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Cognition 99 (2006) 237–273
www.elsevier.com/locate/COGNIT

Folkbiology of freshwater fish

Douglas L. Medin[a,*], Norbert O. Ross[b], Scott Atran[c], Douglas Cox[d], John Coley[e], Julia B. Proffitt[f], Sergey Blok[g]

[a]*Department of Psychology, Northwestern University, 220 Swift Hall, 2029 Sheridan Road, Evanston, IL 60208, USA*
[b]*Vanderbilt University, Nashville, TN, USA*
[c]*Centre National pour la Récherche Scientifique (France), University of Michigan, Ann Arbor, MI, USA*
[d]*Hilary J. Waukau Environmental Resources Center, Keshena, WI, USA*
[e]*Northeastern University, Boston, MA, USA*
[f]*Northwestern University, Evanston, IL, USA*
[g]*University of Texas, Austin, TX, USA*

Received 20 June 2003; accepted 15 December 2003

Abstract

Cross-cultural comparisons of categorization often confound cultural factors with expertise. This paper reports four experiments on the conceptual behavior of Native American and majority-culture fish experts. The two groups live in the same general area and engage in essentially the same set of fishing-related behaviors. Nonetheless, cultural differences were consistently observed. Majority-culture fish experts tended to sort fish into taxonomic and goal-related categories. They also showed an influence of goals on probes of ecological relations, tending to answer in terms of relations involving adult fish. Native American fish experts, in contrast, were more likely to sort ecologically. They were also more likely to see positive and reciprocal ecological relations, tending to answer in terms of relations involving the full life cycle of fish. Further experiments support the view that the cultural differences do not reflect different knowledge bases but rather differences in the organization and accessibility of knowledge. At a minimum the results suggest that similar activities within a well-structured domain do not necessarily lead to common conceptualizations.

Keywords: Taxonomic; Native American; Folkbiology; Ecology

* Corresponding author.
E-mail address: medin@northwestern.edu (D.L. Medin).

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doi:10.1016/j.cognition.2003.12.005

One of the most striking observations in folkbiology is the high level of agreement both within and across cultures in the categorization of plants and animals (e.g. Atran, 1990; Berlin, 1992; Boster, 1987; Boster & D'Andrade, 1989; Lopez, Atran, Coley, Medin, & Smith, 1997; Malt, 1995; Shafto & Coley, 2003). This agreement has been attributed to the correlational structure of the environment (e.g. Rosch, 1978); the idea being that correlated features or properties create natural "chunks" or basic level categories that any well-adapted categorization system must acknowledge or exploit. Of course, the observation that the basic level may change as a function of expertise (e.g. Johnson & Mervis, 1997, 1998; Tanaka & Taylor, 1991; see also Coley, Medin, & Atran, 1997) forces nuances on the idea that the structure is in the environment. Furthermore, coherence may also be importantly driven by (universal) inference principles that, for example, allow tadpoles and frogs and even caterpillars and butterflies to be seen as different stages of the same kind of thing (Atran, 1998). Nonetheless, there is a broad agreement that the sort of perceptual and conceptual features associated with people's categorization schemes correspond much more closely with correlated features than with orthogonal distributions of them. Overall, there is considerable consensus in people's categorization of living things.

Agreement on categories does not necessitate agreement on the *basis* for categorization. The same categories can result from very different sources of information. For example, woodticks have categories that correspond very closely with the human concept, mammal, but the basis for woodtick categorization is not visual (morphological) features or abstract properties like bearing live young but rather the presence of butyric acid. In short, similar outcomes in categorization processes are no guarantee of similar underlying features. One consequence of the assumption of correlated features is that two people or two groups may have roughly the same categorization scheme but have very different underpinnings for it. For example, Lopez et al. (1997) noted that undergraduates in the USA and the Itza' Maya of Guatemala both sorted mammals into categories that corresponded fairly well with science. However, the justifications for sorting (and multi-dimensional scaling results) suggested that the USA students had relied heavily on size as the basis of sorting, whereas the Itza' used a broad range of morphological and ecological criteria and primarily used size to describe within category differences.

There is some evidence that expertise affects both the basis for categorization and categorization itself. Boster and Johnson (1989) observed that free sorting of ocean fish by commercial fisherman actually agreed *less* with scientific taxonomy than the free sorts of novices. One possibility is that the experts were using goal-related knowledge to structure their categories (e.g. Barsalou, 1985). Medin, Lynch, Coley, and Atran (1997) also used a free sorting task, in this case with different kinds of tree experts (landscapers, parks maintenance personnel, and taxonomists). They found that landscapers tended to sort trees into goal-related categories but that the free sorts of maintenance personnel (and taxonomists) corresponded more with scientific taxonomy. This finding suggests that kinds of expertise play a role in category organization.

One hypothesis that summarizes the current literature is that the correspondence of expert sorts to (general purpose) scientific taxonomy is driven by the relationship between that taxonomy and how expertise-related goals structure the domain. If the goals crosscut the taxonomy (as they do for landscapers), then the correlation with science will be