THE PERCEPTUAL BASES OF ETHNOBIOLOGICAL CLASSIFICATION: EVIDENCE FROM AGUARUNA JÍVARO ORNITHOLOGY

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ABSTRACT.—Preliminary experiments conducted to explore the principles of Aguaruna Jívaro bird classification of 164 commonly occurring species reveal that classification is primarily determined by the perceptual salience of each species. Those species of birds rated independently by a western ornithologist as perceptually highly salient are shown to have stable, codable Aguaruna names. Birds of low perceptual salience have low codability. Birds of all levels of perceptual salience are consistently more codable for males than for females, indicating a marked division of ornithological knowledge by sex. Methodological and theoretical implications of these findings for further work in microethnobiological research are discussed.

INTRODUCTION

Ethnobiology is moving slowly toward an understanding of the principles underlying native systems of biological classification. Work over the last several years has explored the formal structural features of ethnobiological taxonomies. A major conclusion of this work is that native systems of biological classification are structurally quite similar. (Berlin 1972; Berlin et al. 1973; Bulmer 1974; Hays 1974; Hunn 1977).

Considerably less research has been devoted to determining the substantive nature of ethnobiological classification. Ethnobiologists are not yet able to predict which groups of plants and animals will be given conceptual recognition by the local society nor predict how the recognized groups will be perceived to be related. This is perhaps the most serious weakness in our understanding of how ethnobiological systems of classification actually work.

In this paper, we will explore some of the substantive features of ethnobiological classification by describing a portion of our research on Aguaruna Jívaro ornithology[1]. We will address 2 primary questions about Aguaruna bird classification. First, we will try to explain why the Aguaruna find certain species of birds easier to name than others. Second, we will examine why some named species are perceived to be more similar to one another than to other species. Answers to these questions require an understanding of the correspondence of native names to individual biological species. Our analysis of this correspondence employs 2 methods, each leading to complementary conclusions. The first part of this paper focuses on *individual biological species.* Here we determine which species are likely to be given stable linguistic recognition by a large numbers of informants and which are likely to receive more variable labeling. This line of investigation helps answer our first question, why certain species are easier to name than others.

The second part of this paper focuses on the *individual* native name. Here we attempt to discover the patterns in which particular names are applied to biological species. These patterns, we believe, help reveal the internal structure of ethnobiological categories and contribute to an answer of our second question, why certain biological species are perceived to be similar to one another. We believe that our findings will contribute to a better understanding of the structure and function of ethnobiological systems of classification.

DISCUSSION

Part I: The Psychological Salience of Ethnobiological Categories

The fundamental plant and animal taxa in ethnobiological systems of classification have been called folk generic categories (Berlin et al. 1973, 1974; Berlin 1972, 1976, 1977). While folk generic categories have been defined in differing ways by several authors (Bartlett 1940; Bulmer 1970; Cain 1956; Conklin 1954; Rosch et al. 1976), we believe that underlying these various formulations is a recognition of essentially the same conceptual and biological unit[2].

Work in ethnobiological classification has up until now made the assumption that folk generic categories of plants and animals differ little from one another in their perceptual distinctiveness, however this might be measured. This assumption is probably wrong. Several years of field work in ethnobiology have led us to the belief that biological species differ considerably in their overall distinctiveness from one another, and that this differential distinctiveness leads to the formation of folk generic categories of differing degrees of perceptual importance. Following traditional psychological terminology, we will use the term salience to refer to the relative perceptual importance or distinctiveness of any specified species of bird. As will be seen below, perceptual salience can be measured indirectly.

The Linguistic Codability of Ethnobiological Categories.—An examination of the ways local populations apply names to species of plants and animals reveals that people agree closely on the appropriate name of some species and disagree markedly on the name of other species. Following the usage of Brown and Lenneberg (1954) in their classic study of color naming, we will use the term *codability* to refer to the degree of variability in naming responses for any specified stimulus, in this case, for any particular species. The greater the variability in naming, the less codable the species.

One should expect species with high salience ratings to be highly codable while species of lower salience ratings should be less codable. If such a relationship could be shown to hold true, it would suggest that a society's linguistic codification of the biological universe is constrained by the character of the natural discontinuities in a particular habitat.

The Naming Experiments.—In order to collect information to test the relationship of salience and codability, we undertook a series of naming experiments in a small village of Aguaruna Jívaro in the Upper Maranon River Valley of northern Peru. Specimens of 157 species of birds were collected and prepared for use as stimuli in 3 naming experiments. The species used in our experiments did not constitute a complete inventory of the total avifauna found in the region inhabited by the Aguaruna, an avifauna that is believed to include some 500 species. We are confident, however, that they represented the most common and regularly occurring birds in the immediate locality of our field site. As far as possible, sexually dimorphic species were represented by specimens of both sexes in the naming experiments. A total of 260 specimens were ultimately employed as stimuli in our experiments.

Because of the large number of specimens, 3 separate naming experiments were conducted. Specimens were placed on long, cane work tables against backgrounds of tancolored botanical corrugates. The placement of specimens along tables was arbitrary, with the exception that specimens of the same species never appeared directly adjacent to one another.

In carrying out the naming tasks, informants were asked of each specimen *"wajim paiya,"* "What is it called?" and the response was recorded in a notebook. Each subject required approximately 15-20 minutes to complete each experiment. All participants were paid a nominal sum at the completion of each task.

Twenty-eight informants (18 male, 10 female) participated in the first experiment, 25 (21

males, 4 females) in the second, and 27 informants (21 males, 6 females) in the third experiment. Practical considerations made it impossible for all informants to participate in each of the 3 experiments. Furthermore, women were hesitant to participate as subjects in the study, leading to a sample biased toward male informants.

The Measurement of Perceptual Salience.—There are no established criteria for measuring perceptual salience of plants or animals. For purposes of this preliminary research, perceptual salience was determined by the subjective judgments of one of us (JPO) who has specialized in the study of the systematics and ecology of Peruvian birds for the last 20 years. The entire series of bird specimens was examined and ranked into 4 major salience categories — from very high (116 specimens), high (94 specimens), moderate (32 specimens) to low (18 specimens). Male and female birds of the same species showing strong sexual dimorphism were usually given separate salience ratings. All of the saliency judgments were, of course, carried out independently of any information for the linguistic codability of the individual species. The criteria used in establishing perceptual salience will be discussed below.

Measurement of Codability.—A codability measure was needed that would characterize the degree of agreement among subjects for each specimen. A number of possibilities were considered. The most obvious was the size of the mode, the number of people offering the most common name for the specimen. Another would be the number of distinct names offered, comparable to the use of the number of different species in an area as a measure of species diversity. The Brown and Lenneberg (1954) codability score used a combination of the above measures. While all of the measures considered gave similar orderings of specimens by their codability, we decided to determine codability with a variant of the Shannon measure of uncertainty (Clifford and Stephanson 1975; Garner 1962), namely:

$$1 - \frac{N(\log_2 N) - \sum_{i=1}^{s} n_i(\log_2 n_i)}{N(\log_2 N)}$$

where N is the number of naming responses (i.e., subjects), s is the total number of names, and n_i is the frequency with which the ith name was given as a response.

This measure ranges from one, in the case of total agreement, to zero, in the case of total disagreement. We chose this measure because it is computed on the basis of the frequencies of all of the names applied to a given specimen rather than just the most common name or names.

Findings.—Table 1 shows the relationship found between linguistic codability and perceptual salience. Whether measured with Peason's or Spearman's r, the correlation between salience and codability is statistically significant at the .001 level. Interestingly, most of this effect seems attributable to the contrast of the 'very high' group with the lower salience levels since the correlation coefficients remain very nearly the same when the lower 3 levels are collapsed into a single group, see Table 2.

Currently, efforts are underway to codify the ornithological criteria used as the basis for salience ratings. This is difficult because multiple criteria are involved and each may have differing weights in any particular case. The features most often mentioned by the ornithologist were size of bird, opportunity for observation, distinctiveness of plumage, and distinctiveness of the bird's vocalizations. Only one of these characters, size, is easily quantifiable[3]. As predicted by Hunn for ethnobiological classification in general (Hunn 1977:74), size is quite strongly correlated with the codability of a bird, as shown in Table 3.

TABLE 1.—*Correlation of Salience with Codability*

Pearson -R	Prob	Spearman R	Prob	N
.478	.001	.492	.001	252

TABLE 2.—*Correlation of Collapsed Salience with Codability*

Pearson R	Prob	Spearman R	Prob	N
.467	.001	.472	.001	260

TABLE 3.—*Correlation of Size with Codability.*

	Pearson R	Prob	Spearman R	Prob	N
Codability with Size	.396	.001	.369	.001	274
Salience with Size	.203	.001	.117	.033	248

TABLE 4.—*Multiple Regression of Codability on Salience and Size.*

Variable	F to Enter	Prob	Multiple R	R Square	R Square Change	Simple R	N
Salience	69.4	.001	.469	.220	.220	.469	248
Size	34.2	.001	.562	.315	.095	.397	248

TABLE 5.—*Comparison of Men with Women by Codability.*

	Mean	Standard Deviation	N
Men	.700	.244	289
Women	.408	.350	289
Difference	.292	.272	289

T = 9.49   p $\ll$ .001

The correlation of codability and size is significant at the .001 level. However, since salience ratings were in part based on size, there is also a weak but statistically significant correlation of size with salience ratings. To show the effect of size differences controlling for level of salience, the results of a multiple regression of codability on salience and size are presented in Table 4. It can be seen that while salience is the better of the 2 predictors of codability, both are highly significant and explain substantially independent portions of the variability in codability. The apparent independence of size and salience may be partially attributable to the many small birds which were highly salient and codable due to their striking plumage color.

Linguistic codability not only varies according to the characteristics of what is perceived but also according to the characteristics of the human perceiver. One would expect that ornithological knowledge will increase with age, and our initial studies support this intuition. Earlier work on inter-informant variation in Aguaruna plant identification

(Boster 1977) suggested that we might also expect differences by sex of subject. Table 5 indicates that the birds in our naming tasks were significantly more codable for men than for women. A T test was performed treating the men and women's codabilities of each token as matched samples. The T value was 9.49 with 288 degrees of freedom, p $\ll$ .001.

An individual's skill in the classification of birds is the outcome of life experience, role expectation and some component of natural talent. The first 2 factors differ according to the sexual division of labor. The third does not. In spite of the fact that women have ample opportunity to observe birds on a casual basis, their roles do not train them to become "bird watchers." Aguaruna males, on the other hand, become adept folk ornithologists at an early age while hunting birds with the blowgun. When hunting, they have many opportunities to see the birds just as they appear in our bird naming tasks: dead, close at hand, with feathers intact. Even when a woman has an opportunity to observe birds in food preparation, she is at a disadvantage due to the male practice of removing all plumage before giving the bird to the woman for cooking. On the other hand, in the classification of manioc varieties, it is the mature women who are the experts, reflecting their role and experience as manioc cultivators. These findings suggest that the Aguaruna division of intellectual labor mirrors the division of physical labor.

Part II: The Internal Structure of Ethnobiological Categories

Our focus to this point has been to examine the relationships of the *biological species* to the various linguistic expression(s) used to refer to that species.

We now take the *name* as a starting point, and ask in what ways a single name maps onto biological species. Just as one can measure degree of agreement on the name of a given species, it is also possible to measure the range of species referred to by a particular name. The examination of the biological range of a term affords an understanding of the internal structure of ethnobiological categories.

As mentioned in the discussion on the naming experiments, there may be more than 500 species of birds in the immediate region of tropical rainforest inhabited by the Aguaruna. It is an area of ornithological diversity exceeded by few other regions of the world. There is little reason to expect that the human population in the area will develop a system of classification that provides a separate name for each of these 500 or more species. It is notable, nonetheless, that we have elicited, independent of the naming experiments, more than 300 distinct Aguaruna generic names for birds. Our ultimate goal is to specify the biological ranges of each of these terms, and to outline the ways in which these categories are conceptually organized into a coherent system of classification. Before discussing the experimental results that bear on the internal structure of ethnobiological categories, it is essential to present an overview of our current understanding of Aguaruna bird taxonomy.

Aguaruna Bird Taxonomy.—The most general terms in Aguaruna ornithological systematics are *chigki* and *pishak*. The former term is best glossed 'large game bird' and may not be appropriately applied to any bird that is not edible.

The term *pishak* is polysemous. Its primary meaning seems to be 'small bird.' Its secondary meaning is 'bird' and may, in certain contexts, be applied to species also labelled as *chigki*. We are uncertain of the extent to which this meaning is held by the population as a whole.

Our understanding of the organization of the 300 basic generic categories is far from complete. However, it seems clear that the Aguaruna do not mentally store these 300 categories in some arbitrary list structure. On the contrary, systematic elicitation and informed observation reveal that subjects form "horizontal groupings" (Hunn 1977:62) of species of birds that are perceived to be closely related to one another on the basis of overall similarity.

Such groupings were first described for ethnobotanical systematics as "covert categories"

(D'Andrade MS; Berlin et al. 1968) and later as "covert complexes" (Berlin et al. 1974). Covert complexes have been discovered in several other ethnobotanical systems of plant classification (Berlin 1977; Hays 1974, 1976). For ethnozoology, these mid-level categories are described in detail by Hunn (1977), as well as by Bulmer (1974), Dwyer (1977) and Majnep and Bulmer (1977). While not all folk generic categories are members of one of these groupings, complexes include the vast majority of all Aguaruna birds. Finally, Aguaruna complexes are remarkably similar in content to well recognized ornithological taxa at the family and sub-family levels of classification.

The Aguaruna system is distinct from most other systems described in the literature in that at least some of these mid-level complexes are named (e.g., *pinchu* 'hawk,' *yampis* 'dove,' *shiik* 'puff bird').

The taxonomic structure for Aguaraun bird classification seems to be a shallow one comprised of approximately 300 basic generic classes, most of which are members of mid-level complexes. Most of these complexes are unnamed. Finally, some small number of generic taxa are sub-divided into what we have called "folk species." Typically, a generic category will be segmented into 2 or 3 folk species, though we do have a few examples of 5 or more. This taxonomic structure is illustrated in Figure 1.

The Naming Experiments, Part II.—Our sample of 157 species of birds elicited 275 distinct naming expressions in our experiments. Some of these names were applied by all informants to one or more specimens in the naming tasks but others were used much less frequently. Of the 275 expressions, less than half were judged to be "good names," either by observing the frequency of their application to a given specimen or by the restriction of their application to a narrow biological range.

The relationship of stable generic names to the species in our sample provides a tentative picture of Aguaruna bird classification. Some 140 of the 157 species are found to be members of one of the mid-level complexes described above. Another 10 are seen as isolates, not participating as a member of any complex, and another 7 are not systematically paired with any Aguaruna name. Because only 157 of the approximately 500 birds in the area were examined in our experiments, none of the complexes is represented by their total membership. Nonetheless, the basic outlines of the structure of each are apparent.

The Complexes.—Methods of establishing the membership of covert complexes in ethnobiological classification have been outlined in Berlin et al. (1968), Hays (1974, 1976), and Hunn (1977). The complexes we describe here were established on the basis of 2 primary
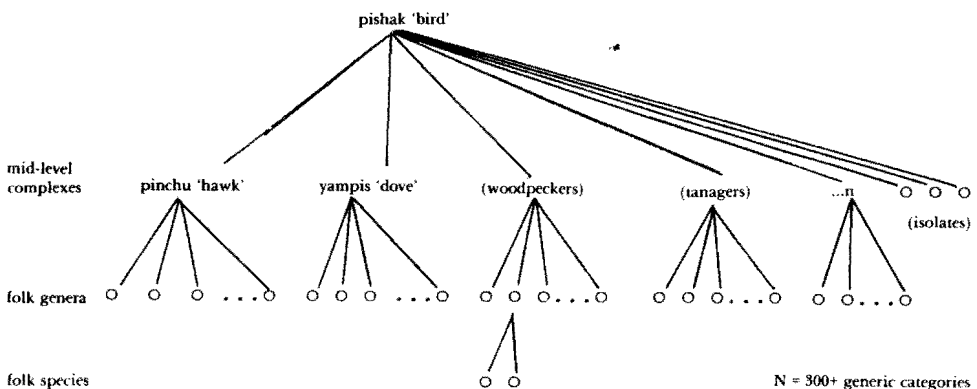

FIG. 1.—Schematic overview of Aguaruna bird taxonomy.

types of evidence. First, we systematically interviewed 3 knowledgeable Aguaruna males. The subjects were asked to form groups of all those generic bird names that they considered to be *pataji* 'in the same family,' or *kumpaji*, 'closely similar.' The third subject, quite knowledgeable but nonliterate, was interviewed over several days in lengthy, tape-recorded sessions. The ethnographer, working through an alphabetically arranged dictionary of all the potential bird names that had been collected from earlier interviews, asked the subject, "Brother, does such and such a bird have any relative?", recording the names of the birds on cards. Because of the number of bird names involved, the ethnographer found it impossible to remember which names had already been listed as the relative of some particular category. The subject, however, would emphatically state, "We have already named that one." The stability of his groupings became evident when, on beginning analysis of these materials, we discovered that he had provided mutually exclusive complexes of bird names with the exception of 2 generic names which had been assigned to more than a single group!

A second kind of evidence used for the recognition of ethnobiological complexes comes from observing the actual distribution of naming responses. Often, the biological ranges of Aguaruna names will systematically overlap in such a way as to suggest close perceptual similarity of the categories involved. As an illustrative example consider 2 Aguaruna bird names, A and B. These expressions refer to at least 3 species — 1, 2, and 3 — in the following fashion. Species 1 predominately receives name A, species 3 predominately receives name B, and species 2 receives name A by half of the subjects and name B by the other half. If 20 individuals are involved in the naming task, we can diagrammatically indicate these facts as shown in Figure 2. The distribution of naming responses allows one to infer that categories A and B are conceptually related in that their biological ranges overlap. When the generic categories of a covert complex elicited from knowledgeable subjects correspond with those generic categories tied together on distributional grounds such as those just described, we have good reason to believe that we have discovered a stable, salient, grouping of birds.
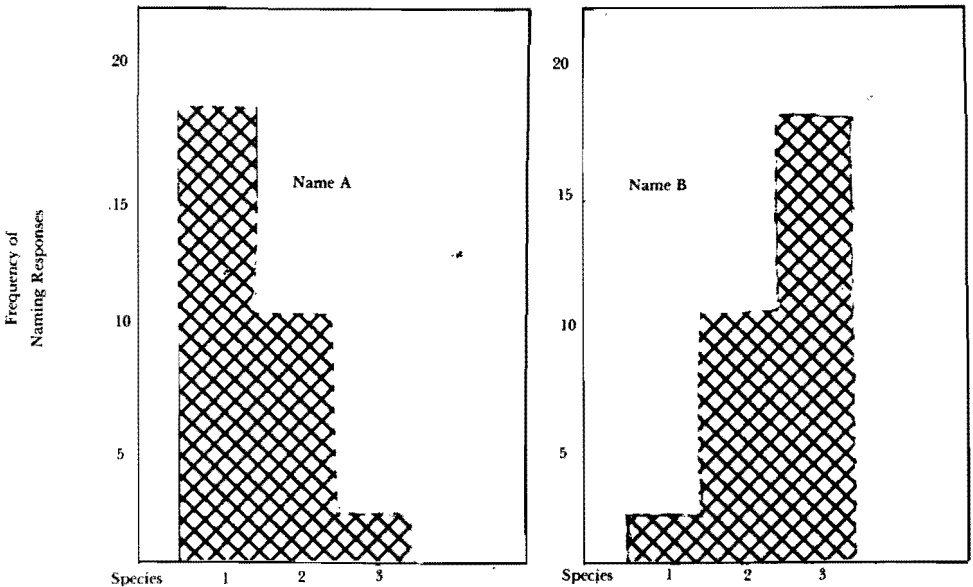

FIG. 2.—Hypothetical mapping of 2 names onto 3 species by 20 subjects.

Of the 27 mid-level complexes attested in our data, 4 are named and 23 are covert. Some examples of complexes with their English common-name glosses, are as follows:

Named
1) pinchu   'hawks and falcons'   3) pagka   'ant shrikes'
2) yampis   'doves'   4) shiik   'puff birds'

Covert
5) 'woodpeckers'   16) 'hummingbirds'
6) 'wrens'   17) 'large solitary fly catchers'
7) 'spotted antbirds'   18) 'small flycatchers'
8) 'ant wrens'   19) 'thrushes'
9) 'oropendolas and relatives'   20) 'rails and crakes'
10) 'cotingas'   21) 'quails and partridges'
11) 'aracaris and toucans'   22) 'curassows, guans and chachalacas'
12) 'barbets'   23) 'cuckoos'
13) 'manakins'   24) 'trogons'
14) 'tanagers and relative'   25) 'vultures'
15) 'Folliage gleaners and relatives'   26) 'umbrella birds'
                                           27) 'parrots'

While a description of each of these complexes is prohibited by limitations of space, one, the woodpeckers, is described in detail as illustrative.

The Woodpeckers.—When asked to provide the names of the relatives of *tatasham*, the most distinctive woodpecker in the area, informants respond with 7 or 8 of the following categories:

1) tatasham   5) dai
2) samamu   6) tejesha
3) sawake   7) shiapu
4) jiip   8) yaakit

At the time we conducted our naming experiments, 8 species of woodpeckers had been collected and, of the 8 elicited names, terms 1-5 were employed by our Aguaruna subjects. The distribution of naming responses over the 8 species can be seen in Table 6. Table 6 reveals the internal structure of the 6 categories employed by the Aguaruna in classifying these 8 species, a structure diagrammatically represented in Figure 3.

TABLE 6.—*Distribution of naming responses for 8 species of woodpeckers in naming experiment*.

	AGUARUNA NAMES FOR WOODPECKERS					
SPECIES OF WOODPECKERS	(SHIG) TATASHAM	SAMAMU (TATASHAM)	JIIP	SAWAKE	DAI	TEJESHA
1) *Phloeceastas melanoleucos*	25, 25					
2) *P. rubricollis*	23	4				
3) *Celeus spectabilis*	4, 3		4, 1	16, 23	2, 1	
4) *C. elegans*				23	1	
5) *C. grammicus*				12	10	
6) *Chrysoptilus punctigula*				6	15	1
7) *Veniliornis affinis*				2	21	
8) *V. passerinus*				6	15	

*Numbers indicate number of subjects on a single naming experiment responding with specified name. Two numbers in a cell indicate 2
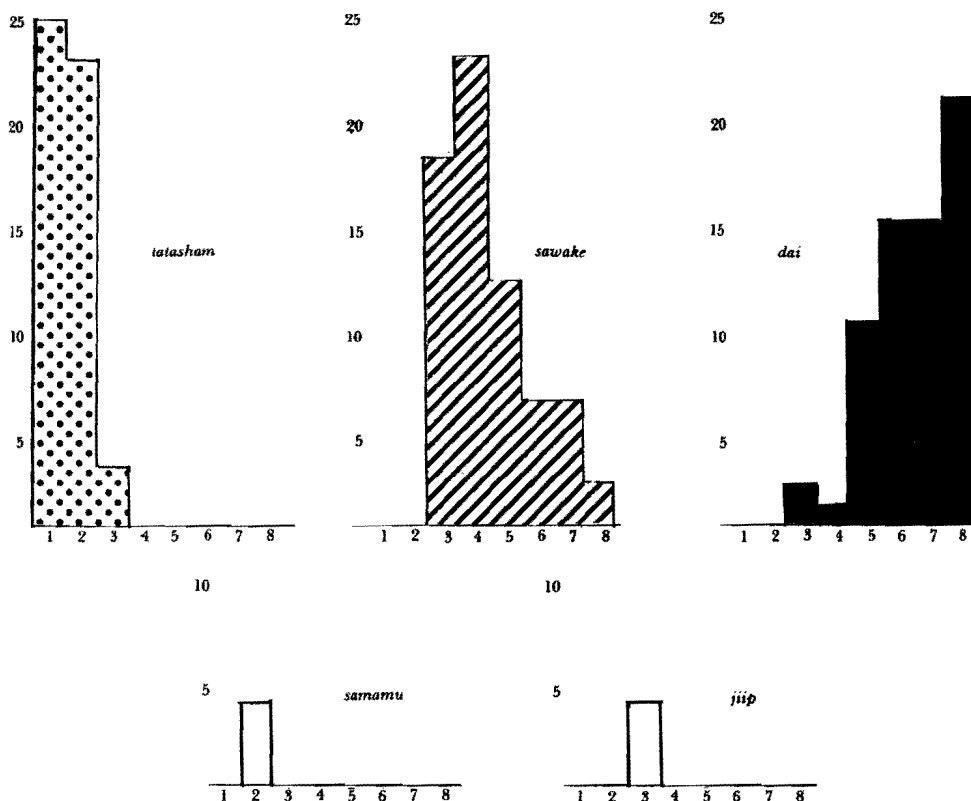
Note: Highest number of possible responses for single species = 25.

WOODPECKER SPECIES

1. *Phloeceastas melanoleucos*	3. *Celeus spectabilis*	5. *C. grammicus*	7. *Veniliornis passerinus*
2. *P. rubricollis*	4. *C. elegans*	6. *Chrysoptilus punctigula*	8. *V. affinis*

FIG. 3.—Distribution of naming responses for 8 woodpecker species in naming experiment.

A careful consideration of Table 6 and Figure 3 will, we believe, lead to the following inferences.

1) For most informants, just 3 folk *generic* categories are sufficient to classify the 8 species of birds. These categories are *tatasham, sawake,* and *dai*.

2) For speakers using only these 3 terms, each of the categories formed by them is biologically polytypic, i.e., each named category includes 2 or more species.

3) Nonetheless, for these polytypic categories, a single biological species can be discerned which might be interpreted as focal, or most typical of the category. For *tatasham,* the focal species is *Phloeceastas melanoleucos;* for *sawake, Celeus elegans,* and for the *dai, Veniliornis affinis.*

4) Some informants, all knowledgeable males, distinguish *P. rubriocollis* with the name *samamu,* separating it from *tatasham,* with its focus on *P. melanoleucos.*

5) Some few informants, again males, recognize *Celeus spectabilis* with a separate generic name, *jiip.*

6) Finally, 3 species — *V. passerinus, Chrysoptilus punctigula,* and *C. grammicus* are ambiguously assigned to either *sawake* or *dai.*

These distributional facts are in large part interpretable in terms of the morphological and behavior characteristics of the biological referents. Of the 4 genera present, *Phloeceastas* is

the largest and most vividly marked. It should not be confused with members of the other woodpecker genera and is, in fact, linked with *Celeus* only 3 times (2 of the 3 subjects are women). *Celeus, Veniliornis,* and *Chrysoptilus* are much less distinctively marked and our naming data show that they are likely to be confused with one another.

Of the 3 polytypic genera (*Phloeceastas, Celeus,* and *Veniliornis*), a single species in each emerges as the most striking perceptually, and each of these represents the focal member of the named Aguaruna category. *P. melanoleucos,* the focal *tatasham,* is strikingly black and white in contrast to *P. rubricollis,* which is more evenly black and brown.

Furthermore, *P. melanoleucos* is more likely to be observed, frequenting clearings, the forest edge, and tree falls. *P. rubricollis* is found in more dense forests, often in the upper canopy and is not easily seen.

Celeus is a polytypic genus of 3 species (Fig. 4). The naming data suggest that *C. elegans* is the prototypical *sawake. C. spectabilis* is singled out by a few males as *jiip,* and *C. grammicus* is often confused with the smaller genus *Veniliornis.* It is difficult to explain this pattern of naming responses solely on the basis of morphological features. The pattern of naming responses, we believe, is best explained in terms of the frequency of observation of these species by the Aguaruna themselves. *C. elegans* and *C. grammicus* are much more common than *C. spectabilis.* It is apparent that the majority of the people have formed their category of *sawake* around the more common *C. elegans* and have merged the more striking but rare *C. spectabilis* into the already formed category.

The 2 species of *Veniliornis* are quite similar in appearance, though *V. affinis,* which frequents the forest edge and clearings, is seen more often than *V. passerinus,* a bird of the deep forest. We believe *V. affinis* is selected as focal due to these facts (Fig. 4).

Chrysoptilus punctigula is ambiguous and is likely to be merged with *sawake* (the *Celeus* spp.) or with *dai* (the *Veniliornis* spp.) (Fig. 4). We believe that this merger is also perceptually based. Infrequently observed, *Chrysoptilus* is about the same size as the typical *Celeus,* but its drab olive green colors make it similar to *Veniliornis.* The 2 conflicting characters cause it to be confused with the 2 named folk categories which it most closely resembles, *dai* and *sawake.*

It is important to note that the relationships of the species to one another than can be inferred from the distribution of naming responses for this set of birds should be similar for both Aguaruna and modern western ornithology since modern ornithological classification is also based on overall morphological and behavioral similarities of species. Figure 5 provides a diagrammatic representation of the degree of relatedness of the species involved as determined by Aguaruna naming responses as it compares with the classification of biological affinity as determined by ornithological practice. Both systems are clearly similar in overall structure.

Common and Expert Knowledge: Lumpers vs. Splitters.—As mentioned earlier, our data on the internal structure of Aguaruna bird categories come from 2 major sources: interviews with knowledgeable subjects and naming tasks with segments of the local community. The kinds of data obtainable from these 2 sources differ markedly. Through interviews, an ethnographer can gain an insight into an individual's use of a large range of categories. Through naming tasks, the ethnographer can determine to what extent the community as a whole is in agreement on the good examples of the named categories. The naming task data represent an aggregation of all of the individual categorizations into a single collective representation. The collection of both kinds of data provides the opportunity to investigate the ways in which individual categorizations are coordinated in collective naming. Using information from both sources, the patterns of disagreement on the best name for species can often be explained as the outcome of 2 different individual strategies of categorization. Among modern biologists, these strategies are called 'lumping' and 'splitting.' Given a set of closely related biological species, the splitters will make a greater number of named distinctions in the set than the lumpers. As a result, the lumper's name refers to a wide biological range while the splitter's name is more narrowly focused. Even in those cases in

FIG. 4.—Eight woodpecker species used in naming experiments reported upon in this paper. From top to bottom: *Phloeoceastas melanoleucos, P. rubricollis, Celeus spectabilis, C. elegans, C. grammicus, Chrysoptilus punctigula, Veniliornis affinis, V. passerinus.*
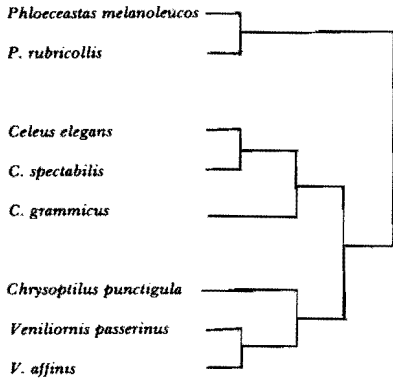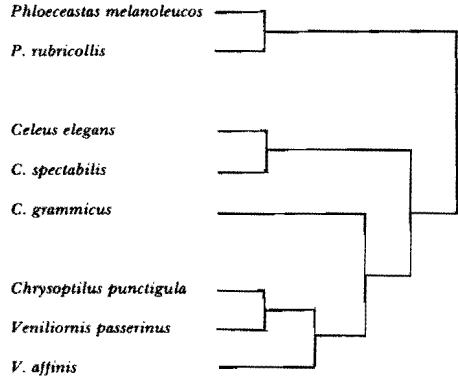
WESTERN BIOLOGICAL TAXONOMY   AGUARUNA TAXONOMY OF WOODPECKERS
          OF WOODPECKERS   (as inferred from naming tasks data)

FIG. 5.—Comparison of western and Aguaruna classification of woodpeckers.

which lumpers outnumber the splitters, the splitter's names can be recognized as those consistently applied to a narrow biological range and rarely used outside of that range.

Our hearts belong with the splitters. These subjects provide the most intricate and internally consistent categorizations. Lumpers' categories are not only broader but sometimes almost random. For these reasons, among others, we equate splitting with expertise. In our study, splitters tend to be older men though a few of the younger men also showed considerable skill at fine discrimination of birds. However, it should be understood that the lumpers and splitters were not absolutely fixed groups for sometimes even the most expert made 'mistakes.'

The typical lumping strategy is to classify 2 or more closely related biological species by the same name while the typical strategy in splitting is to separate the species. Furthermore, the lumper's name for the category will generally be that used by the splitter to refer only to the most salient of the related species. This can be illustrated in Figure 8. In the case of the woodpecker genus *Phloeceastas* discussed earlier, lumpers refer to both *P. melanoleucos* and *P. rubricollis, tatasham* while splitters reserve *tatasham* for *P. melanoleucos* alone, calling the less salient *P. rubricollis, samamu*. In the treatment of the genus *Celeus*, lumpers refer to all species as *sawake* (with some confusion on *C. grammicus*), while splitters call only *C. elegans* and *C. grammicus, sawake*, distinguishing *C. spectabilis* with the name *jiip*. In sum, lumpers and splitters agree on the name of the most salient species and differ only in their designation of the least salient. This amplifies the correlation of salience with codability.

CONCLUSIONS

In this paper, we have examined the patterns of correspondences between Aguaruna names for birds and the biological species to which these names refer. The patterns of inter-informant variation that can be observed has allowed us to make several inferences about the components of the structure and process of ethnobiological classification. First, we found that highly perceptually salient species are more codable than are less salient species. Salience was demonstrated to be determined in part by size of bird, though we believe that distinctiveness of plumage coloration, frequency of observation, and distinctiveness of vocalization, also contribute to overall salience. We found that female subjects disagreed more often on the names of birds than do males, and we suggested that this could be explained as an outcome of the sexual division of labor in Aguaruna society.

Second, an examination of the distributional patterns of bird names over multiple biological species has allowed for a better understanding of the internal structure of ethnobiological categories. A detailed analysis of one covert grouping of birds, the woodpeckers, revealed that the prototypical members of the complex were perceptually

LUMPERS

	tatasham	*Phloeceastas melanoleucos*
		P. rubricollis
(Woodpeckers)		*Celeus grammicus*
	sawake	*C. elegans*
	⋮	*C. spectabilis*
	(other woodpeckers)	

SPLITTERS

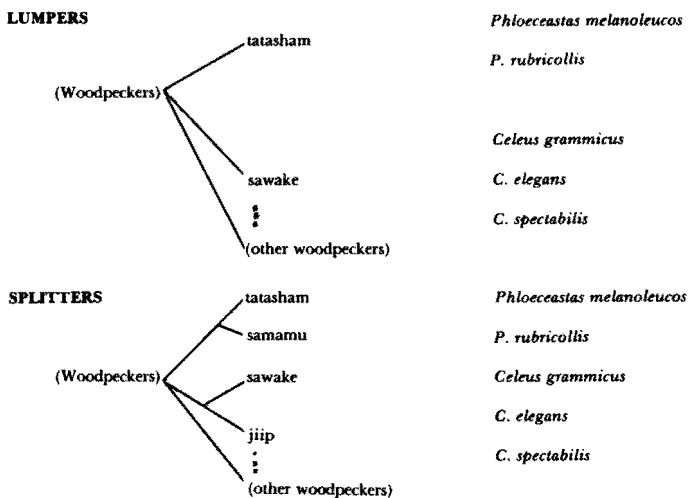|		
	tatasham	*Phloeceastas melanoleucos*
	samamu	*P. rubricollis*
(Woodpeckers)	sawake	*Celeus grammicus*
	jiip	*C. elegans*
	⋮	*C. spectabilis*
	(other woodpeckers)	

FIG. 6.—Aguaruna lumping and splitting strategies for the classification of woodpecker species.

more salient, on the basis of numerous characters, than other species in the complex. Furthermore, species that are closely related ornithologically were shown to be also closely related perceptually in the folk system. Both the western scientific and folk systems were thus seen to be quite similar in overall structure. Finally, we noted that the patterns of disagreement in naming within the complex reflected individual strategies of classification based on expertise which we called lumping and splitting. When lumpers and splitters agree on the name for a species, it is generally on the most perceptually salient, a pattern which increases the correlation of codability and perceptual importance.

Several years ago, Hunn (1977) proposed what to many seemed an impossible task for ethnobiological theory. There he stated that the "... ultimate test (of a theory of ethnobiological classification) involves the prediction of the scientific denotata of all folk-biological categories nomenclaturally recognized for a particular culture ... and the subsequent and independent verification of the predictions by field investigations" (Hunn 1977:72). Our findings suggest that such a test may one day be feasable. Not only should we eventually be able to specify which species are likely to be named in some particular habitat, but we should be able to specify those species that are seen to be related, those which are likely to be focal and peripheral to some category as well as those species that are likely to be totally unknown. The most logical place to make such a series of predictions would be in a society residing in a habitat similar to that of the Aguaruna with a comparable tropical forest avifauna. While we are aware that the number of factors involved make such an exercise difficult, the outcome of the experiment should bring us closer to an understanding of precisely what constraints govern the formation of ethnobiological categories in general.

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NOTES

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2. The ethnobotanist H.H. Bartlett, the first modern writer to refer to these classes as generic categories, defined them as those categories which are "more or less consciously thought of as the smallest grouping requiring a distinctive name" (1940:341). For the zoological systematist A.J. Cain, these categories refer to the smallest perceptual discontinuities in the biological world that can be recognized "...

without close study" (1956:97). For the ethnozoologist, Ralph N.H. Bulmer, these fundamental units (in his terminology, "speciemes") are readily perceived on the basis of numerous characters of form and behavior (Bulmer 1968, 1970; Bulmer and Tyler 1968). Rosch et al. (1976) use the term "basic level objects" to refer to these fundamental categories. For us, generic categories are definable in terms of a series of linguistic, taxonomic, psychological, and biological criteria, (c.f., Berlin 1977). Generic categories in ethnobiological systems of classification cryout to be named.

3. Size measurements were taken from The Birds of South America (Schauensee 1970). Since we were unable to obtain size measurements for some of the birds and salience ratings were unavailable for certain others, the number of items involved in each comparison may vary between 248 and 274. Effect of this fluctuation on the correlation coefficients seems to have been minimal.

4. Comparably named suprageneric groupings have recently been described by Steven Feld for the Kaluli of New Guinea (Feld 1979).