

Folk Biological Cognition

Scott Atran

Current Anthropology, Vol. 34, No. 2 (Apr., 1993), 195-198.

Stable URL:

<http://links.jstor.org/sici?sici=0011-3204%28199304%2934%3A2%3C195%3AFBC%3E2.0.CO%3B2-%23>

Current Anthropology is currently published by The University of Chicago Press.

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/about/terms.html>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at <http://www.jstor.org/journals/ucpress.html>.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

JSTOR is an independent not-for-profit organization dedicated to creating and preserving a digital archive of scholarly journals. For more information regarding JSTOR, please contact support@jstor.org.



Books¹

Folk Biological Cognition

SCOTT ATRAN

Ecole Polytechnique, Centre de Recherche en Epistemologie Appliquée, 1, rue Descartes, 75005 Paris, France. 6 XI 92

Ethnobiological Classification: Principles of Categorization of Plants and Animals in Traditional Societies. By Brent Berlin. Princeton: Princeton University Press, 1992. 335 pp. £35/\$45

In *Ethnobiological Classification* Brent Berlin expands his pioneering work on the structure of folk biological classification with new theoretical insights and examples of how minds and societies categorize organic nature. Here, as in earlier studies, he champions a universalist perspective that places species-specific cognitive processes—notably perception—before socially idiosyncratic concerns with functional utilization. The major theoretical claim in this “intellectualist” stand against the “utilitarian” bias of cultural relativism is that humans first know the world by spontaneously apprehending it—as it really is. Only then can they put what they know of nature to use.

To elaborate the point, he organizes the most comprehensive survey to date of folk biological systems the world over, with special attention to examples that do not fit neatly into a first reading of the universalist scheme. Again and again, he shows that the significant variations reported within and between cultures appear to make sense only as patterned responses to the joint constraints of local ecological history and a panhuman cognitive structure that is specifically targeted on living kinds. People everywhere “instinctively” tend to segregate, say, dogs from cats, trees from grasses, birds from fish. This is not because of the different uses they may have for them but because these different biological species, ecological forms, and phyletic lines are selectively perceived (roughly) as nature intended them to be: “human beings are drawn by some kind of innate curiosity to those groupings of plants and animals that represent the most distinctive chunks of biological reality” (p. 290).

To be sure, cultural interest can, within fairly well-defined limits, mobilize alternate cognitive strategies and modify both the mental and the physical landscape

in which organisms appear. For example, “it now appears likely that factors relating to the attributed cultural importance of particular plant and animal species will work toward the reduction of linguistic variation for highly important organisms and propel variation forward in the case of less important species” (pp. 204–5). Thus, augmented with detailed descriptions of the cultural significance of animals and plants in everyday life, comparative ethnobiological study can become a powerful historical tool for measuring degrees of cultural divergence within a language family. In the case of Maya studies, for instance, this largely untapped technique promises to help resolve long-standing issues about historical developments that have thus far proven intractable to lexical, glottochronological, and archaeological analyses.

In so short a space I can hardly do justice to the wealth of information and to the numerous practical implications of Berlin’s study. I can only recommend it as a foundation for any prospective field study. In what remains, then, I concentrate on some of the theoretical aspects of the work that transcend ethnobiology and ethnolinguistics but have potentially important implications for cognitive science and for the history and philosophy of systematic biology.

For Berlin, the folk biology of all cultures is hierarchically organized into a shallow taxonomy. Each taxonomic level is in approximate accord with the corresponding rank of Linnaean systematics. Thus, the two *folk kingdoms* in any folk biological taxonomy broadly coincide with the animal and plant realms. Folk zoological *life forms* typically include all local species of the same biological class (e.g., bird, fish). By contrast, different folk botanical life forms (e.g., tree, grass) often contain species of the same biological family but nonetheless include those species whose morphology and ecological proclivity appear to confine them to similar roles in the “economy of nature.” *Intermediate taxa* generally contain several species that belong exclusively to the same scientific family (or, in the case of less salient organisms, scientific order). *Folk generics* habitually include only species of the same scientific genus (dog, maple). Often, however, the locally represented scientific genus is monospecific. This is particularly true of the most salient organisms, that is, the larger vertebrates and phylogenetically isolated phanerogams. *Folk specifics* and *varietals* characteristically represent strains of domesticated species (collie, retriever, sugar maple, red maple) or of species that are otherwise particularly significant for the culture (noxious, medicinal, etc.). Folk kingdoms and intermediate taxa often go unnamed, folk specifics and varietals are generally poly-

1. Permission to reprint items in this section may be obtained only from their authors.

mial, and life forms and generics are usually labeled by a single lexical item.

The general idea is that people come biologically prepared to form biological categories, which represent staggered levels of reality. In line with Darwin, Berlin asserts that this ranking of "groups within groups" is "not arbitrary like the grouping of the stars in constellations" (p. 135). Folk biological categories, like the Linnaean categories of "orthodox" scientific systematics, have two components: a fixed rank (class of classes, e.g., genus, family) and a corresponding taxonomic content (a class, e.g., dog, canine). Berlin implies that ranks are cross-culturally stable and contents should not vary arbitrarily as a function of theories and belief systems. There also should be a significant cross-cultural correlation among folk systems and between folk biological and scientific taxonomies—this to the degree that perception of readily apprehended features of morphology, behavior, and ecological proclivity is measurably independent of cultural transmission and to the degree that systematics continues to rely on such features either to infer phylogenetic relationships or simply to summarize the observable patterns produced by evolution.

Before Berlin, work on folk biological classification failed to distinguish taxa from taxonomic ranks, and this confusion of logical type led to all sorts of muddles. For example, the ethnolinguistic artifice of "terminal taxa"—that is, taxa which are not further subdivided—was mistaken for a psychologically real level of classification. Because terminal taxa can include varieties (e.g., toy poodle, hunting poodle), monovarietal specifics (e.g., red squirrel, grey squirrel), monospecific generics (e.g., lion, tiger) and unaffiliated taxa (e.g., bat, cassowary), cross-cultural differences in terminal taxa have been wrongly taken by Lévi-Strauss and others (including Berlin in his own earlier work in the 1960s) as evidence for the cultural relativity of biological ranking. Instead, Berlin argues that the admitted cultural variability at the specific and varietal levels expresses patterns whose significance can only be properly gauged as later variations on a prior generic theme.

Apparently, the natural selection of our cognitive faculties has allowed us to evolve an almost effortless "passive curiosity" that automatically discerns folk generics. Such generics more or less correspond to what zoologist Ernst Mayr calls "nondimensional" biological species—spatially sympatric species that are readily observed to coexist in the same general area over a few generations but are isolated from one another by reproductive barriers and distinct ecological proclivities. More than half a century ago, Mayr found that New Guinea folk in the area in which he was conducting an ornithological study gave priority in their vernacular naming of the local avifauna to precisely such species. Along with Mayr, Berlin cites George Gaylord Simpson, another zoologist and "orthodox biological systematist," to the effect that these most distinctive biological taxa are "quite as obvious to [the] modern scientist as . . . to a Guaraní Indian" (p. 78).

Yet, according to Berlin, it is not the (nondimensional)

species concept but the genus concept that occupies the privileged analytic rank both in folk biology and in (the history and practice of) scientific systematics. In support, he cites a number of eminent botanists and historians of botany—including Harley Harris Bartlett, Edward Lee Greene, and A. J. Cain—who maintain that generic groupings are those that most readily strike the mind's eye. Following Greene, Berlin notes that Aristotle's student and successor, Theophrastus, recognized some 550 such "generics" of plants—"a number quite in line with the upper limits of generic taxa that one finds in typical modern folk botanical systems" (p. 57).

Aristotle, however, described a similar number of such privileged animal groupings, although historians of zoology usually refer to these as "species." The apparent confusion is resolved, I think, once it is realized that the distinction between genus and species makes little sense for most folk in a local environment. For many of the most salient animals (mammals) and plants (trees), genera have only one locally represented species; here genus and species are extensionally equivalent and cannot be distinguished perceptually. In other cases, local biological families are represented by only a few polytypic genera. Accordingly, the constituent species of these genera are often separated by a wide phenotypic gap, which is perceived as similar to the gap that separates the monospecific genera of locally polygeneric families.

Historically, a principled distinction between species and genus did not begin to arise until the end of the 16th century. In 1583, Andreas Cesalpino, the founder of systematic botany, fixed the species as the rank that includes all and only those groups of organisms that arise from the same seed. Not until a century later (1694) did Joseph Pitton de Tournefort establish the genus as a fixed rank superordinate to the species. By then the number of known species had increased by an order of magnitude (to 6,000) during Europe's age of exploration. In other words, the rank of genus became the new cognitive repository for what Berlin calls "Nature's Fortune 500+" as science sought to preserve the mnemonic convenience of common folk sense.

Given botany's rationalist penchant at the time for optimizing information storage and recall, Carolus Linnaeus followed Tournefort in focusing on the genus as the privileged level of taxonomy. But Georges Buffon, initiator of "the empirical method" in zoology and Linnaeus's chief rival, continued to favor the species as the principal *causal* nexus of biological relationships between organisms and groups of organisms. The debate over whether the species or the genus is the fundamental taxonomic grouping continues to this day. "Orthodox" zoologists accent the evolutionary role of species as reproductive and geographical isolates; botanists underscore the lack of clear-cut barriers between plant species. This allows that taxonomy is based as much on subjective "art and convenience" as on objective biological reality, with the genus providing the most "natural" meeting between subject and object.

In this regard, a legitimate doubt arises over the pur-

ported correspondence between scientific systematics and folk taxonomies. Do the statistical correlations result from a fundamental accord between human perception and "objective" discontinuities in the perceptible world, as Berlin claims, or are they (at least partially) artifacts of the method of comparison? Berlin's assertion of the "objectivity" of (the core of) folk biological taxa relies on correlations with what he calls "orthodox biological taxonomy." Yet an adequate appraisal requires separate assessment of the correlation between folk taxonomy and (minimally) three different sorts of scientific classification: cladistics, phenetics, and classical (or orthodox) evolutionary taxonomy. On this point, it merits note that (Pearson) correlations between rival scientific taxonomies often fare no better or worse than those between folk taxonomies and orthodox scientific taxonomies.

Cladistics attempts only to record strict branching sequences in phylogeny. Thus, in a cladistic analysis the birds may appear as close relatives of the crocodiles. By contrast, in a classical analysis the birds would be considered almost equidistant from crocodiles and turtles. Because the birds radiated into a largely vacant niche in the air, they underwent great evolutionary speciation. From a classical standpoint, this would rank them apart from the other amniotes (turtles, crocodiles, snakes and lizards, mammals). The case is similar for the mammals, thus leaving the reptiles to occupy their own unique evolutionary space, but from a strictly cladistic standpoint, "reptiles," like "fish," might be considered simply a residual group rather than a central historical subject of evolution.

Roughly speaking, classical taxonomy is something of a compromise between phenetic classifications, which are morphologically based, and cladistic classifications, which are chronologically based. Because classical taxonomy deals with the joint effects of phylogenetic descent and adaptive radiation, it more readily reconstructs evolutionary relationships on the basis of shared morphological, behavioral, and ecological characters. Folk taxonomy, which is primarily based on perceptual assessments of local phenotypic relationships between phenomenally salient biological species, might thus more closely approximate classical taxonomy. Should the correlation between the cultural consensus on folk taxonomy and classical taxonomy prove the stronger, then continued preference for classical taxonomy may reflect the continuing hold of common sense on science rather than a strictly "objective" correspondence.

Berlin's inattention to these problems stems, I fear, from a deeper inattention to the *conceptual processing* that underlies biological taxonomies (as opposed to the lexical and other psycholinguistic processes which he so keenly reveals). The allegedly "passive," innate propensity to discern biologically salient groupings of organisms may turn out to be much more "active" conceptually (not just perceptually) than he intimates. Berlin's "passive" approach to natural-object categorization is in keeping with a view that has come to be known as "prototype theory," as developed by Berlin's colleagues at

Berkeley, the psychologist Eleanor Rosch and the linguist George Lakoff (pp. 24–25). From this vantage, "it is generally the case that one or more closely related species that fall within the basic range of a folk genus are considered to be more representative of the folk genus than others." Granted, but further extrapolation from the evidence is somewhat doubtful: "from this perspective, folk generics may be thought of as comprised of a central species (or small set of species) which comes to psychologically represent a *prototypical image* around which perceptually similar species are grouped."

That primary taxa are generally associated with prototypical *Gestalten* is clear. It is much less certain, however, that prototypicality determines folk taxonomic conceptions of what primary taxa *are* (i.e., the truth conditions for including an organism in a taxon). Prototypicality may well be a general psychological heuristic applicable to virtually *any* domain, but this does not mean that prototypicality is what the categories are essentially about. Thus, the prime numbers 1, 2, and 3 (or the polygons square, equilateral triangle, and regular hexagon) may be psychologically prototypical and utilized as such in all sorts of computational and recognitory heuristics. Still, they are no more or less perfectly prime (or polygonal) than any other primes (or polygons).

Whatever confusion there may be about *whether* a given organism belongs to a certain taxon or not, usually there is no questioning the presumption that *if* it belongs to that taxon, *then* the organism has the same underlying nature as all other members of the taxon. For example, prototypical patterns in informant judgments over which taxon a given organism belongs to are also underscored by the response patterns of individual informants. Among the Itza Maya of Guatemala, *ya'ax kan* (green snake) is typically applied to the green vine snake, *Oxybelis fulgidus*, a moderately venomous colubrid, but occasionally to another colubrid, the green rat snake, *Elaphe triapsis*. Similarly, *k'ok'o* (fer-de-lance) typically denotes the deadly pit viper. *Bothrops asper*, and occasionally also the morphologically similar colubrid *Xenodon rabdocephalus*. Informants are most indecisive, though, over whether *ya'ax kan* or *k'ok'o* applies to the green pit viper, *Botreichis schlegelii*, whose habitat generally lies outside an Itza's seasonal range of displacement. As one informant put it, "The elders say that there is a *ya'ax kan* that is *k'ok'o*, but if it is *k'ok'o* it cannot have the same *pusik'al* ['heart' or essence] as *ya'ax kan*. . . . it may be hidden in the trees like *ya'ax kan* because it [too] has the color of leaves, but if its poison spreads within you like a gas, and you die within a day, then it is *k'ok'o*. . . . *ya'ax k'ok'o*." Only the dead may know for certain whether a given snake is *ya'ax kan* or *k'ok'o*, but it must be one or the other.

Recent work by psychologists such as Frank Keil at Cornell, Sheila Walker at Indiana, and Susan Gelman at Michigan suggests that even very young children across cultures believe each generic taxon (but no basic-level artifact grouping) to possess an inherent physical nature or "essence." This presumed (but initially unknown) nature is held responsible for the kind's teleological

growth and its characteristic behavior, morphology, and ecological proclivity. It is this presumption that allows people to assign morphological variants (e.g., a dog born voiceless and three-legged) to a taxonomic type (by nature a barking quadruped) and that guides inductions about the likely distribution and normal development of biological properties that are not immediately obvious ("Mighty oaks from acorns grow"). Thus, from an instance of an organism or attribute a person can "automatically" predict its taxonomic extension to a complex set of indeterminately many living forms and related properties. As a result, "when you've seen one, you've seen them all."

Plausibly, it is this cognitive propensity to essentialize biological notions that allows token morphological variants (caterpillars, tadpoles) to be fixed to taxonomic types (butterfly, frog) in perceptually nonobvious ways. Moreover, the presumption that (even unknown) essences *causally* generate all organisms of a kind appears to underlie the most remarkable intellectual feature of biological taxonomy, namely, that of a powerful inferential schema for inducing nonobvious and wide-ranging relationships. (For example, given that humans have tonsils, we may "safely" infer that gorillas have tonsils.)

Making inferences from one category to another (e.g., from humans to gorillas) enables us to set forth assumptions and predictions and generalize from the known to the unknown. This function of classification is arguably the foundation of the scientific method in biology. To most biologists, the "best" classification is the one that maximizes the probability that statements known to be true of two organisms are true of all members of the smallest taxon to which they both belong. Thus, by finding that rabbits, say, share a given property with the microorganism *E. coli*, one is justified in exploring the possibility that the property is shared by all organisms ("organism" being the lowest-ranked taxon containing rabbits and *E. coli*). In this, science extends the reasoning folk biology made humanly possible.

Berlin's study is a necessary prelude to any future work in the field. The cognitive study of folk psychology and the history and philosophy of biology can avoid it only at the peril of missing what is perhaps the most cumulatively productive effort to date in the relevant domains of cognitive anthropology. Whether or not one agrees with this or that aspect of Berlin's theoretical stance, I can barely imagine a cogent empirical argument that fails to consider his position or ignores his paradigmatic examples. Neither can I foresee any young ethnobiologist's making a novel and scientifically significant contribution without first attending to it.

Books Received

ALASUUTARI, PERTTI. 1992. *Desire and craving: A cultural theory of alcoholism*. Albany: State University of New York Press. 226 pp. \$39.50 cloth, \$12.95 paper

- ASSAYAG, JACKIE. 1992. *La colère de la déesse décapitée: Traditions, cultes et pouvoir dans le sud de l'Inde*. Paris: CNRS. 558 pp. 280 FF
- BASU, ALAKA MALWADE. 1992. *Culture, the status of women, and demographic behaviour: Illustrated with the case of India*. Oxford: Clarendon Press. 266 pp. £30
- BATTEN, MARY. 1992. *Sexual strategies: How females choose their mates*. New York: Jeremy P. Tarcher/Putnam Books. 248 pp. \$21.95
- BEGLEY, VIMALA, AND RICHARD DANIEL. Editors. 1992. *Rome and India: The ancient sea trade*. Madison: University of Wisconsin Press/London: The Eurospan Group. 226 pp. £31.95
- BERNINGHAUSEN, JUTTA, AND BIRGIT KERSTAN. 1992. *Forging new paths: Feminist social methodology and rural women in Java*. London: Zed Books. 290 pp. £32.95/\$55.00 cloth, £12.95/\$19.95 paper
- BLAU, JUDITH R. 1992. *The shape of culture: A study of contemporary cultural patterns in the United States*. New York: Cambridge University Press. 206 pp. \$39.95 cloth, \$15.95 paper
- BORNEMAN, JOHN. 1992. *Belonging in the two Berlins: Kin, state, nation*. Cambridge: Cambridge University Press. 386 pp. £40.00 cloth, £14.95 paper
- BOYER, L. BRYCE, AND RUTH BOYER. Editors. 1992. *The psychoanalytic study of society*. Vol. 17. *Essays in honor of George D. and Louise A. Spindler*. Hillsdale: Analytic Press. 384 pp. \$36
- BRASK, PER, AND WILLIAM MORGAN. Editors. 1992. *Aboriginal voices: Amerindian, Inuit, and Sami theater*. Baltimore: Johns Hopkins University Press. 146 pp. £20.50/\$26.95
- BREZZINGER, MATTHIAS. Editor. 1992. *Language death: Factual and theoretical explorations with special reference to East Africa*. New York and Berlin: Mouton de Gruyter. 445 pp. DM 208
- CARMACK, ROBERT M. Editor. 1992. *Harvest of violence: The Maya Indians and the Guatemalan crisis*. Norman: University of Oklahoma Press. 352 pp. \$12.95
- CARRASCO, DAVID, AND EDUARDO MATOS MOCTEZUMA. Editors. 1992. *Moctezuma's Mexico: Visions of the Aztec world*. Boulder: University of Colorado Press. 188 pp. \$45
- CARRITHERS, MICHAEL. 1992. *Why humans have cultures: Explaining anthropology and social diversity*. Oxford: Oxford University Press. 218 pp. £30.00 cloth, £7.99 paper
- CÁTEDRA, MARÍA. 1992. *This world, other worlds: Sickness, suicide, death, and the afterlife among the Vaqueiros de Alzada of Spain*. Chicago: University of Chicago Press. 390 pp. £47.95/\$68.95 cloth, £15.25/\$21.75 paper
- COPPET, DANIEL DE. Editor. 1992. *Understanding rituals*. London: Routledge. 120 pp. £30.00 cloth, £9.99 paper
- COWAN, C. WESLEY, AND PATTY JO WATSON. Editors. 1992. *The origins of agriculture: An international perspective*. Washington, D.C.: Smithsonian Institution Press. 224 pp. £38.95/\$59.95 cloth, £15.50/\$23.95 paper
- CRUMP, THOMAS. 1992. *The anthropology of numbers*. Cambridge: Cambridge University Press. 198 pp. £11.95/\$15.95
- CUNNINGHAM, KEITH. 1992. *American Indians' kitchen table stories: Contemporary conversations with Cherokee, Sioux, Hopi, Navajo, Zuni, and members of other nations*. Little Rock: August House. 296 pp. \$25.95 cloth, \$14.95 paper
- DEMAREST, ARTHUR A., AND GEOFFREY W. CONRAD. Editors. 1992. *Ideology and pre-Columbian civilizations*. Seattle: University of Washington Press. 278 pp. \$35.00 cloth, \$15.95 paper