THE TENEJAPA TZELTAL VERSION OF THE ANIMAL KINGDOM[1]

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A summary description is presented of the structure and content of the folk zoological classification system of the Tzeltal-speaking Mayan Indians of Tenejapa, highland Chiapas, Mexico. The system is examined in the light of certain general principles of folk biological classification and nomenclature suggested by Berlin and his collaborators. The Tzeltal folk zoological system described is shown to accord with those general principles.

The Study of Folk Biology

There is a long anthropological tradition of describing the cultural knowledge which diverse peoples demonstrate of the plants and animals in their environments. For Mexico Sahagún's *General History of the Things of New Spain* (1956) contains a lengthy account of this sort, perhaps the earliest ethnobiological treatise. In the United States such studies date to the early efforts of the Bureau of American Ethnology. These first studies of ethnobiology typically consisted of a list of biological species with native names appended, followed by a summary of uses noted in the cultural repertoire. The emphasis was on documenting the utility of species, especially of the flora. The lists were ordered with respect to the scientific names, and species of no known use were often excluded.

In the last twenty years such data have assumed a different significance for anthropology. Since Conklin's (1954) exemplary study of Hanunóo folk botany, the focus has shifted to the relevance of patterns of classification and nomenclature in folk systems for our understanding of universal principles of semantics and cognition. Modern descriptions of folk biological systems stress the lexemic status of the names for plants and animals and the logical relations among the

categories labeled. They strive for comprehensiveness, since the structure of the classification system rather than usage of species is the focus of attention.

The pioneering work of Berlin and his botanical collaborators among the Tzeltal of Chiapas, Mexico (Berlin, Breedlove, and Raven 1966, 1968, 1973, 1974; Berlin, Breedlove, Laughlin and Raven 1970; Berlin 1972, 1974a) has transformed the ethnography of folk biological knowledge from particularistic description to commentary on the fundamental issues of anthropology: What is culture? How does man make sense of his world?

These basic questions are approached first through more specific theoretical issues. For example, Berlin *et al.* (1966) considered the nature of the correspondence between folk systems of classification and the product of modern systematic biology. They then concluded that no necessary correspondence was to be expected, noting that scientific biology tends to produce a general purpose classification—one which is logically natural in the sense that the classification is derived from a consideration of all available data. By contrast folk systems tend to be special purpose classifications—motivated by specific subsistence and other culturally-defined requirements. Bulmer (1970) argued to the contrary on the basis of his experience with New Guinea folk zoological systems. Berlin (1974:267) now agrees that folk and scientific biological classification are fundamentally alike. This complex issue continues to generate debate and a refinement of our analytical apparatus (cf. Hunn n.d.). I will return to this issue in closing.

Berlin and his colleagues (1968) demonstrated the existence of covert or unlabeled taxa and described techniques for delineating such taxa (see also Brown 1974; Berlin 1974b). The complexity of the name-category mapping has been further illuminated by the development of a typology of names for plant and animal taxa (Conklin 1962; Berlin *et al.* 1973:216-217). In particular, Berlin's distinction between primary lexemes and secondary lexemes provides information essential to recognize taxa of diverse types (see Figure 4). Most important is the distinction between *generic taxa*, which appear to constitute the core of any folk biological classification—the taxa first to be named historically and psychologically most salient—and taxa of greater inclusiveness or greater specificity. The correlation of types of names with kinds of concepts, of course, is central to semantic theory. Folk biology now has an analytical tool kit of some power for relating ethnographic particulars to questions of general theoretical interest.

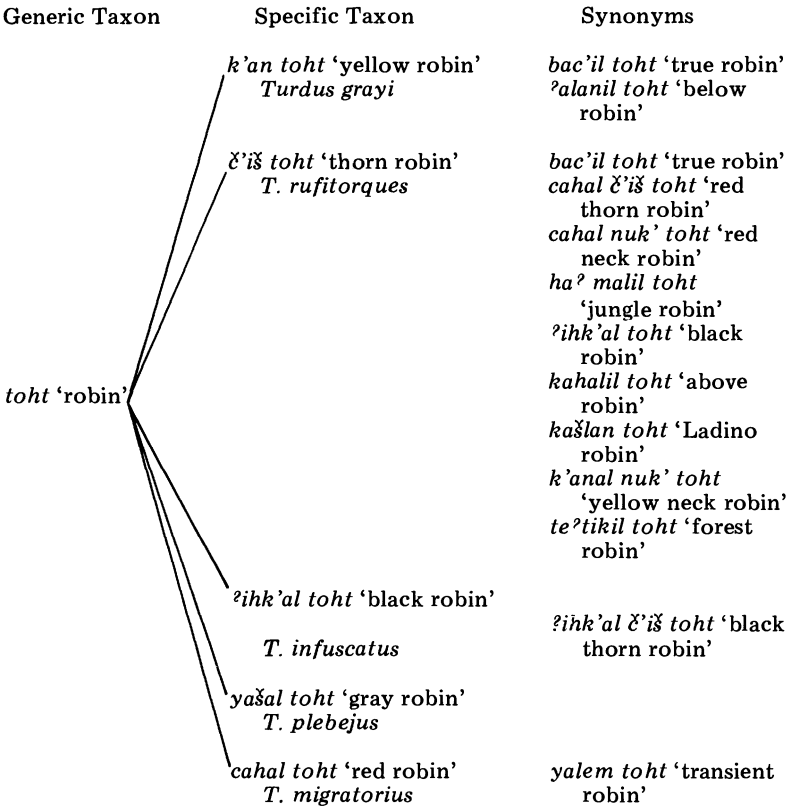
The Tzeltal Folk Zoology: Procedures

My research in Tzeltal folk zoology (Hunn 1973) was inspired by Berlin's prior work in folk botany. I spent nine months in and around Tenejapa, a Mayan Indian community in highland Chiapas, Mexico. My data collecting techniques were eclectic. I did not restrict myself to the question-and-answer frame format outlined by Metzger and Williams (1966) but pursued any line of attack which promised to lessen my doubt about the meaning of a Tzeltal animal name or to increase my list of names. The basic units of data are instances of simultaneous naming of an individual animal in Tzeltal by an informant and in Latin by the investigator. A series of such units establishes a more or less obvious pattern of correspondence between Tzeltal and scientific categories. Being a birdwatcher by avocation I was able to name most birds encountered. Large mammals were identified at the Tuxtla Gutiérrez zoo where Miguel Alvarez del Toro has established a good representative collection of Chiapas mammals. Small mammals, lizards, snakes, amphibians, and nearly 1000 invertebrate specimens were collected and identified by various experts after my return.[2] Each specimen was named by one or more Tzeltal informants and the Tzeltal and Latin names later compared. Descriptive texts in Tzeltal, folk tales, sorting tasks, and a geographically representative survey of 25 informants added information to the compilation.

One of the fairest criticisms of ethnoscientific reporting is that the statements of a very few informants are immortalized as *the* culture of the linguistic group or local community which the informants represent (Harris 1968:585). Of course this criticism applies as well to most if not all ethnographic accounts. Yet the amount of variability in lexical and cognitive repertoires within a group is not fully appreciated (cf. Hays 1974). Tenejapa is a community of at least 10,000 Indians most of whom remain basically monolingual in Tzeltal, a language spoken by at least 100,000 persons today. Most of my information comes from six Tenejapanecos with corroborative data from no more than seventy individuals. They do not speak for all Tzeltal speakers, nor all Tenejapanecos, but only for themselves. And the few individuals who contributed information to my study often disagreed as to the proper name for a particular animal. However the variability is not entirely random. Thus a reasonably coherent picture can be described of the knowledge of what has been called the "omniscient informant."

The omniscient informant is everywhere at once. Thus the differences between informants from highland (6000-9000 feet) and lowland (3000-6000 feet) areas of Tenejapa are not incorporated in the basic system described since the omniscient informant will be familiar with any taxon consistently recognized by any local group within Tenejapa. Likewise variation in the degree to which individuals attend to their faunal environment is ignored in describing *the* system, since it is assumed that the omniscient informant will attend to the environment

FIGURE 1. TZELTAL 'ROBINS': FROM THE PERSPECTIVE OF THE OMNISCIENT INFORMANT
(from Hunn 1973:242-245)



Species not known: *T. assimilis.*
Name not defined: *sakil toht* 'white robin'

as closely as the most attentive individual. This fiction may be considered a "little white lie" so long as no significant specialization of knowledge occurs within the community. I found no evidence that any category or group of Tenejapanecos had access to esoteric knowledge of animals.

The robins (*Turdus* spp.) provide an example of the types of variation often encountered (see Figure 1). All informants recognize at least two kinds of robins which are labeled binomially as *X toht* and *Y toht*, where *toht* is the onomatopoetic name for the generic taxon and is known to all informants. Most widely used are the terms *k'an toht* (yellow robin) for the abundant lowland species, the Clay-colored Robin (*Turdus grayi*) and *č'iš toht* (thorn robin, onomatopoetic) for the common highland species, the Rufous-collared Robin (*T. rufitorques*). Other informants may label this distinction as *ʔalanil toht* (lowland robin) and *kahalil toht* (highland robin) or may refer to the Rufous-collared Robin in more descriptive terms such as *cahal nuk' toht* (red-neck robin), etc. These variants may be true synonyms, in which case a single speaker recognizes them as referentially equivalent, or they may be micro-dialectal or idiolectal variants, in which case they are synonymous from the point of view of the omniscient informant.[3]

A number of informants cite the existence of a third and some a fourth kind of robin. *ʔihk'al toht* (black robin) was considered distinct by most informants who recognized the term. Some offered descriptions of the bird and its habits which supported the assumption that the term referred to the Black Robin (*T. infuscatus*), a rather rare highland robin. Other informants add *cahal toht* (red robin) or synonymously *yalem toht* (transient robin). This most likely refers to the American Robin (*T. migratorius*), an uncommon winter visitor from the north. Near the conclusion of my fieldwork I netted a fifth species, the Mountain Robin (*T. plebejus*). My major informant did not have a name for it other than robin, but the local informant provided the name *yašal toht* (gray robin). Thus the omniscient informant is credited with distinguishing five kinds of robins (see Figure 1). Though no single informant recognizes so many, it seems fair to assume that any Tenejapaneco is capable of distinguishing all five, and would if he had sufficient experience of all five species. Thus I contend that the system attributed to the hypothetical omniscient informant accurately reflects *how* Tenejapanecos classify animals, even though no single informant commands the entire system. This system then provides a framework in which most variation in naming can be interpreted as synonymy or homonymy.

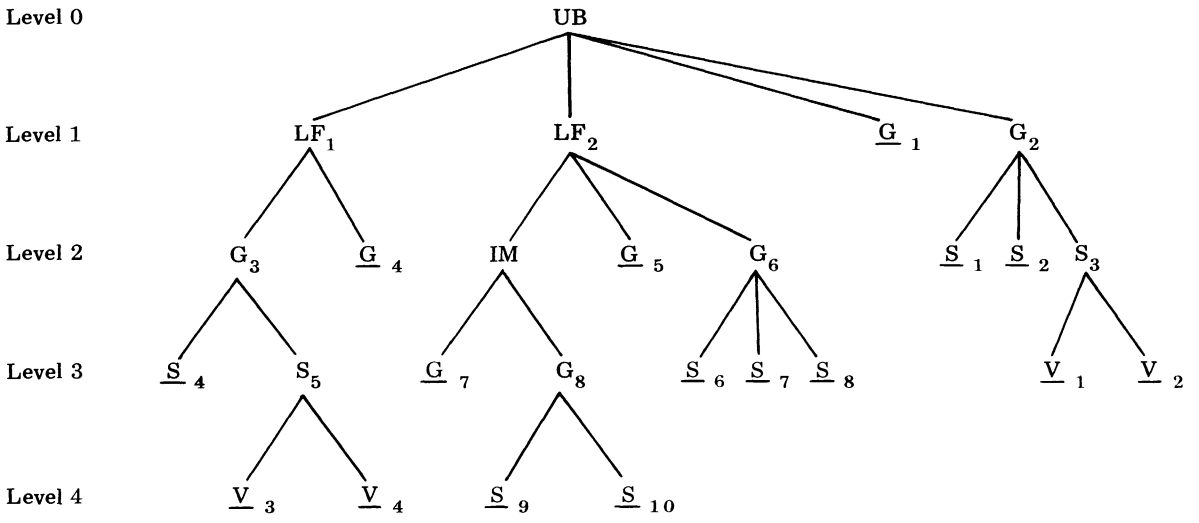
Categories of objects or events and the conceptual relations defining systems of such categories are the substance of ethnosemantic studies.[4] The first analytical step in such studies involves inferences from naming behavior in order to establish conceptual categories, as illustrated above. The next analytical step leads to hypotheses about the structure of the system of categories inferred from the naming patterns. There are many possible structural types. For example, componential analysis produces a paradigmatic structure by selecting variable dimensions or attributes which define the categories of the system by reference to the logical conjunction of particular ranges of values on the semantic dimensions underlying the system of concepts. Such an approach has been reasonably effective for analyzing systems of kinship terms though it yields no definitive solutions (cf. Burling 1966). Componential structures, however, are of very limited utility for analyzing folk systems of biological classification. For example, dogs and cats are not distinguishable by any simple componential rule. Individual examples of each are readily identified, but the categories are not defined by reference to any set of features characteristic of and unique to each category. Most folk taxa are categories of this sort, i.e., semantic primitives.

A structural principle readily observed in all folk biological systems so far described is that of the taxonomy (cf. Kay 1971). Taxonomic structures relate the categories or taxa of a domain hierarchically (see Figure 2). The domain is delimited by the unique beginner, that taxon which includes all the others. Levels within the taxonomy may be distinguished by reference to the number of taxa between a given taxon and the unique beginner. For example, a poodle is a kind of dog, dogs are kinds of mammals, and mammals are kinds of animals, the unique beginner in this case. Thus poodle is at level 3, dog at level 2, mammal at level 1, and the unique beginner is the only taxon at level zero. Taxa at the "bottom" are terminal taxa, regardless of their level. A set of taxa which are immediately included in the same superordinate taxon constitute a contrast set, e.g., poodle, dachshund, and German shepherd are all members of the contrast set included in dog. These few principles may be used to transform a random assortment of categories of plants or animals into a structural description of a semantic domain.

The Tzeltal Folk Zoology: Results

We may now trace the outline of the taxonomic structure of the Tzeltal domain of animals. First, does such a domain exist for Tzeltal

FIGURE 2. TAXONOMIC STRUCTURE AND FOLK TAXONOMIC RANK
(adapted from Berlin *et al.* 1973:215)



Folk taxonomic rank: UB = unique beginner, LF = life form, IM = intermediate, G = generic, S = specific, V = varietal.

Terminal taxa are underlined.

speakers? If so, what is the unique beginner? There are no simple answers to these questions. The term *čanbalam*, best analyzed as snake plus jaguar, may be used to refer to any organism in their experience which is included in the kingdom Animalia and to nothing else. Microscopic organisms and such puzzles as corals and sponges are not part of their experience. However horse-hair worms (Nematomorpha, Gordioidea), which look and act more like a very thin root than anything else, are classified as animals. There is a single exception. Human beings are not included. Unlike men, animals lack souls and do not speak, though in contrast to plants they move. Despite this caveat, informants stress the relationship of men and monkeys, and monkeys are *čanbalam*. It is clear that the natural affinity of all animals including men is recognized. Man's uniqueness is defined by reference to cultural not natural characteristics.

An additional qualification is necessary. I claim that *čanbalam may* refer to all animals but man, but it is more often used in a restricted sense, to label a category roughly comparable to the class Mammalia.[5] Thus I defined *čanbalam*$_1$ (animal) and *čanbalam*$_2$ (mammal) as two distinct polysemous meanings of the term, though in fact the distinction is blurred (see Figure 3). Fortunately there is further evidence to suggest that an inclusive animal category indeed exists (Hunn 1973:161-164). For example, the numeral classifier *-koht* is used to count all and only animals, again excepting man.

Proceeding down the taxonomy from the unique beginner, we next encounter a few taxa of the life form type, as defined by Berlin *et al.* (1973:214-216). The term *čanbalam*$_2$ (mammal) has already been noted. In this restrictive sense are included all mammals but men, bats,

FIGURE 3. RANGE OF DENOTATION OF *ČANBALAM* 'ANIMAL/MAMMAL' ACCORDING TO A SURVEY OF 23 TZELTAL INFORMANTS (Hunn 1973:163)

čanbalam includes:	
core mammals	23/23
plus legged herptiles	21/23
plus snakes	18/23
plus birds	17/23
all vertebrates	16/23
plus certain invertebrates	13/23
all animals except man	8/23

FIGURE 4. FOLK TAXONOMIC RANK, NUMBER OF TAXA, AND NAME TYPES

Rank	Expected number of taxa (Berlin *et al.* 1973:215-216)	Observed number of taxa: Tzeltal folk zoology	Associated lexeme type
Unique beginner	1 covert	1 ambiguously named	*primary*:
Life form	5-10	6 named	simple: e.g., *toht* 'robin'
Intermediate	mostly covert, few or none named	1 named, 40 covert	unproductive: e.g., *hti?*
Generic	majority	341 named, 1 covert	*lukum* 'worm eater'
			productive: e.g., *?ahaw čan* 'master snake'
Specific	fewer than generic	171 named, 2 covert	*secondary*: e.g., *bac'il c'i?* 'true dog'
Varietal (Subspecific)	very few	none	

Defining criteria of lexeme types (adapted from Berlin *et al.* 1973:219-222).

Simple primary lexemes consist of a single morpheme.

Unproductive (complex) primary lexemes are polymorphemic, but no part of the name labels a taxon superordinate to the one in question.

Productive (complex) primary lexemes are polymorphemic, and the "head" element of the name labels a superordinate taxon, but the taxon in question directly contrasts with generic taxa.

Secondary lexemes consist of two parts; the head element labels the superordinate taxon; the "attributive" element modifies the head; and the taxon so labeled directly contrasts with taxa labeled similarly.

and the armadillo. The armadillo, according to informants, lacks hair and has a back like a turtle, while the bat flies and has wings, though it is not a bird. Thus bats and the armadillo differ from the majority of mammals in notable and salient respects. The bat category illustrates a very general phenomenon in folk biological systems. At level 1 of the taxonomy one finds not only the broadly inclusive life form taxa, such as bird and mammal, but also unaffiliated or ambiguous generic taxa such as bat (Berlin *et al.* 1973:216). There are very few life form taxa in the Tzeltal zoological system, and these include only 60 percent of

the generic taxa. The remaining generic taxa are unaffiliated or grouped only in covert complexes (Figure 5).

FIGURE 5. DISTRIBUTION OF TAXA AMONG TZELTAL ZOOLOGICAL SUPRAGENERIC TAXA

Named suprageneric taxon	Number of included generics	Number of named taxa of lesser rank included
mut$_1$ 'bird'	110	157
čanbalam$_2$ 'mammal'	45	74
(includes *č'o* 'rat')	(10)	(13)
čan$_1$ 'snake'	23	25
šuš 'wasp'	10	12
čanul ha'$_1$ 'water bug'	9	9
čay 'fish'	8	8
Totals (excluding *č'o*)	205	285
Unaffiliated taxa	137	230
Total	342	515
Percent of taxa affiliated	60 percent	55 percent

The term *mut* may be used to refer to any species of bird and to nothing else.[6] The life form bird includes 110 generic taxa and 144 terminal taxa. The life form mammal includes 46 generics and 63 terminal taxa. There are no other named taxa of this scope.

Several named taxa intermediate between the life forms and the generics in scope are included in the system. For example, *č'o* (small rodent) is a kind of *čanbalam*$_2$ and includes in turn 10 generics (12 terminal taxa). The kinds of *č'o* recognized are typically equivalent to a scientific genus. All are what we would call rats and mice, except that shrews—not rodents but insectivores—are also included here. Mammalogists might forgive this unnatural association given the superficial similarity of mice and shrews and in view of the fact that the Tzeltal are well aware that *ya'al be* (shrew) is atypical, being carnivorous. *čan*$_1$ (snake) is a category roughly comparable to *č'o* in scope including 23 generics (24 terminal taxa).[7]

Other groupings of similar or related generic taxa are evident, though most are not named. I recognized 45 such complexes, only five of

which are named at all consistently. The remaining 40 covert intermediate groupings are comparable to the obvious but unlabeled association of whales and porpoises; frogs and toads; and dogs, wolves, and coyotes in folk English. An example from Tzeltal is vulture, a covert category which includes three generic taxa: *ʔusel* the King Vulture (*Sarcorhampus papa*), *caʔlos* the Black Vulture (*Coragyps atratus*), and *šulem* the Turkey Vulture (*Cathartes aura*). These names appear together in spontaneous listings, in conversation, and are grouped in formal sorting tasks. They may also be referred to as *shoyetik* (companions).

Berlin argues that the core of any folk biological taxonomy is the set of generic taxa. A large majority of all folk taxa are generic. Of the 563 taxa included in my account of the Tzeltal folk zoological system 342 (61 percent) are generic. Generic taxa are usually recognizable by the type of name applied to them. For example, *toht* (robin), *šulem* (Turkey Vulture), *šʔain* (crocodile), and *pehpen* (butterfly/moth) are generic taxa labeled by simple primary lexemes (see Figure 4). *šulem* and *šʔain* are monotypic, that is, they are not further subdivided. Thus they are terminal taxa, as are 84 percent of all Tzeltal folk zoological generics.

The specific taxa included in *toht* (see Figure 1) are labeled in a fashion definitive of the specific contrast set, that is, all the kinds of *toht* have binomial names (secondary lexemes), as with *ʔihkʼal toht* (black robin), *kʼan toht* (yellow robin), *čʼiš toht* (thorn robin), etc.[8] While subspecific or varietal taxa have been recorded for some folk systems[9] no further subdivisions of specific taxa were noted for the Tzeltal folk zoology.

General Principles in the Tzeltal Folk Zoology

To summarize, the Tzeltal folk zoological taxonomy is comparable in numerous details to other folk biological systems. The following similarities are particularly noteworthy as they are cited by Berlin *et al.* (1973) as "general principles of classification and nomenclature in folk biology."

1) The number of generic taxa in the Tzeltal folk zoology in close to 500 (Berlin *et al.* 1973:216), and generic taxa are numerically predominant.

2) The unique beginner is ambiguously named. Berlin *et al.* (1973:215) suggest that the unique beginner will not be named consistently in most folk systems.

3) Life form taxa "are invariably few in number, ranging from five to ten, and among them are included the majority of all named taxa of lesser rank" (Berlin *et al.* 1973:215). This generalization holds for the Tzeltal folk zoological system if we include both obvious life forms and the named complexes of more limited scope (see Figure 5).

4) Intermediate taxa, i.e., those which intervene between life forms and generics, are rarely labeled (Berlin *et al.* 1973:215). The *č'o* (small rodent) is the only such taxon labeled in the Tzeltal zoological system. However, as noted above, 40 covert complexes, of which 29 are included in some life form taxon, were cited in the Tzeltal folk zoological analysis.

5) According to Berlin *et al.* (1973:215), specific taxa are less numerous than generic taxa, while subspecific (i.e., varietal) taxa are "rare in most folk biological taxonomies." The figures for the Tzeltal folk zoological system are: 342 generic taxa, 173 specific taxa, and no subspecific taxa.

6) Finally, Berlin *et al.* (1973:215) assert that "specific and varietal taxa characteristically occur in contrast sets of few members, the most frequent being a set of two classes." The relationship between the size of a contrast set and its frequency of occurrence is known as the distribution of polytypy. This distribution is highly regular (cf. Geoghegan n.d.). The Tzeltal zoological system exhibits the typical pattern (see Figure 6).[10] Berlin's suggestion that large contrast sets tend to be associated with taxa of maximal cultural significance is not supported by the present analysis. Of course, the Tzeltal are agriculturalists. The dog, turkey, and Muscovy duck are the only preconquest domesticated animals. Yet *tuluk'* (turkey) and *peč'* (duck) are monotypic, while *c'i?* (dog, includes but three specific taxa, *bac'il c'i?* (true dog), *kašlan c'i?* (Ladino dog), and *polisía c'i?* (police dog), the two last of obviously recent vintage. By contrast, the most complex zoological generics refer to highly heterogeneous assortments of small animals of little cultural significance (see Figure 6).

Two final questions should receive comment. First, what is the relationship between folk and scientific systems of biological classification? Is man free to create his own culturally defined world as the Sapir-Whorf hypothesis suggests (Sapir 1921:209)? Or is he constrained by "objective reality," or by the nature of the human mind or by the

FIGURE 6. DISTRIBUTION OF POLYTYPY FOR TZELTAL FOLK ZOOLOGICAL TAXA

Size of specific contrast set	Number of such contrast sets
0	287
2	25
3	16
4	6
5	4
6	1 *lukum* 'worm'
7	1 *pehpen* 'butterfly/moth'
8	1 *ʔus* 'fly'
9	0
10	1 *ʔam* 'spider'
>10	0
total	342 generic taxa

interaction of mind and reality? Clearly folk and scientific system both closely approximate the taxonomic structural model. Yet what of the correspondence of the taxa themselves? In order to answer the question of the degree to which folk taxa and scientific taxa correspond I have developed a statistic described in detail elsewhere (Hunn n.d.). This statistic provides a means of calculating the degree to which a given folk taxon fails to correspond to the scientific system and for summing these measures in an index of the degree of dissimilarity between a folk system and the relevant portion of the scientific system. A value of zero for this measure indicates that every folk taxon of the system corresponds perfectly to some scientific taxon. A value of one indicates maximal disparity between the systems. By this measure the Tzeltal sub-domain of mammals rates a degree of dissimilarity of 0.07, i.e., 7 percent of the maximal disparity. Preliminary calculations indicate an even lower figure for the Tzeltal birds. I can only conclude that human beings are constrained to a high degree in the way the biological environment is conceptualized, since folk and scientist, proceeding quite independently, arrive at strikingly similar versions of biological reality.

This leads to a final point. What motivates men to devote a significant portion of their vocabulary to plants and animals? It is commonly assumed that lexical elaboration correlates with cultural

elaboration, as the perennial example of Eskimo names for snow is meant to indicate. That such a correlation exists is clear (cf. Berlin, Breedlove, and Raven 1966; Berlin, Breedlove, Laughlin, and Raven 1970). It helps explain the fact that Tenejapanecos distinguish 42 kinds of ants, bees, and wasps, but only 8 kinds of butterflies and moths. However, it is not a sufficient explanation. The Tzeltal, for example, are agriculturalists. Hunting is an occasional pastime for certain individuals only. Animal husbandry is not particularly important. Yet Tenejapanecos recognize 563 animal taxa as opposed to 720 plant taxa (Berlin *et al.* 1974). One might expect a greater disparity of emphasis in favor of plant classification given the fact that they depend predominantly on plants for their survival. Furthermore, Tenejapanecos label 158 categories of birds, most of which are of no known cultural significance. As a solution we might choose to consider the mere existence of an organism as a minimal criterion of cultural or cognitive significance.

Tenejapanecos are vitally interested in their world. They observe it closely and thus recognize patterns of variation which are empirically real. They focus more closely on aspects of their environment of special relevance to their particular way of life, but they ignore no part of it. They organize their knowledge systematically. In this we find the essential prerequisites of the scientific method.

NOTES

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[2]I would like to acknowledge the assistance of the following specialists in the task of identifying specimens: James Patton, James Lynch, and James Stewart, Museum of Vertebrate Zoology, University of California, Berkeley; E. I. Schlinger, H. V. Daly, J. T. Doyen, R. E. Dietz, S. L. Szerlip, M. Bentzien, and P. Rauch, Division of Entomology, University of California, Berkeley; R. M. Bohart, Department of Entomology, University of California, Davis; George Buxton and Allan Hardy, Laboratory Services, Division of Plant Industry, California Department of Foods and Agriculture; Allyn Smith, D. D. Chivers, D. E. Breedlove, and L. C. Binford, California Academy of Sciences, San Francisco; Joseph Copp, Scripps Institute of Oceanography; and Miguel Alvarez del Toro, Instituo de Historia Natural, Tuxtla Gutiérrez, Chiapas, Mexico.

[3]A further complication is due to the fact that for lowland informants the true robin (*bac'il toht*) is the Clay-colored Robin, but highland informants may apply *bac'il toht* to the Rufous-collared Robin, the common species in their experience. Thus *bac'il toht* is alternately synonymous with *k'an toht* in the lowlands and with *č'iš toht* in the highlands.

[4]Names do not map in a one-to-one fashion to the categories of such systems. Instances of synonymy and homonymy and the existence of covert categories have been noted. Yet there is no ready access to conceptual data except through evidence of naming behavior. The anthropological analysis rests on nomenclatural evidence.

[5]Or to some category of animals intermediate between the most restrictive use and the most general (Figure 3). The situation is much as in English where animal may at one moment include birds, fish, insects, human beings, etc., and the next be used to contrast with men, or birds, e.g., "a dog's not a bird, it's an animal."

[6]The term *mut* also means chicken. Thus again we must distinguish two polysemous meanings, mut_1 (bird) and mut_2 (chicken). Since the chicken is a post-conquest introduction, *mut* most likely originally meant bird (cf. Kaufman 1970:170).

[7]The morpheme *čan* appears in a variety of contexts where it clearly does not mean snake. The oil beetle (*Meloe* spp.) is called *tuluk' čan* which does not mean turkey snake, but better turkey bug. The *nušel čan* (swimming bug) is not considered a snake, nor is *way way čan* (sleep-sleep bug), a peculiar lethargic beetle placed under a child's head to make the child sleep. Yet $čan_2$ does not mean bug, since *k'alel čan* (bright critter) is a kind of lizard, *cocil holol čan* (hair-of-the-head critter) is the horse-hair worm, and *čanul ha?* (critter of the water) may refer to a class of water birds. The term *čan*, in fact, may be appropriated in modified form to label any animal. It also appears in $čanbalam_1$, the unique beginner.

[8]Generic taxa may be labeled by morphemically complex names as well. For example, *tešereš ne*, literally scissor-tail, the Swallow-tailed Kite (*Elanoides forficatus*), and *tuh kulum pukuh* the Great Horned Owl (*Bubo virginianus*)—a name which contains the morphemes *tuh* (stinking) and *pukuh* (devil) but which as a unit imitates the call of the owl—are unproductive complex primary lexemes. Productive primary lexemes such as *yaš mut* literally blue bird, the Eastern Bluebird (*Sialia sialis*), also labels a generic taxon despite the fact that the bluebird is a kind of bird. This taxon contrasts directly with categories labeled by typically generic names and thus does not belong to a specific contrast set.

[9]Berlin *et al.* (1974) cite eight such taxa in the Tzeltal folk botanical system. Conklin (1954) cites a considerably larger number for the Hanunóo folk botany. In all cases, such sub-specific taxa refer to important cultigens.

[10]In fact, the Tzeltal zoological system approximates the theoretical pattern more closely than any other system so far tested. If one applies the logarithmic transformation to both variables, i.e., size of contrast set and frequency of such contrast sets, and calculates the best fitting straight line for the transformed data points, Pearson's *r* for the association of real to predicted points is 0.99 in this case (Geoghegan n.d.:6).

REFERENCES CITED

BERLIN, BRENT

1972—Speculations on the growth of ethno-botanical nomenclature. Language in Society 1:51-86.

1974a—Folk systematics in relation to biological classification and nomenclature. Annual Review of Ecology and Systematics 4:259-271.

1974b—Further notes on covert categories and folk taxonomies: a reply to Brown. American Anthropologist 76:327-331.

BERLIN, BRENT, DENNIS BREEDLOVE, ROBERT LAUGHLIN, and PETER RAVEN

1970—Lexical retention and cultural significance in Tzeltal-Tzotzil comparative ethnobotany. Working Paper #29, Language-Behavior Research Laboratory. Berkeley: University of California.

BERLIN, BRENT, DENNIS BREEDLOVE, and PETER RAVEN

1966—Folk taxonomies and biological classification. Science 154:273-275.

1968—Covert categories and folk taxonomies. American Anthropologist 70:290-299.

1973—General principles of classification and nomenclature in folk biology. American Anthropologist 75:214-242.

1974—Principles of Tzeltal plant classification: an introduction to the botanical ethnography of a Mayan speaking community of highland Chiapas. New York: Seminar Press.

BROWN, CECIL H.

1974—Unique beginners and covert categories in folk biological taxonomies. American Anthropologist 76:325-327.

BULMER, RALPH N. H.

1970—Which came first. The chicken or the egghead? *In* Échanges et communications, mélanges offerts à Claude Lévi-Strauss à l'occasion de son 60ème anniversaire. Jean Pouillon and Pierre Maranda, eds. The Hague: Mouton.

BURLING, ROBBINS

1964—Cognition and componential analysis: God's truth or hocus-pocus? American Anthropologist 66:20-28.

CONKLIN, HAROLD C.
1954—The relation of Hanunóo culture to the plant world. Ph.D. dissertation. New Haven: Yale University.
1962—Lexicographical treatment of folk taxonomies. *In* Problems in lexicography. Indiana University research center in anthropology, folklore, and linguistics publication 21. F. W. Householder and Sol Saporta, eds. Bloomington: University of Indiana.

GEOGHEGAN, WILLIAM H.
n.d.—Polytypy in folk biological taxonomies. Paper presented at the American Anthropological Association Annual Meeting, New Orleans, 1973.

HARRIS, MARVIN
1968—The rise of anthropological theory. New York: Thomas Y. Crowell.

HAYS, TERENCE E.
1974—Mauna: explorations in Ndumba ethnobotany. Ph.D. dissertation. Seattle: University of Washington.

HUNN, EUGENE
1973—Tzeltal folk zoology: the classification of discontinuities in nature. Ph.D. dissertation. Berkeley: University of California.
n.d.—A measure of the degree of correspondence of folk to scientific biological classification. American Ethnologist. (In press.)

KAY, PAUL
1971—Taxonomy and semantic contrast. Language 47:866-887.

KAUFMAN, TERRENCE
1970—Posición del Tzeltal y del Tzotzil en la familia linguïstica mayance. *In* Ensayos de antropologïa en la zona central de Chiapas, Norman A. McQuown and Julian Pitt-Rivers, eds. México, D.F.: Instituto Nacional Indigenista.

METZGER, DUANE, and GERALD WILLIAMS
1966—Some procedures and results in the study of native categories: Tzeltal firewood. American Anthropologist 68:389-407.

SAPIR, EDWARD
1921—Language: an introduction to the study of speech. New York: Harcourt, Brace.

SAHAGÚN, BERNARDINO DE
1956—Historia general de las cosas de Nueva España, Tomo III, Libro 11. Angel Maria Garibay K., ed. México, D.F.: Editorial Porrua.

References Cited

Further Notes on Covert Categories and Folk Taxonomies: A Reply to Brown

Brent Berlin

American Anthropologist, New Series, Vol. 76, No. 2. (Jun., 1974), pp. 327-331.

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Folk Taxonomies and Biological Classification

Brent Berlin; Dennis E. Breedlove; Peter H. Raven

Science, New Series, Vol. 154, No. 3746. (Oct. 14, 1966), pp. 273-275.

Stable URL:

http://links.jstor.org/sici?sici=0036-8075%2819661014%293%3A154%3A3746%3C273%3AFTABC%3E2.0.CO%3B2-U

Covert Categories and Folk Taxonomies

Brent Berlin; Dennis E. Breedlove; Peter H. Raven

American Anthropologist, New Series, Vol. 70, No. 2. (Apr., 1968), pp. 290-299.

Stable URL:

http://links.jstor.org/sici?sici=0002-7294%28196804%292%3A70%3A2%3C290%3ACCAFT%3E2.0.CO%3B2-%23

General Principles of Classification and Nomenclature in Folk Biology

Brent Berlin; Dennis E. Breedlove; Peter H. Raven

American Anthropologist, New Series, Vol. 75, No. 1. (Feb., 1973), pp. 214-242.

Stable URL:

http://links.jstor.org/sici?sici=0002-7294%28197302%292%3A75%3A1%3C214%3AGPOCAN%3E2.0.CO%3B2-I