Yet the limited inventory of standard Brownian life-forms in Sahaptin obscures the wealth of abstract concepts Sahaptin speakers use to organize their knowledge of natural history. For example, the highly salient distinction drawn between *xnit* ("edible roots") and *tmaanit* ("edible fruits") signifies the underlying rhythm of the Sahaptin traditional subsistence round. "Edible roots" are typically spring seasonal foods useful by virtue of their underground storage of starch through the winter. "Edible fruits" are foods useful for their reproductive organs, which mature in summer and fall. The timing of the harvest, the habitats where the plants are harvested, the tools used in harvest and preparation, and the social context of harvest activities are all reflected in this fundamental bifurcation of the year (Hunn 1982).

The insistence on monolexemically labeled taxa diverts our attention from a Sahaptin folk zoological classification scheme of impressive perspicacity and high abstraction. In fact, during the first year of Hunn's fieldwork, elicitation was so focused on monolexemic expressions that a classification scheme recorded for Sahaptin in the last century by Everette (1883) was completely overlooked. Subsequently, contemporary Sahaptin consultants confirmed Everette's report in all but minor details. Without the earlier report, an orthodox folk taxonomist might have missed the classification altogether.

The Sahaptin divide the animal world into *ƛ'ax^{w} tamam-tamamɬama* ("all the egg makers") and *ƛ'ax^{w} nq'ut-nq' utɬáma* ("all the milk makers"). Except for the fact that humans are excluded, the latter category is, as far as we know, the only case of a folk mammalian life-form based on the scientifically most important criterion. The "egg makers," by contrast, include birds, reptiles, fish, and insects. Crosscutting this distinction is another dichotomy: *waskú tk^{w}ataɬáma* ("forage grass eaters") and *nukút tk^{w}ataɬáma* ("flesh eaters"). This is the fundamental ecological distinction between herbivores and carnivores. A third set of crosscutting distinctions is that drawn with respect to locomotion and habitat: *wayna-waynaɬá* ("flyers such as birds and flying insects"), *wayxti-wayxtiɬá* ("runners such as deer and buffalo"), *panaytiɬá* ("climbers such as squirrels"), *xanim-xaniɬá* ("burrowers such as ground squirrels and marmots"), *yitk^{w}aniɬá* ("head-under-water swimmers such as fishes"), *sunaytiɬá* ("head-above-water swimmers such as beavers, turtles, and water-striders"), *sapxunaytiɬá* ("creepers such as ants, bugs, spiders, and turtles"), and *tk^{w}taniɬá* ("crawlers such as snakes"). All of these terms are excluded from Brown's analysis by virtue of their polylexemic labels. Yet the system clearly is both salient and persistent, as its form has scarcely altered during the past 95 years of intense acculturation.

In sum, the Sahaptin case demonstrates that: (1) to the extent that Brown's analysis relies on simple bilingual terminological equivalences, it very likely glosses over usage subtleties

critical to the evaluation of his general hypotheses; and (2) the search for "basic plant and animal terms" analogous to "basic color terms" leads to the arbitrary exclusion of a large number of highly inclusive categories of intellectual, communicative, ecological, and economic significance.

many Tzeltal inclusive botanical categories are not life-forms

It is ironic that the very case study that inspired Berlin, Breedlove, and Raven's (1973) initial statement on the nature and role of life-form taxa in ethnobiological classification systems should, on closer inspection, illustrate a serious defect in that formulation. Brown's universalist arguments, of course, build on the analytical framework of Berlin, Breedlove, and Raven. They require that life-forms be defined by reference to "the form of the whole organism" and specifically rule out categories that classify folk botanical taxa on the basis of their utility. By contrast, we find a clear if implicit utilitarian factor in the denotative meaning of Tzeltal botanical life-forms. If terms that incorporate notions of utility in their definitions are excluded from the life-form inventory, Tenejapa Tzeltal would have but a single botanical life-form rather than the four Brown (1979b) reports.

There are, according to Berlin, Breedlove, and Raven (1973:220), four Tzeltal plant life-forms: *te?* ("woody plants," with 178 generics), *wamal* ("herbaceous plants," with 119 generics), *?ak'* ("vines," with 24 generics), and *?ak* ("grass," with 36 generics). Except for taxa of ambiguous life-form affiliation and 97 unaffiliated taxa, these categories collectively include all Tzeltal folk generics. Taxa are left unaffiliated by Tzeltal on the basis of morphological aberrance and/or *cultural significance* (Berlin, Breedlove, and Raven 1974:415; emphasis added). *Cultural utility* is thus an important Tzeltal criterion for excluding a plant from life-form membership, and examples cited by Berlin, Breedlove, and Raven make it clear that at least three of the four Tenejapa Tzeltal botanical life-forms (*wamal, ?ak',* and *?ak*) are defined by uselessness.

Take, for example, "beans" of the genera *Phaseolus* and *Cannivalia*. These are classified as either *čenek'* or *čenek' mut;* the former are cultivated while the latter are wild vines of limited utility. *Čenek' mut* is a member of the life-form "vine," but its very similar cultivated congeners are left unaffiliated. The grass genus *Lasiacus* is similarly split between two folk genera of "unimportant" species classed as "grasses" and two other folk genera of unaffiliated culturally "significant" species. An unexceptional herbaceous plant such as *Chenopodium ambrosioides* is excluded in a like manner from the "herbaceous plant" life-form *wamal* by virtue of its cultural significance: it is a protected garden weed and is "a favored and essential flavoring herb for boiled chicken-turkey soups" (Berlin et al. 1974:306, 486). Among highly inclusive Tzeltal plant categories, only "tree" appears to exclude such nonmorphological uselessness criteria. Thus, if Brown's life-form definitions are strictly followed, the Tzeltal plant domain only contains the life-form "tree."[10]

Conceivably, a believer in life-form universals might argue that life-form categories develop from cultural-use categories, so that the Tzeltal forms contain uselessness criteria because they are incipient life-forms. If so, there must be some proof that such a general linguistic process occurs and that the "incipient" nonmorphological stage is short-lived or uncommon. There are, in fact, indications that highly inclusive categories in other languages also designate the unimportant. A Tobelorese, for example, "singles out" important species of "moss" and "spider" for special names while lumping all other mosses and spiders under general terms (Taylor 1980:164, 287–288). There is no reason to think that the Tzeltal botanical categories are unique in their incorporation of nonmorphological criteria.

many Tzeltal zoological inclusive terms are not life-forms

Tzeltal zoological life-forms do not exhibit this anomaly, perhaps because animal domestication was poorly developed in the indigenous economic sector. Yet, considerations other than overall morphology undeniably play a role in the definition of one of the four Tenejapa life-forms named by Brown and Witkowski (1982:102). The category *čanbalam* ("mammal" or "creature") does not extend to humanity even though humans are thought to have a basic morphological resemblance to monkeys and other *čanbalam*. Rather, only humans have *č'ulel* ("souls"). More generally, it seems likely that in most languages humans are routinely distinguished from other animals for similar nonmorphological reasons.

Even without this qualification, *čanbalam* still would not be well described as a "mammal" life-form. Elsewhere, Hunn (1977) has described the category as a "rubber taxon" because the boundaries of the category may stretch to cover a variety of points between the core "typical mammal" range and a range inclusive of all nonhuman, known members of the animal kingdom. In some informants' opinion, the category includes lizards but neither snakes, birds, nor invertebrates; for others, it includes lizards and snakes but neither birds nor invertebrates; for still others, it includes lizards, snakes, and birds, and so forth (Hunn 1977:134–135). One could discount this informant variation by stressing the clear mammalian focus of *čanbalam,* but only by abandoning the rule that life-forms must occur at the first level of the taxonomic structure. Depending on informant opinion, *čanbalam* contrasts directly with "bird" and "snake," or it may include one or the other or both. Hence, these latter categories may be at taxonomic level one, and thus be life-forms, or they may be at level two, and thus be what are, strictly speaking, intermediate- or generic-level categories.

The highly inclusive animal category "bird," except when considered a type of *čanbalam,* is not problematical. The category *čan* ("snake"), however, is best understood not as a life-form but as a "named complex," because "snake" seems transitional between a life-form and a folk generic (Hunn 1977). The category is biologically heterogeneous, but 13 immediately included "kinds of snakes" are obligatorily labeled by binomials of the form *X čan;* the remaining 9 immediately included snakes are sometimes so labeled as well. Thus, *čan* could be construed not as the life-form Brown and Witkowski (1982:103) claim but as a large polytypic folk generic taxon more like the "bean" category *čenek'*. Precisely the same argument applies to Tzeltal "fish" and "grass." All three of these life-forms thus reflect a degree of perceptual salience more characteristic of polytypic folk generic taxa than of categories such as "tree," "herbaceous plant," "vine," "bird," and "mammal." This contrast within the set of highly inclusive taxa between the more "natural," perceptually salient, inductively learned, folk genericlike concepts, on the one hand, and the more artificial, perceptually ambiguous, but more inclusive categories constructed through deduction, on the other (Hunn 1976), suggests that Brown's life-forms are logically and psychologically diverse and lack any theoretically significant common thread (Hunn 1982).

conclusion

In this paper, we make no attempt to question Brown's explanation of life-form universals because the data being explained are so dubious. Although there have been many attempts to find fault with Berlin and Kay's (1969) color-term universals, most of these attempts have proved inconsequential. Why, then, are Brown's universals so doubtful, while Berlin and Kay's more convincing?

Perhaps color categorization is by nature quite different from highly inclusive biological categorization. Kay and McDaniel (1977) show that color terminology is closely related to the neurophysiology of color perception. Biological life-forms are not likely grounded in genetically fixed neurophysiological organization. Why, in a world that encompasses desert oases, coral atolls, arctic tundras, high mountain forests, and other diverse realms, as well as an enormous range of technical and social organizations, would one expect people everywhere to categorize the more abstract features of their biological experience similarly? Obviously, one would not, and anyone who would prove such a counterintuitive hypothesis has a heavy and onerous burden of proof.

How could such a proof be accomplished? One way would be to consult monolingual speakers of various languages, while taking care that the language being studied has not undergone significant semantic convergence with a European language. That is, one should determine whether differences exist between least-acculturated and most-acculturated speakers. Then, a strict application of Berlin and Kay's methods could be attempted. To do this, one should attempt to find biological categories that include a large number of generic categories. However, one should not *assume* that the categories are or should be based on "overall morphology." Rather, one should determine what criteria are actually used to define the category. This can be done by asking informants for definitions; but a more effective way would be to get informants to list numerous examples of the category. One might then use the order of listing as suggestive of the extent to which a particular generic category typifies a highly inclusive category. To confirm this estimate, one should then ask informants to verify that a particular generic category is considered a good example of the highly inclusive one and why this judgment was made. The result would be an *empirical* determination of a highly inclusive category's defining criteria, both for its focus and its range.

By determining such criteria, one would discover, incidentally, whether the term is applicable in all situations or whether the term can only be used in restricted contexts. If the term is so restricted, one should be able to discover whether the category is restricted to organisms having particular uses, to useless organisms, to organisms having (or not having) religious importance, and so forth.

What is clearly necessary in the study of highly inclusive folk biological categories, as in the cross-cultural study of any semantic domain, is exacting quality control on the data. Even more important than quality control, however, is a willingness to determine *inductively* which categories people themselves think are important and why. As Dougherty (1978:78) argues from developmental data, those categories "that are seen as best reflecting objective structures vary according to the interests and attention of human groups and individuals." "Vegetables" and "farm animals" may yet turn out to be more psychologically salient and evolutionarily important than "bushes" and "snakes."

notes

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[1] Samal is the name used for the Sinama-speaking peoples of the Philippines. All references to Samal or to Sinama should be understood as references to Basilan Strait people speaking Northern Sinama. Sahaptin refers specifically to John Day River and Umatilla dialects of Columbia River Sahaptin originally from winter villages between Rock Creek, Washington, and Umatilla, Oregon. Tzeltal refers to the Tenejapa dialect of Tzeltal.

[2] Given the time limitations and unsettled political conditions in the area, it is fortunate that Randall and a field assistant were able to interview 17 people in some detail. A much larger sample would be more informative, but we doubt such data would affect the conclusions we have reached regarding a particular village's categories. Additional informants from other villages would provide different perspectives on the categorization of Northern Sinama inclusive biological categories.

[3] This example is not intended as an argument that traditional biological categories are easily destroyed by Western intrusion. In fact, this same informant, some ten years after graduating from fisheries high school, argued that the *Ilex* squid is "fish" because one catches it on a hook and eats it all the time. We argue that biological categories are discussed in the early years of school and therefore *may* have an effect on a child's categorization of plants and animals.

[4] There may be some color terminologies that cannot be thus described. Berlin and Kay (1969:49) cite a manuscript by Gardner (1966) which argues that amount of illumination is also considered in categorizing color by Paliyan Tamil. Jones and Meehan (1978) show that Anbarra Gidjingali speakers of North Arnhem Land consider highly reflective surfaces such as tin foil and moonlit waves to be focal examples of their color "light/white/silver."

[5] For each kind of *kayu* listed, the informant was asked, "Is X a real *kayu*?" Answers typically ranged from "yes, real *kayu*" to "not exactly *kayu*." Once the *kayu* were so categorized, the informant was asked, "Why is X not exactly *kayu*?" or "Why is X a real *kayu*?"

[6] Two Samal treated "coconut palm" quite differently than the rest. They placed "coconut" first and fourth on their lists, so they clearly thought "coconut palms" to be exemplary *kayu*. These lists were both taken by a field assistant, and no data were acquired on why "coconut palms" were considered exemplary. It may be that these Samal were thinking of the fronds as firewood, or it may be that they were thinking of these as "large."

[7] If focal "large fish" are defined as those regularly appearing among the first five items on a majority of lists, then "the dolphin" and "the sailfish" are focal *daing*. The only *daing* recalled by more than one informant and appearing either first or second was "the sharkoid" and "the Spanish mackerel." Of the four focal "large fish," only two are true fish.

[8] There may be additional reasons. Before 1975 ducks were considered too dirty for Samal to eat, so they may have been excluded on these grounds. Chickens, by contrast, are said not to be *manuk-manuk* unless they are juvenile pets. *Manuk-manuk* is the reduplicated form of *manuk* ("chicken"). Chickens are so important culturally that possibly the word for "bird" originally meant "chickenoid." However, reduplication is also used in Sinama as a diminutive, so that a young chicken would be called *manuk-manuk* just as a small fish *(daing)* would be called *daing-daing*. An adult chicken could not be called *manuk-manuk* because a misunderstanding might result. We were never able to get Samal to agree to this interpretation, however. Rather, they maintained that chickens cannot fly and so are not *manuk-manuk*.

[9] This possibility is fairly remote. "Bat" was mentioned second on the list provided by a group of "not-yet-married" males. They had just shot a fruit bat out of a coconut palm and this obviously affected their recall of "birdoids." What this suggests, however, is that "bat" is not a sufficiently deviant *manuk-manuk* to be excluded from core membership.

[10] It is noteworthy that two of four highly inclusive Aguaruna Jivaro plant categories (*daek* ["vine"] and *dupa* ["herb"]) exhibit a very similar pattern of complex signification. Domestic yams, for example, are *not* "vine," though their wild relatives are (Berlin 1976).

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