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FOLK ZOOLOGICAL LIFE-FORMS AND LINGUISTIC MARKING

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ABSTRACT. – Folk zoological life-form terms are added to languages in a highly regular manner. Elsewhere (Brown 1979a) cross-language data have been assembled showing that life-forms of the triad FISH, BIRD, and SNAKE are lexically encoded first by languages, although in no particular order, followed by WUG (e.g., American English *bug)* and MAMMAL. The present paper reports recent research which has led to some revisions in the encoding sequence. However, its primary purpose is to outline how the sequence fits into the framework of linguistic marking developed over the years by Jakobson, Greenberg, and others. Linguistic marking involves variables such as life-form term frequency of use, term complexity (phonological or morphological), and acquisition by children learning langauge. Consideration of zoological life-form classification as it relates to these variables shows that there is a universal marking hierarchy for animal life-form concepts.

INTRODUCTION

Folk zoological life-forms are the most inclusive, comprehensive animal classes regularly found in languages. In a study published in 1979 I assemble evidence from 112 globally distributed languages showing that five life-forms, FISH, BIRD, SNAKE, WUG (e.g., American English *bug)* and MAMMAL are added to languages in a highly regular order (Brown 1979a). Since 1979 research has continued with the goal of expanding and refining cross-language data upon which the animal life-form encoding sequence is based. This has led to some revisions in originally described generalizations which are outlined here. However, the major purpose of this study is presentation of evidence showing that the zoological life-form encoding sequence fits into the framework of linguistic marking developed over the years by Jakobson (1941), Greenberg (1966, 1969, 1975), and others.

METHODS

Revised animal life-form encoding sequence

In the original study (Brown 1979a) cross-language data were compiled from two major sources: (1) dictionaries and (2) nondictionary sources. Nondictionary data were collected through personal communications with individuals who gathered information firsthand in the field, through reference to published and unpublished monographs and articles treating folk animal classification, and by me directly from informants. Of the 112 languages initially surveyed, dictionaries were primary sources for 78 cases and nondictionary sources were drawn on for the remaining 34.

Since nondictionary sources deal primarily with animal naming and classification, they are obviously more reliable with respect to thoroughness and accuracy of biological reference than dictionary sources. The fact that most data assembled in the original study were gathered from dictionaries meant that the initial investigation was necessarily preliminary. Ideally most data in terms of which uniformities in folk biological classification are determined should be compiled from nondictionary sources. I have recently assembled life-form data from nondictionary sources for 144 languages (Brown 1981a). This has led to certain changes in the animal life-form encoding sequence. The revised encoding sequence is presented in Figure 1.

	[no life forms]	→	BIRD FISH SNAKE	→	WUG MAMMAL
Stages:	0		1-3		4-5

FIG. 1 – Revised folk zoological life-form encoding sequence (Brown 1981a).

DISCUSSION

The encoding sequence of Figure 1 is interpreted as a series of stages in the growth of folk zoological life-form vocabularies with one life-form term being added at each stage. Stage 0 languages totally lack terms for animal life-forms. Stage 1 languages encode one, Stage 2 languages encode two, and Stage 3 languages encode three of the life-forms FISH, BIRD, and SNAKE. At Stage 4 languages add a term for either WUG or MAMMAL. The remaining animal life-form class is encoded at Stage 5.[1]

The critical features associated with the five life-forms of the encoding sequence are as follows:

BIRD — Large creature (relative to creatures such as bugs) possessing wings and usually having feathers and a bill or beak. (This life-form always includes birds. In its greatest extension it includes birds and flying mammals such as bats.)

FISH — Creature possessing a streamlined body and fins, usually having gills. (This life-form always includes true fish. In its greatest extension it includes true fish and fish-shaped mammals such as dolphins and whales).

SNAKE — Featherless, furless, elongated creature usually lacking appendages. (This life-form always includes snakes and/or worms. In its greatest extension it includes snakes, worms, lizards, eels, and occasionally, other elongated creatures such as reptile-like insects.)

WUG — Small creature other than those included in BIRD, FISH, and SNAKE. (This life-form always encompasses bugs, i.e. insects and other very small creatures such as spiders, and frequently is extended to worms. Occasionally the category also includes other creatures such as lizards, tortoises, and frogs if these are small.)[2]

MAMMAL — Large creature other than those included in BIRD, FISH, and SNAKE. (This life-form always includes mammals. It is often extended to other large animals such as iguanas and crocodiles and, in addition, to such creatures as tortoises and frogs if these are large.)[3]

To a greater or lesser extent each of the above five categories encodes a large, pan-environmental discontinuity in nature. (As noted presently, the status of WUG and MAMMAL as true discontinuities is problematic.) In other words, each is a linguistic reflection of a morphologically distinctive, but highly heterogeneous grouping of creatures found in most environments inhabited by humankind. Thus these categories are distinguished from other general animal classes which do not encode discontinuities in nature but rather are based on criteria other than gross morphology. Such criteria include animal habitat (e.g., house vs. forest), edibility (e.g., poisonous vs. nonpoisonous, tabooed vs. nontabooed), symbolic status (e.g., sacred vs. profane), relationship to human beings (e.g., flying vs. crawling vs. trotting vs. burrowing), and so on. In the literature on folk biological classification those categories based on the latter criteria are identified as "special purpose" classes while those encoding discontinuities in nature are called "general purpose" classes.

Clearly there are other large zoological discontinuities in addition to the five noted above which are pan-environmental. Examples include ants, spiders, wasps, moths and butterflies, and toads and frogs to mention a few. However, the discontinuities treated in my investigation are singled out for special attention because they appear to be especially significant for humans. This special importance is mirrored cross-linguistically in folk zoological classification. For example, these discontinuities are consistently encoded by languages. In other words, they are realized as labeled zoological classes over and over again. Most importantly, categories reflecting them tend to be the most polytypic animal classes of languages. Four folk zoological taxonomies studied in detail would appear to support this observation. Tables 1-4 list the most polytypic "general purpose" animal classes found in Chrau (Thomas 1966), Kyaka Enga (Ralph Bulmer, personal communication), Ndumba (Terence Hays, personal communication) and Tzeltal (Hunn 1977) respectively.

TABLE 1. *Seven most polytyic general purpose animal classes in Charu (extracted from Thomas 1966).*

Class	Number of immediately included labeled classes
sŭm (BIRD)	17
ca (FISH)	12
vih (SNAKE)	7
kyôq ("frog"/"toạd")	5
si ("louse")	5
khlang ("bird of prey")*	5
ong ("wasp")	5

*khlang is not included in sŭm (BIRD).

TABLE 2. *Eight most polytypic general purpose animal classes in Kyaka Enga (Ralph Bulmer, personal communication).*

Class	Number of included terminal labeled classes
yaka (BIRD)	180
kau (SNAKE)	71
sa (MAMMAL ("large mammal"))	32
mugi ("frog"/"toad")	19
wi (MAMMAL ("small mammal"))	13
mena ("pig")*	13
maemae ("butterfly"/"moth")	7
re ("ant")	7

*mena is not included in either sa ("large mammal") or wi ("small mammal").

TABLE 3. *Nine most polytypic general purpose animal classes in Ndumba (Terence Hays, personal communication).*

Class	Number of immediately included labeled classes
kuri (BIRD)	86
to'vendi (WUG)	49
fai (MAMMAL ("large mammal"))	15
kaapa'raara (SNAKE)*	11
faahi (MAMMAL ("small mammal"))	10
feqana ("frog"/"toad")**	9
kaapura'rora ("butterfly"/"moth")	8
kaa'puri ("ant")***	8
quara ("pig"/"domestic mammal")****	8

*kaapa'raara is immediately included in to'vendi (WUG).
**feqana is immediately included in to'vendi (WUG).
***kaapura'rora and kaa'puri are both immediately included in to'vendi (WUG).
****quara is not included in either fai ("large mammal") or faahi ("small mammal").

TABLE 4. *Eight most polytypic general purpose animal classes in Tzeltal (extracted from Hunn 1977).*

Class	Number of immediately included labeled classes
mut (BIRD)	106
čanbalam (MAMMAL)	36
čan (SNAKE)	23
č'o ("small rodent")*	12
šuš ("wasp")	10
ʔam ("spider")	10
čay (FISH)	8
čanul haʔ ("water bug")	8

*č'o is immediately included in canbalam (MAMMAL).

Tables 1-4 show that BIRD, FISH, SNAKE, WUG, and MAMMAL, if encoded, are consistently among the most polytypic animal classes in a taxonomy. Indeed, with the single exception of the Tzeltal FISH category (Table 4), classes encoding the five zoological discontinuities are the most polytypic animal categories in all four languages. The Tzeltal exception is due to the fact that the language is spoken in a mountainness region of southern Mexico where fish are severely restricted in number and diversity. Similarly, Kyaka Enga and Ndumba are spoken in highland regions of New Guinea where fish are virtually lacking, accounting for the fact that these languages do not encode FISH.

Six languages among the 144 recently surveyed treat WUG and MAMMAL in a special manner. Instead of encoding WUG and MAMMAL in separate categories, creatures of these groupings are lumped together in a single labeled class. These "combined WUG-MAMMAL" categories typically include bugs and mammals and frequently extend to other creatures which are neither birds, fish, or snakes, such as lizards, turtles, frogs, and so on. Distributional considerations indicate that languages encode combined WUG-MAMMAL only after addition of all three classes of the initial triad, BIRD, FISH, and SNAKE.

While zoological life-forms are typically encoded through use of a single label, they are sometimes lexically realized in other ways. For example, languages may lack a term for a class extended to mammals in general, but lexically encode MAMMAL through the binary opposition "large mammal"/"small mammal" (e.g., Ndumba, see Table 3). Languages doing so are judged as having a MAMMAL life-form in my studies (Brown 1979a, 1981a). In some cases, languages may encode only one-half of a binary opposition, e.g., only "small mammal." These languages are also judged as having MAMMAL life-forms. Binary opposition is particularly prevalent in the encoding of SNAKE. SNAKE is frequently recognized through the binary contrast "small elongated animal"/"large elongated animal." The "small elongated animal" category usually encompasses worms alone while the "large elongated animal" class is usually restricted to true snakes.

Explanatory framework

I (Brown 1979a, 1981a) have proposed an explanatory framework to account for the developmental priority of BIRD, FISH, and SNAKE and the late emergence of WUG, MAMMAL, and combined WUG-MAMMAL. Incorporated into this framework are three principles of naming-behavior: (1) criteria clustering, (2) binary opposition, and (3) dimension salience.

Criteria clustering occurs when certain features of natural objects correlate or cluster thus producing discontinuities in nature. Criteria clustering underlies encoding of BIRD, FISH, and SNAKE. For instance, Bruner et al. (1956: 47) cite the example of birds, creatures possessing feathers, wings, and a bill or beak. A creature's possession of feathers is highly predictive of wings and a bill or beak, so much so that an expectancy of all these features being present together is built up. This expectancy can lead to the lexical encoding of BIRD. Similarly, FISH and SNAKE have respective sets of defining features showing high levels of mutual predictability. The occurrence of fins predicts a streamlined body and gills, and greatly elongated creatures usually lack appendages as well as feathers and fur. In brief, BIRD, FISH, and SNAKE constitute salient discontinuities in nature and, thus, are natural candidates for lexical encoding. (See Hunn [1976, 1977] for a detailed consideration of the influence of discontinuities in nature on folk classification).

The late encoding of WUG, MAMMAL, and combined WUG-MAMMAL is in part a function of their relative indistinctiveness as natural discontinuities vis-a-vis the distinctiveness of BIRD, FISH, and SNAKE. Each of the former three groupings is exceptionally heterogeneous and demonstrates little criteria clustering. For example, while most mammals have four appendages used for locomotion and/or object manipulation, so do many other animals including such common creatures as lizards, salamanders, frogs, and turtles. Consequently, possession of four appendages is not particularly predictive of other faunal characteristics such as fur or hair. Exemplars of WUG have even less in common than creatures included in MAMMAL. WUG, for example, encompasses animals having legs and lacking them, having wings and lacking them, having segments and lacking them, and so on. Combined WUG-MAMMAL, of course, aggregates the heterogeneity pertaining to WUG and MAMMAL.

The principles of binary opposition and dimension salience underlie the encoding of WUG and MAMMAL. Classification through binary opposition is a common feature of language. Physical and conceptual dimensions are universally encoded initially through binary contrast, e.g., deep/shallow, sharp/blunt, rough/smooth, good/bad. Only later are such dimensions recognized by single terms, e.g., depth, sharpness, texture, and value respectively. The priority of binary contrast in dimension encoding is often apparent in the development of terms for whole dimensions. These are frequently derived from one of the two labels for associated oppositions: for example, depth from deep and sharpness from sharp.

Sometimes classification of natural objects involves their "dimensionalization." In other words, they are treated as if they are distributed along a dimension and are encoded through binary contrast. When this occurs, the dimension involved is invariably size. The importance of size in biological classification illustrates the principle of dimension salience. Dimensions are not particularly salient if they only apply to a small number of different objects. Since all biological organisms vary by size, there is a strong tendency for this dimension to underlie encoding of plant and animal classes through binary contrast.

After the three major zoological discontinuities are encoded as life-form classes, there remains a large and varied group of creatures which are not affiliated with life-forms. These left over or "residual" creatures often include mammals, lizards, frogs, turtles, snails, worms, and bugs to mention just the more obvious ones. Life-form encoding beyond BIRD, FISH, and SNAKE usually involves lexical recognition of subgroupings of these animals. However, among residual creatures distinct discontinuities are not easily discerned since criteria clustering is not much, if at all, in evidence. As a consequence, languages usually resort to a common classificatory strategy that need not necessarily involve distinct discontinuities, that is, binary opposition based on the salient dimension size. Thus the addition of WUG and MAMMAL encodes the contrast "small residual creature"/"large residual creature."[4]

There is another way of dealing with residual creatures which is occasionally resorted to by languages. Instead of lexically recognizing them through binary opposition based on size, some languages simply regard residual creatures, both large and small, as forming a unified grouping which is encoded by use of a single term. This, of course, creates combined WUG-MAMMAL life-form classes.

The relative rarity of combined WUG-MAMMAL among the 144 languages surveyed (Brown 1981a) suggests that humans are usually disinclined to use classificatory strategies that do not incorporate substantive defining features. Membership in a combined WUG-MAMMAL category does not involve substantive characteristics of creatures but rather their lack of membership in other life-form classes, i.e. their residualness. On the other hand, the binary contrast WUG/MAMMAL does entail a substantive feature, that is, animal size. The relatively high frequency of occurrence of the latter contrast among the world's languages indicates that humans are somehow more comfortable with life-form classes which are anchored in objective reality, even if only minimally so.

Folk biological life-forms and societal scale

In two studies I report that size of both botanical (Brown 1977) and zoological (Brown 1979a) life-form vocabularies is positively correlated with societal scale. Languages having few biological life-form terms are usually spoken by people living in small-scale societies with little of the political integration, social stratification, and technological elaboration found in large urban societies where people speak languages usually having many life-form terms.

The special usefulness and aptness of biological life-forms in large-scale societies may relate to the increasing separation of humans from direct reliance and dependence on the natural environment in these societies. The typical individual in a small-scale society can usually name and identify hundreds of separate plant species (Berlin et al. 1974; Conklin 1954; Hays 1976), while typical nonspecialist members of modern urban society might do well to name and identify even one hundred (Dougherty 1978). When people lose detailed knowledge of plants and animals including names for them, less specific terms, such as life-form labels, tend to grow in number and become increasingly salient. Addition of biological life-form classes to languages, then, indexes a general decrease of interest in and concern with the world of plants and animals.

Salience of biological classes can be measured through frequency of use of terms for them in ordinary language. The more frequently used words of a language tend to label more salient classes and the less frequently used words, less salient categories. Thus, in languages of modern nation-state societies terms for animal life-form classes generally should be more frequent in use than terms for less general animal categories. Tables 5-7 organize information relating to the salience of animal concepts (classes) as measured by frequency of use of terms for them in three nation-state languages, American English, Arabic, and Peninsular Spanish respectively. As expected, these tables show that animal life-form classes for the most part are ranked among the very most salient animal categories in these languages.

TABLE 5. *Ranking of the 66 most salient animal concepts in American English based on frequency of occurrence of terms for them in written language (extracted from the "Lorge-Thorndike Semantic Count" found in Thorndike and Lorge 1944).*

FREQUENCY	ANIMAL CONCEPT(S)
1000+	"animal/creature/beast" (849 animal, 324 creature, 202 beast), horse
582	dog
482	FISH (fish)
348	BIRD (bird)
266	robin
247	WUG (216 insect, 31 bug)
246	SNAKE (127 snake, 54 serpent, 65 worm)
234	cattle
205	lion
202	cat
195	sheep
175	goose
162	rabbit
160	deer
155	cow
148	toad
145	wolf
143	pig
131	bee, crow, monkey, seal
114	rat
112	eagle
111	duck
108	cardinal
103	chicken
98	bull
90	lamb, mule
89	spider
87	ant
84	elephant
81	hound
75	goat, mouse, possum
72	beaver
69	ox
68	cock
62	shark
61	trout

TABLE 5 (Continued)

FREQUENCY	ANIMAL CONCEPT(S)
58	muskrat
56	mole
54	cricket
52	owl
50	calf, dragon, dragonfly, hen, kitten, pony
48	fowl
47	buffalo
44	badger
43	donkey, hare, hog
42	fox
41	squirrel, gorilla, hawk
40	turtle, lark, tiger

Tokens (running words counted) = 4,500,000

TABLE 6. *Ranking of the 44 most salient animal concepts in Arabic based on frequency of occurrence of terms for them in written language (extracted from Landau 1959).*

FREQUENCY	ANIMAL CONCEPT(S)
59	"animal/creature"
31	BIRD
30	"dog"
27	"lion"
26	"camel"
16	FISH
12	"horse"
10	SNAKE (9 "snake," 1 "worm"), "locust"
9	WUG
8	"cow"
6	"deer," "mule," "elephant," "bee"
5	"monkey/ape"
4	"reptile/burden animal," "goat," "spider," "cat"
3	"mosquito," "sheep," "wolf," "ostrich," "cock"
2	"swine," "hen," "fly," "leech," "vulture/eagle," "ant"
1	"duck," "fox," "ox," "buffalo," "dove," "donkey," "giraffe," "hawk," "hyena," "scorpion," "lynx/leopar," "cobra," "tiger"

Tokens (running words counted) = 272,178

TABLE 7. *Ranking of the 65 most salient animal concepts in Peninsular Spanish based on frequency of occurrence of terms for them in written language (extracted from Buchanan 1941).*

FREQUENCY	ANIMAL CONCEPT(S)
214	"animal/creature"
207	BIRD
188	"horse"
160	"dog"

TABLE 7 (Continued)

FREQUENCY	ANIMAL CONCEPT(S)
117	"bull"
115	FISH
82	"lion"
73	"cat"
71	"cow"
58	"cock," "ox"
53	SNAKE (35 "snake," 18 "worm")
45	"goat," "chicken"
41	"mouse"
40	"fly (insect)"
39	"pig"
38	"eagle"
37	"sardine"
34	"cattle," "pigeon," "donkey"
33	"mule"
32	"wolf"
31	"fox"
29	"butterfly"
27	"hare," "turkey"
26	"parrot"
25	"spider," "snail," "frog," "tiger," "sheep"
23	"mosquito"
22	"bee"
21	"ant," "toad"
20	"partridge," "rabbit," "raven"
19	"duck"
18	"grub," "monkey," "crab," "blackbird"
15	WUG
14	"elephant"
13	"thrush," "cricket"
12	"locust"
11	"mole"
10	"hog," "cardinal," "bear"
9	"flea," "falcon"
8	"turtledove," "reptile," "lizard," "woodpecker"
7	"deer," "swallow"
6	"whale," "clam"

Tokens (running words counted) = approximately 1,200,000

Salience rankings of animal concepts (classes) presented in Tables 5-7 are based on frequency of occurrence of terms for them in written rather than spoken language.[5] Animal concepts ranked in each table constitute a group of the most salient animal classes in a language. For example, those of Table 5 are the 66 most salient animal categories in American English by frequency of use criteria. Animal concepts are ranked from the most salient one in a language to the least salient of the pertinent group. In a number of cases different terms of a language label the same animal class. Frequency counts for these are added together to yield an overall count for the class. For example, American English WUG has a frequency score of 247 which is the sum of the occurrences of *insect* (216) and *bug* (31) in a token of approximately 4,500,000 running words. The frequency score for the concept SNAKE in each of the three languages is the sum of counts for "snake" and "worm" classes. Individual scores for the latter two animal concepts are also given.

Tables 5-7 show that two zoological life-forms, BIRD and FISH are among the six most salient animal concepts in each of the three nation-state languages. In addition, SNAKE is found among the 11 most salient animal concepts in all three. In two languages, American English (Table 5) and Arabic (Table 6), SNAKE and WUG have virtually the same high degree of salience (see frequency scores for these). Only Spanish (Table 7) has a life-form concept, WUG, which shows a relatively low salience ranking. It should also be noted that the most general faunal concept of all, "creatures, beasts, or animals in general," is ranked first in salience in all three languages.[6]

Since people living in small-scale societies have less need for general animal concepts than people of nation-state societies, it is probably the case that life-form classes and other general animal categories, if encoded, are not especially salient for them. As it happens, most of the world's languages apparently lack very broad "unique beginner" or "kingdom" classes encompassing plants in general or animals in general (Berlin 1972; Berlin et al. 1973), indicating that cross-linguistically these are not very salient for speakers of nonnation-state languages. In addition, word frequency data from small-scale society languages should show that many, if not most, generic animals classes are ranked higher in salience than animal life-form classes, in sharp contrast to the relative rankings of generics vis-a-vis life-forms presented in Tables 5-7 for nation-state languages. Unfortunately, adequate word frequency counts for small-scale society languages are not now available to test this proposition.

The association between size of biological life-form inventories and societal scale indicates a tendency for the number of life-form terms to increase with increases in the scale and complexity of societies. Since societal scale has generally increased during the course of human history, especially so during the last several thousand years, it follows that biological life-form vocabularies in the vast majority of cases have grown rather than shrunk in size and, thus, that the animal life-form encoding sequence is basically additive in nature. This conclusion has been borne out in several studies which have used the comparative method of historical linguistics to reconstruct biological life-form growth in the histories of several genetic groups of languages (cf. Fowler 1972; Brown 1979b, 1981b, 1981c; Brown and Witkowski 1982).

Life-forms and linguistic marking

Cross-language regularities in animal life-form classification are related to linguistic marking. The framework of marking has been developed over the years by Jakobson (1941), Greenberg (1966, 1969, 1975), and others. Marking involves all components of language: phonology, grammar, and the lexicon. Marking in the lexicon entails a distinction between marked and unmarked words. The animal life-form encoding sequence is in fact a universal marking sequence or hierarchy. Terms for BIRD, FISH, and SNAKE are regularly unmarked in languages vis-a-vis terms for WUG and MAMMAL which are marked.

There are several diagnostic features of marking that tend to co-occur in typical marking relationships. Some of these are as follows:

Unmarked Item	Marked Item
1. The implied in an implicational relationship.	1. The implier in an implicational relationship.
2. Earlier acquisition by languages.	2. Later acquisition by languages.

3. Greater frequency of use (in text or spoken language).	3. Lesser frequency of use.
4. Less complex (phonologically or morphologically).	4. More complex.
5. Earlier child acquisition.	5. Later child acquisition.

Marking features 1 and 2 are closely interrelated and entail a cross-language perspective. An implicational relationship is evident when the occurrence of a certain item in languages implies or predicts the occurrence of another item, but not vice versa. For example, the cross-language data (Brown 1979a, 1981a) show that if a language has a WUG term, it will have terms for FISH, BIRD, and SNAKE. However, if a language has a term for any one of the latter three life-forms, it will not necessarily have a label for WUG. Thus WUG implies FISH, BIRD, and SNAKE, but none of these imply WUG. Similarly both MAMMAL and combined WUG-MAMMAL imply the former three life-forms, but not vice versa. Thus, WUG, MAMMAL, and combined WUG-MAMMAL are marked vis-a-vis BIRD, FISH, and SNAKE which are unmarked (feature 1).

Implicational associations involving lexical items are often the synchronic result of cross-language regularities in the order in which these items are acquired languages. Such relationships form the basis for the proposal of an animal life-form encoding sequence (Brown 1979a, 1981a). For example, the fact that WUG implies BIRD, FISH, and SNAKE but not vice versa is understandable if languages regularly encode BIRD, FISH, and SNAKE before encoding WUG. In addition to implicational relationships there is independent evidence which corroborates the acquisitional hypothesis outlined in Figure 1. This is evidence developed through the comparative approach of historical linguistics showing that languages add animal life-form terms to their vocabularies in the order of the encoding sequence (cf. Brown 1981b; Brown and Witkowski 1982). In terms of this evidence alone, one could determine that FISH, BIRD, and SNAKE are unmarked relative to WUG and MAMMAL which are marked (feature 2).

Marking features 3, 4, and 5 are closely interrelated but these associations are realized in individual langauges rather than across languages in the manner of features 1 and 2. For example, Zipf (1935, 1949) has shown that frequency of use (feature 3) correlates strongly with phonological (or orthographic) length of words (feature 4). High frequency is associated with short word length and, thus, with less complexity, and low frequency with long length and more complexity. This correlation is attributable to efficiency of communication factors: efficiency is enhanced when frequently used words are short rather than long. Since unmarked items are less complex than marked items and since they occur more frequently, it is not surprising that they tend to be acquired by children learning language before marked items (feature 5).

Since the animal life-form encoding sequence is also a marking hierarchy, it should reflect other criteria of marking in addition to features 1 and 2. For example, in individual languages we should expect that terms for BIRD, FISH, and SNAKE occur more frequently in ordinary use than terms for WUG and MAMMAL (feature 3).

Frequency of use

Above, data are presented showing that folk zoological life-form names are among the most frequently used animal terms in three languages affiliated with nation-state societies. In Table 8 similar data are compiled for 11 nation-state languages showing that frequency of use of the five animal life-forms of the encoding sequence correlates strongly with the order in which these are added to languages. In other words, an additional feature of marking, frequency of use, attests to the universal marking hierarchy for animal life-forms which is also evidenced by other marking features such as implicational relationships and language acquision order.

TABLE 8. *Frequency ranking of folk zoological life-forms in eleven nation-state languages.*

LANGUAGES	FREQUENCY RANKING				
	High				. . . . Low
Arabic	BIRD (29)	FISH (16)	SNAKE (10)	WUG (9)	MAMMAL (n.f.)
Brazilian Portuguese	BIRD (291)	SNAKE (142)	FISH (133)	WUG (43)	MAMMAL (<5)
Chinese	FISH (12)	BIRD (9)	SNAKE (<9)	WUG (<9)	MAMMAL (<9)
French	BIRD (108)	SNAKE (62)	FISH (54)	WUG (45)	MAMMAL (<5)
German	FISH (1025*)	BIRD (612*)	SNAKE (598*)	WUG (<100)	MAMMAL (<100)
Italian	FISH (17)	BIRD (10)	SNAKE (8)	WUG (4)	MAMMAL (<4)
Japanese	BIRD (16)	SNAKE (11)	FISH (8)	WUG (6)	MAMMAL (6)
Rumanian	BIRD (53)	SNAKE (28)	FISH (19)	WUG (<4)	MAMMAL (<4)
Russian	BIRD (114)	FISH (84)	SNAKE (32)	WUG (<13)	MAMMAL (<13)
Spanish	BIRD (207)	FISH (115)	SNAKE (53)	WUG (15)	MAMMAL (<5)
U.S. English	FISH (1079)	BIRD (770)	SNAKE (380)	WUG (372)	MAMMAL (27)

*close estimate
n.f. = not found among tokens surveyed
( ) enclose absolute frequency figure
< = less than

Each language of Table 8 is affiliated with life-form growth Stage 5 having all five animal life-forms of the encoding sequence. Frequency data presented in Table 8 are extracted from word frequency counts based on written rather than spoken language.[7] Frequency figures (given in parentheses) are based on counts for more than one lexical item when more than one word denotes the same life-form in a language. For example, in U.S. English two terms, *bug* and *insect,* designate WUG. The individual frequencies of these items are 65 and 307 occurrences respectively yielding a total frequency for WUG of 372. Similarly, the Peninsular Spanish BIRD figure, 207, is an aggregation of counts for its two BIRD terms, *pâjaro* (66 occurrences) and *ave* (141 occurrences). In addition, frequency counts for SNAKE in several languages (Arabic, Brazilian Portuguese, French, German, Spanish, and U.S. English) are aggregations of counts for "snake" and "worm" terms. In some cases frequencies of "worm" terms are so low that they are not given in sources, thus meaning that for some languages counts for "snake" terms alone yield figures for SNAKE. Chinese and Japanese are exceptional among the 11 languages since they both lump worms with bugs in WUG and lack "worm" labels.

Without exception, in each of the 11 languages (Table 8) BIRD, FISH, and SNAKE occur more frequently in written usage than WUG. Table 8 also shows that these three are more frequent than MAMMAL in all languages. However, frequency counts for

MAMMAL are almost certainly deflated for some languages and, hence, are not entirely reliable. This is due to the fact that terms for "creatures in general" are sometimes used secondarily to designated MAMMAL such as occurs in American English with *animal.* The same is probably true of "animal" terms in the several Romance languages represented. Terms for "creatures in general" occur in these languages at very high frequencies. For example, U.S. English *animal* has a frequency of 1226 compared to 1079 for FISH, the most frequently occurring English animal life-form (see Table 8). It is impossible to calculate with any degree of reliability what proportion of *animal's* occurrences involve MAMMAL as the intended referent as opposed to "creatures in general." Since counts for MAMMAL in Table 8 do not include these unknown values, they undoubtedly underrepresent MAMMAL's true frequency of use in some languages.[8]

Complexity of form

Unmarked words tend to be less complex than marked words. For example, in American English *bird, fish,* and *snake* are all monosyllabic while *insect, mammal,* and *animal* (secondarily MAMMAL) are disyllabic and trisyllabic. However, complexity of form is a somewhat less reliable measure of markedness than frequency of use since exceptions are relatively often encountered. In other words, marked terms are more than occasionally found to be equal in complexity or even less complex than unmarked terms. For instance, the alternative American English WUG label, *bug,* like unmarked, *bird, fish,* and *snake,* is monosyllabic. In addition, with regard to phonological complexity *bug* is simpler than two of the three unmarked terms: *bug* [bəg], *bird* [bɨrd], *snake* [sneyk], and *fish* [fiš]. And, of course, *bug,* is simpler than all three unmarked items with respect to orthographic segment count: *bug* (three), *bird* (four), *snake* (five), and *fish* (four). The criterion of complexity of form, then, reflects a strong tendency rather than an absolutely determinate phenomenon.

When lexical items maintain the same relative marking values across languages, as do folk zoological life-form terms, then on the average unmarked terms should be less complex than marked terms. With this expectation in mind, I have calculated average orthographic length of animal life-form terms encountered in the 144 languages surveyed in the recent animal life-form study (Brown 1981a). This was achieved by simply counting the number of orthographic segments of words for a life-form class, summing them, and then dividing that sum by the number of terms counted.[9] In the case of SNAKE, orthographic segment counts for "snake" terms, "snake and worm" terms, and "worm" terms were aggregated and this total was divided by the number of terms counted. Average orthographic length of animal life-form labels are as follows (from shortest to longest):

FISH:	4.87 segments
SNAKE:	5.53 segments
BIRD:	5.66 segments
MAMMAL:	5.75 segments
WUG:	6.70 segments

These figures, of course, are another reflexion of the universal marking hierarchy for folk zoological life-forms. On the average, terms for BIRD, FISH, and SNAKE which are unmarked are shorter in orthographic length than terms for WUG and MAMMAL which are marked. This marking relationship can also be expressed in a slightly different manner using averages. The average length of terms for BIRD, FISH, and SNAKE considered together is 5.38 segments compared to an average length of 6.14 segments for terms for residual creatures considered together (including terms for combined WUG-MAMMAL).

Above it is noted that animal life-form terms tend to be more numerous and salient in languages spoken in large-scale societies than in those spoken in small-scale ones. For example, frequency data are presented showing that animal life-form words tend to be among the most frequently used names for creatures in three languages affiliated with nation-state societies. Since frequency of use is inversely correlated with complexity of form, it follows that average orthographic length of animal life-form terms in nation-state languages should be less than that of corresponding terms in small-scale society languages.

Of the 144 languages surveyed (Brown 1981a), seven are regularly spoken by peoples living in large-scale, nation-state societies: Cantonese, Indonesian, Mandarin, Northeastern Thai, American English, Czech, and Japanese. Table 9 presents the average orthographic length of life-forms in these languages compared to the average lengths calculated for life-forms in all languages surveyed (the overwhelming majority of which are affiliated with small-scale societies). With the exception of calculations for MAMMAL, these figures accord with the hypothesis that animal life-form classes are more salient for people of large-scale societies than for those of small-scale ones. Another way of putting this is that animal life-form terms of nation-state languages are unmarked vis-a-vis corresponding terms of small-scale society languages (cf. Dougherty 1978).

TABLE 9. *Average orthographic length of animal life-form terms of nation-state languages compared to average length of life-form terms of all 144 languages surveyed in Brown (1981a).*

AVERAGE ORTHOGRAPHIC LENGTH

LIFE-FORMS	Nation-State Languages	All Languages
FISH	3.14 segments	4.87 segments
SNAKE	4.10 segments	5.53 segments
BIRD	4.14 segments	5.66 segments
WUG	5.00 segments	6.70 segments
MAMMAL	6.00 segments	5.75 segments

Child acquisition

Chase (1980) has investigated child acquisition of folk zoological life-forms in two languages, Juchitan Zapotec (Oaxaca, Mexico) and American English. His general conclusions are that child speakers of both languages learn animal life-form terms and associated concepts in the order of the animal life-form encoding sequence (Figure 1). Thus, by child acquisition criteria BIRD, FISH, and SNAKE are unmarked relative to WUG and MAMMAL which are marked.

Of Chase's two investigations the American English study provides more insights into life-form acquisiton by children than the Juchitan Zapotec study. Juchitan Zapotec has only two animal life-forms of the encoding sequence, FISH and SNAKE. Since all children interviewed by Chase controlled terms for these life-forms, the Juchitan Zapotec study sheds little light on order of life-form acquisition. However, the language also has incipient WUG and MAMMAL life-form classes (Brown and Chase 1981). Incipient life-forms are similar to full-fledged life-forms in that criteria of membership are identical except that incipient classes do not extend to known organisms having their own label.[10] Thus, for example, in Juchitan Zapotec only unknown and unnamed bugs are included in incipient WUG. This is overtly recognized by adult speakers of the language (Brown and Chese 1981). On the other hand, child speakers of Juchitan Zapotec often extend terms for incipient WUG and MAMMAL to named creatures as well as to unnamed ones. This parallels lexical overextensions by children frequently cited in the psycholinguistic literature (cf. Lindfors 1980:170-171). Of course, children later acquire the adult usage of these terms.

Chase's (1980) American English study has both stratificational and longitudinal aspects. Initially Chase interviewed ten white, middle class children living in northeastern Illinois ranging in age from approximately three to nine years. Seventeen months later seven of these ten were reinterviewed and six additional children were incorporated into the study at that time. Chase found that number of animal life-forms possessed by children correlates perfectly with age, the youngest having fewest and the oldest having most. In addition, the composition of life-form inventories possessed by these children indicates that they acquired them in the order of the encoding sequence. For example, no child was discovered to have a combination of life-forms such as BIRD, FISH, and WUG (lacking SNAKE and MAMMAL). In the follow up study of some children most had acquired additional animal life-forms, again in accordance with the order of the encoding sequence.

Chase (1980) used two strategies for determining possession of knowledge of folk zoological life-forms. All children were first presented with a stack of cards with realistic animal pictures (mostely in color) pasted on them. Among these all major animal groupings (mammals, insects, amphibians, reptiles, etc.) were well represented. Children were asked to sort these into piles of creatures that "go together." They were then asked to supply names for both piles and individual cards. In addition to stimulus materials, Chase used traditional ethnoscientific techniques (cf. Black 1969) to elicit inclusive relationships.

In addition to paralleling the lexical encoding sequence (Fig. 1), order of acquisition of animal life-forms by American children shows some interesting language-specific details. This order is outlined in Figure 2. Children ranging in age from roughly three to five and one-half years have knowledge of only two life-forms, FISH and SNAKE (labeled *fish* and *snake* respectively). Before reaching six years in age they learn a third life-form, BIRD (labeled *bird).* At around the age of seven years WUG is acquired (labeled variously *bug* or *insect).* Finally MAMMAL (labeled variously *animal* or *mammal)* is learned after the age of eight years or thereabout.

$$\begin{bmatrix}\text{FISH}\\ \text{SNAKE}\end{bmatrix} \rightarrow [\text{BIRD}] \rightarrow [\text{WUG}] \rightarrow [\text{MAMMAL}]$$

FIG. 2. Order in which American children acquire folk zoological life-forms (Chase 1980).

This acquisitional order seems to be related in part to American children's knowledge of generic terms for creatures. The younger children interviewed by Chase were unable to identify individual fish pictures by generic names (e.g., *trout, bass, catfish,* etc.) with the exception of the shark (called *jaws* by some) and names for individual snakes were not known. On the other hand, they were able to assign generic terms to numerous bird pictures (e.g., *penguin, seagull, parrot, duck, owl,* and so on). Perhaps as a consequence, when sorting pictures, all fish were usually put into a single pile and all snakes were placed in another pile (sometimes also including worm pictures), but birds were often left ungrouped, that is, each bird picture constituted its own pile of one. Children sorting pictures thusly possessed knowledge of FISH and SNAKE life-form classes, but not BIRD.

Children lacking a BIRD life-form are not unfamiliar with the word *bird.* However, they simply do not use the term in a way corresponding to adult American usage; in other words, they do not use it as if it were a label for a full-fledged life-form class. Rather, they apply *bird* only to those creatures with feathers, wings, and a bill or beak which are unknown to them and cannot be identified by use of a generic term. Consequently, for these children known creatures such as ducks, parrots, owls, and so on are definitely not *birds* in their system. Thus younger American children use *bird* as a label for zoological class having the characteristics of incipient life-form categories described above.

Marking and principles of naming-behavior

An important question is what factors determine linguistic marking? Specifically, in this context, what generates the marking hierarchy for folk zoological life-forms? Since the relative marking values of BIRD, FISH, SNAKE, WUG, and MAMMAL are uniform across languages, conditions affecting these values must themselves, for the most part, be regular across languages. Probable influences are the principles of naming-behavior proposed earlier an an explanatory framework accounting for uniformities in animal life-form encoding.

Fundamentally, the animal life-form marking hierarchy is a linguistic reflection of criteria clustering in the physical world, that is, it mirrors the indistinctiveness of WUG and MAMMAL as natural discontinuities relative to the distinctiveness of BIRD, FISH, and SNAKE. In other words, terms for BIRD, FISH, and SNAKE are unmarked vis-a-vis terms for WUG and MAMMAL because the physical objects labled by the former three terms figure into highly salient breaks in nature while those labled by the latter two do not. However, criteria clustering alone does not explain these marking distinctions. Such breaks are consistently followed by humans in classifying and naming objects because they are innately inclined to do so. The marking hierarchy, then, is in part attributable to internal constraints on humans in the processing of external stimuli.

CONCLUSION

The close agreement of physical-perceptual constraints and linguistic marking values for animal life-forms indicates that the former are converted or translated into the latter. The categories BIRD, FISH, and SNAKE are naturally salient and are always encoded first in the development of zoological life-form lexicons. This physical salience is also converted through lexical encoding into linguistic salience which is manifested through typical marking effects such as high frequency of use, simplicity of form, and early acquisition by children learning language.

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LITERATURE CITED

BERLIN, BRENT. 1972. Speculations on the Growth of Ethnobotanical Nomenclature. Language in Soc. 1:51-86.

BERLIN, BRENT, DENNIS E. BREEDLOVE, AND PETER H. RAVEN. 1973. General Principles of Classification and Nomenclature in Folk Biology. Amer. Anthropol. 75: 214-242.

——. 1974. Principles of Tzeltal Plant Classification: An Introduction to the Botanical Ethnography of a Mayan-speaking People of Highland Chiapas. Academic Press, New York.

BLACK, MARY B. 1969. Eliciting Folk Taxonomy in Ojibwa. Pp. 165-189, *in* Cognitive Anthropology (Stephen A. Tyler, ed.). Holt, Rinehart and Winston, Inc., New York.

BROWN, CECIL H. 1977. Folk Botanical Life-Forms: Their Universality and Growth. Amer. Anthropol. 79:317-342.

——. 1979a. Folk Zoological Life-Forms: Their Universality and Growth. Amer. Anthropol. 81:791-817.

——. 1979b. Growth and Development of Folk Botanical Life-Forms in the Mayan Language Family, Amer. Ethn. 6:366-385.

LITERATURE CITED (Continued)

BROWN, CECIL H. 1981a. Folk Biological Life-Forms: A Cross-Language Study of Plant and Animal Classification. Unpubl. ms. Dept. of Anthropol., Northern Illinois Univ.

——. 1981b. Growth and Development of Folk Zoological Life-Forms in Polynesian Languages. J. Polynesian Soc. 90:83-110.

——. 1981c. Growth and Development of Folk Botanical Life-Forms in Polynesian Languages. Unpubl. ms., Dept. of Anthropol., Northern Illinois Univ.

Ibid. 1981d. More on Folk Zoological Life-Forms. Amer. Anthropol. 83:398-401.

BROWN, CECIL H. and PAUL K. CHASE. 1981. Animal Classification in Juchitan Zapotec. J. of Anthropol. Res. 37:61-70.

BROWN, CECIL H. and STANLEY R. WITKOWSKI. 1982. Growth and Development of Folk Zoological Life-Forms in the Mayan Language Family. Amer. Ethnol., 9:97-112.

BROWN, CHARLES B., WESLEY M. CARR, MILTON L. SHANE. 1945. A Graded Word Book of Brazilian Portuguese. New York: F.S. Crofts & Co.

BRUNER, J.S., J.J. GOODNOW, and G.A. AUSTIN. 1956. A Study of Thinking. New York: Wiley.

BUCHANAN, MILTON A. 1941. A Graded Spanish Word Book. · Toronto: The Univ. of Toronto Press.

CHASE, PAUL K. 1980. Acquisition of Folk Zoological Life-Forms by American and Zapotec Children. M.A. thesis, Northern Illinois Univ.

CONKLIN, HAROLD C. 1954. The Relation of Hanunoo Culture to the Plant World. Ph.D. thesis, Yale Univ.

DOUGHERTY, JANET W.D. 1978. Salience and Relativity in Classification. Amer. Ethnol. 5:66-80.

FOWLER, CATHERINE LOUISE SWEENEY. 1972. Comparative Numic Ethnobiology. Ph.D. thesis, Univ. of Pittsburgh.

GREENBERG, JOSEPH H. 1966. Language Universals with Special Reference to Feature Hierarchies. The Hague: Mouton.

——. 1969. Language Universals: A Research Frontier. Sci. 166:473-478.

——. 1975. Research on Language Universals. Annu. Rev. Anthrop. 4:75-94.

HAYS, TERENCE E. 1974. Mauna: Explorations in Ndumba Ethnobotany. Ph.D. thesis, Univ. of Washington.

——. 1976. An Empirical Method for the Identification of Covert Categories in Ethnobiology. Amer. Ethn. 3:489-507.

HUNN, EUGENE S. 1976. Toward a Perceptual Model of Folk Biological Classification. Amer. Ethnol. 3:508-524.

——. 1977. Tzeltal Folk Zoology: The Classification of Discontinuities in Nature. New York: Academic Press.

JAKOBSON, ROMAN. 1941. Kindersprache, Aphasie, und allgemeine Lautgesetze. Uppsala, Sweden: Almqvist and Wiksell.

JOSSELSON, HARRY H. 1953. The Russian Word Count and Frequency Analysis of Grammatical Categories of Standard Literary Russian. Detroit: Wayne Univ. Press.

JUILLAND, ALPHONSE, P.M.H. EDWARDS and ILEANA JUILLAND. 1965. Frequency Dictionary of Rumanian Words. The Hague: Mouton.

JUILLAND, ALPHONSE and VINCENZO TRAVERA. 1973. Frequency Dictionary of Italian Words. The Hague: Mouton.

LANDAU, JACOB M. 1959. A Word Count of Modern Arabic Prose. New York: American Council of Learned Societies.

LINDFORS, JUDITH WELLS. 1980. Children's Language and Learning. Englewood Cliffs, New Jersey: Prentice-Hall Inc.

LIU, ERIC SHEN. 1973. Frequency Dictionary of Chinese Words. The Hague: Mouton.

MIYAJI, HIROSHI. 1966. A Frequency Dictionary of Japanese Words. Ph.D. thesis, Stanford Univ.

MORGAN, B.Q. 1923. German Frequency Word Book Based on Kaeding's Häufig Keitswörterbuch der deutschen Sprache. New York: The Macmillan Company.

THOMAS, DOROTHY. 1966. Chrau Zoology: An Ethnolinguistic Study. *In* Papers on Four Vietnamese Lanuguages, Pp. 1-14. (David D. Thomas, ed.) Auckland: Ling. Soc. of New Zealand.

THORNDIKE, EDWARD L. and IRVING LORGE. 1944. The Teacher's Word Book of 30,000 Words. New York: Bureau of Publications, Teacher's College, Columbia Univ.

VANDER BEKE, GEORGE E. 1929. French Word Book. New York: The Macmillan Company.

ZIPF, G.K. 1935. The Psycho-Biology of Language. Boston: Houghton Mifflin.

——. 1949. Human Behavior and the Principle of Least Effort. Cambridge, Mass.:Addison Wesley Publishing.

NOTES

1. In the initial animal life-form study (Brown 1979a) Stage 0 was not recognized. In addition, the earlier version of the encoding sequence proposed that WUG regularly precedes MAMMAL. Data assembled later (Brown 1981a) do not support such a proposal. The original determination of the priority of WUG vis-a-vis MAMMAL was influenced in part by the fact that the vast majority of language cases surveyed were extracted from dictionaries (see Brown 1981d for a discussion of this point).

2. WUG is a mnemonic derived from *worm* and *bug.*

3. *Animal* is more commonly used than *mammal* as a MAMMAL life-form label by speakers of American English. Since *animal* is also used as a unique beginner term to refer to creatures in general, it is not employed as a life-form gloss to avoid ambiguity of reference.

4. Terence E. Hays working with Ndumba (Tairora) speakers of New Guinea and Eugene S. Hunn working with Tzeltal speakers of Mexico independently identified "residual" biological classes during the early 1970's. For discussions of the role of residualness in folk biological classification, see Hays (1974) and Hunn (1976, 1977).

5. Frequency of occurrence of terms for these concepts are extracted from word frequency books, respectively Thorndike and Lorge (1944), Landau (1959), and Buchanan (1941). In the case of American English only one frequency count of the several found in Thorndike and Lorge (1944) is used, i.e., the "Lorge-Thorndike Semantic Count." In Tables 6 and 7 Arabic and Spanish animal concepts are denoted by English glosses. Associated frequency scores are those of actual animal terms. Actual terms and their frequency scores are given in Table 5 for American English.

6. In American English the term *animal* is used to designate both "creature in general" and MAMMAL. Consequently, two distinct usages contribute to the high salience of this term (frequency count = 849, see Table 5). Such a dual application may also pertain to the equivalent Spanish word *animal.* It is, of course, impossible to determine what proportion of frequency counts for such polysemous items trace to one usage as opposed to the other.

7. The following word frequency books were used as sources for data presented in Table 8: Arabic (Landau 1959), Brazilian Portuguese (Brown, Carr, and Shane 1945), Chinese (Liu 1973), French (Vander Beke 1929), German (Morgan 1923), Italian (Juilland and Travera 1973), Japanese (Miyaji 1966), Rumanian (Juilland, Edwards, and Juilland 1965), Russian (Josselson 1953), Spanish (Buchanan 1941), and U.S. English (Thorndike and Lorge 1944). Thorndike and Lorge (1944) present several different counts for U.S. English. Frequencies for U.S. English life-forms given in Table 8 are aggregated figures from two of these counts, i.e. from the "Lorge Magazine Count" and the "Lorge-Thorndike Semantic Count." Several word frequency books consulted break counts down according to genre of written materials surveyed, e.g., drama, essays, newspapers, technical/scientific literature. These include sources for Chinese, Italian, Japanese, Rumanian, and Spanish. In each of these cases frequency figures from technical/scientific literature are excluded from counts presented in Table 8 since these do not reflect "folk" usage. The approximate number of running terms (tokens) pertaining to each word frequency study is as follows: Arabic (272, 178), Brazilian Portuguese (1,200,000), Chinese (250,000), French (1,147,748), German (10,910,777), Italian (500,000), Japanese (250,000), Rumanian (500,000), Russian (1,000,000), Spanish (1,200,000), and U.S. English (9,000,000). The considerable differences in ranges of frequency counts for different languages (see Table 8) reflect the fact that counts for these languages are based on tokens which vary considerably in size.

8. The frequency count for U.S. English MAMMAL given in Table 8 is the frequency of occurrence of the word *mammal.*

9. In counting orthographic segments, all symbols occupying spaces in the horizontal presentation of a word are tallied. This includes symbols indicating vocalic length and symbols indicating glottalization of consonants. For example, Huastec θu·m "worm" is judged as having four orthographic segments and č'ičin "bird" as having six. When a language has two or more terms for a single life-form class, e.g., Southern Paiute with "bird" and "large bird," segments of all terms are counted and figure into calculations for that life-form.

10. Incipient life-form classes are also residual biological categories (cf. Hunn 1976, 1977; Hays 1974).

SOCIETY OF ETHNOBIOLOGY, INC.

The Society of Ethnobiology, Inc., is now established as a non-profit corporation. The founding Board of Directors was covened at its first meeting in San Diego, during the Fifth Ethnobiology Conference held in April 1982, by Steven A. Weber, founding president. This Board was enlarged to include the existing editorial board of the *Journal of Ethnobiology*. The full Board then acted as follows:

1. Elected Steven Weber to serve as President of the Society for 1983 and Steven Emslie to serve during that period as Secretary/Treasurer of the Society.
2. Chose Dr. Willard Van Asdall of the University of Arizona to succeed Steven Emslie and Steven Weber as editors of the journal for volumes 3 and 4 (1983-1984). Until further notice, all journal correspondence should continue to be sent to the present editorial office: P.O. Box 1145, Flagstaff, AZ 86002. Authors of manuscripts should refer to the inside back cover of this issue for specific instructions.
3. Chose Dr. Richard S. Felger and Lynn Reitner of the Arizona-Sonora Desert Museum to serve as book review editors. Several journal pages will be devoted to book reviews each number beginning with Volume 3.
4. Chose Dr. Paul Minnis of the University of Oklahoma as host for the Sixth Ethnogiology Conference to be held at Norman, Oklahoma, in 1983 (see notice below).

SIXTH ANNUAL ETHNOBIOLOGY CONFERENCE

The sixth ethnobiology conference will be held in Norman, Oklahoma, on March 18-19, 1983. A reception will be held on Thursday evening, the 17th of March with paper sessions on Friday and Saturday. A call for papers will be issued in January, 1983. For further information contact Dr. Paul Minnis, Department of Anthropology, University of Oklahoma, 455 West Lindsey, Room 521, Norman, OK 73019.

SOCIETY OF ECONOMIC BOTANY MEETINGS

The Society of Economic Botany will hold its 23rd annual meeting at the University of Alabama in University, Alabama, June 14-17, 1982. Featured will be a symposium entitled "U.S. OILSEEDS INDUSTRY–GERMPLASM TO UTILIZATION". Further information can be obtained from C. Earle Smith, Jr., Anthropology, Box 6135, University of Alabama, University, AL 35486.

COMMITTEE FOR NUTRITIONAL ANTHROPOLOGY

The Committee for Nutritional Anthropology is an organization within the American Anthropological Association which fosters communication among scholars interested in issues of nutrition and anthropology. The yearly dues of $5 covers the cost of quarterly newsletters on topics of current interest in the field. To join the organization, send a letter of self-introduction and the dues to the current president:

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Tucson, AZ 85724

WEST COAST NETWORK OF NUTRITION AND ANTHROPOLOGY

The West Coast Network of Nutrition and Anthropology is an organization of individuals interested in social and biological aspects of food, nutrition and health. Usually, local meetings are held bi-monthly and an annual meeting is held in the San Francisco area to share research reports. The organization dues are $6 per year and should be sent to:

Dr. Angela Little
Department of Nutritional Science
University of California
Berkeley, CA 94720

Dr. Little can supply information on local California meetings. Information on local meetings in the Vancouver, Canada, are can be obtained from:

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