Complex Concepts

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For some time cognitive anthropology, and indeed cognitive science generally, have been concerned with issues of conceptual representation. Inadequacies in classical and more recent approaches, in particular, prototype theories, have motivated a search for alternative accounts. We propose an approach to conceptual representation that requires the specification of domain theories, from which conceptual definitions are generated, and within which the relations among concepts can be formalized. We demonstrate the utility of a formal characterization of this view of domains and concepts in the analysis of an aspect of the basic metaphysics constructed by the people of West Futuna, Vanuatu. In the process, we expand the set of formal devices traditionally relied upon by anthropologists and others involved in cognitive studies, and thereby gain insight into the complexity of the metaphysical beliefs of an Oceanic people.

The metaphysics we target for study is, we argue, more complex than the kinds of conceptual domains usually dealt with by cognitive anthropology (e.g., Berlin, Breedlove, & Raven, 1973; Berlin & Kay, 1969). The analytical challenge presented by this complex domain has resulted in a broadened understanding of the potential variety in conceptual structures and the means for their representation. Having said this, however, it is incumbent upon us to specify what constitutes conceptual complexity. We shall begin with a general treatment of this problem, to be followed by the development of our particular analysis.

CONCEPTUAL COMPLEXITY

Reflections on the literature suggest that complexity might be handled in at least four ways. We discuss this diversity and take the position that conceptual complexity must refer to three facets of concept definition: internal representation, conceptual embedding, and derivatively, polysemy. We specifically exclude issues related to word usage from treatment in this article, apart from some preliminary discussion.

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First and foremost, complexity must refer to internal representation of the semantic features constituting a concept. Specifically, if a particular concept definition requires more formal mechanisms in its representation than does some other concept, then the former is more complex than the latter. In elaborating this claim we cannot be exhaustive, for no comprehensive theory of the formal constraints on semantic definitions is available. But a simple example or two should suffice to show what we mean. However we define the concept labelled in English *red* (as a prime given by a unique physiological human response to light, or as a set with a defining focus, Lehman, 1985), a dual-focused GRUE category is more complex than *red* by the criterion given above. (GRUE is the usual way of referring, at least in cognitive anthropology, to a category, common to many systems of color nomenclature around the world, that does not distinguish in basic terminology between *green* and *blue*.) A dual-focused GRUE category, that is, a color category, the best examples of which are discretely located in both *FOCAL BLUE* and *FOCAL GREEN*, is defined by the union of two conceptual units comparable to the single unit of English *red*. Dual-focused GRUE categories have been documented repeatedly in the literature (Burgess, Kempton, & MacLaury, 1985; Dougherty, 1977). Dual-focused GRUE is more complex.

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1 We shall take as background to our work, a radically intensional point of view about cognition, knowledge, and meaning quite similar to that put forward, as the nonobjectivist position, by Lakoff (1987) and Johnson (1987). We do not find it necessary to discuss or characterize that view here, but it is necessary to state the caveats, provisos and exceptions to their notion of nonobjectivism that we hold to be essential. First, a concept, especially in the sense of Johnson's (1987) reworking of Kant, is something more abstract than either a set of concrete, substantive features as necessary and sufficient surface conditions for category membership, or a Lakovian family of connections among sense and schemata having the same name, term, or label. Rather, it is a theory (by no means necessarily propositional in character, but formally delineable), and the various schemata are generated as theorems in that theory. That some schemata may be prototypical seems obvious and unnecessary to comment upon further in this article. It is, nonetheless, premature to reject the classical notion of categories being characterized by necessary and sufficient membership conditions on the basis of the inappropriateness of observable surface "features" for these conditions in general, or on the basis of what we have been able to define, early on in this article, as the instantiation problem (see footnote 7). It is not necessary to assume that conditions constituting a set of abstract features are anything other than some domain knowledge structure or structures; in particular, the features of lexico-semantic category or concept definition are not at all necessarily semantic primes.

What goes along with the view we propound here, though we are not going to pursue it or assert categorically that it is a necessary conclusion, is that the appropriate version of set theory to apply in all this is not the Zermelo-Fraenkel axiomatics, to which alone Lakoff refers in his arguments, but rather a Godel-Bernays-von Neumann axiomatics that includes crucially the distinction between sets and proper classes (Lehman, 1985, for references and argument). It ought to be clear to a careful reader of Lakoff that his arguments against the objectivist use of set theory in category definition and in a technical theory of knowledge and meaning do not go through if proper classes, taken as sets paired with, let us say, intensional specifications, are distinguished and not "embeddable" in one another. Subsequent notes will further specify the nature of our version of nonobjectivist theory.
than RED by virtue of the greater formal complexity in specifying its internal representation. To stay within a given language, take the concepts labelled by parent and cousin for any dialect of American English. Again, regardless of how we ultimately define the concept labelled by parent (as a prime or as a constructed definition), this concept is simpler than that labelled cousin because the latter entails the former. The concept labelled cousin involves the semantic elements PARENT OF and its inverse, CHILD OF in a specification of PARENT'S PARENT'S CHILD'S CHILD. The concept labelled cousin is, therefore, more complex than that labelled parent (Lehman & Witz, 1974; Witz & Lehman, 1979). It is this aspect of complexity that is focused upon by traditional cognitive anthropologists, and which might, in retrospect, be applied to the classic work of scholars such as Lounsbury (1956) and Good-enough (1956, 1965).

Second, if a concept A is part of a domain or body of knowledge that itself is complex, that is, involves constructed premises about the structure of the world upon which the concept definitions rest, then concept A, by virtue of its embedded position in the theory of the domain, may be held to be complex. In Fillmore's (1975) terms, if the scene in which a concept fits is complex, then the concept may be properly held to be complex. In Keesing's (1979) terms, if semantic information presupposes culture-specific cosmological assumptions, then the semantic representations are complex.

We develop our position starting from often-explored ground. Malinowski (1935/1978), in fact, argued that no concept is without a foundation of "devices and rules" (p. 13). In addressing problems of translation closely related to our present problems of word meaning, he further pointed out that "translation in the correct sense must refer, therefore, not merely to different linguistic uses but often to different cultural realities behind the words" (p. 14). If, by "cultural realities," Malinowski here was referring to culturally particular theories of the world, then, despite his adoption of the equation of meaning with use—a position we reject for well-known reasons—like us, he can be taken as having argued for a view of complexity that includes internal representations and conceptual embedding.

For example, basic color categories such as RED and GRUE are defined by perceptual primes and are part of a perceptually given domain called color in English. Whereas color concepts may be imported into other bodies of knowledge, they are defined with respect to universally given sensations, which are not au fond, based upon constructed premises.

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1 Parent may be defined as a prime in the structure of a terminological system (Read, 1984) or as a constructed definition in primary genealogical space from which the particular relationship categories and the terms labelling them are projected as a category-theoretic mapping (Lehman & Witz, 1974; Witz & Lehman, 1979). The two representations are provably compatible just in case the features normally characterizing componential definitions of terms are allowed to arise as theorems, or natural computations, in a genealogical algebra of lines and compositions of lines, rather than being given arbitrarily by brute force.
Other concepts, however, may be embedded in elaborate formal theories constructing particular domains. A reanalysis of an example from the literature should illustrate our point. Spradley (1972a) set himself the task of analyzing basic conceptual distinctions that urban nomads make to distinguish among flops.

Although Spradley anticipated a taxonomic structure, and therefore presented his results as though such a structure were appropriate to the data, we argue that his "kinds" of flops can be more adequately analyzed as an open class of things or places usable for flopping, where class membership depends upon the theory of the domain of that activity itself. Spradley never formally characterized this theory, but his ethnography suggested that the basic premises include: the existence of places, the need for a place in which to sleep that meets basic requirements of size, shape, and seclusion as given by the concept of sleeping and the human body, and the lifestyle of urban nomads. This reanalysis presupposes a theory about all kinds of places (Jackendoff, 1985, for the notion "place") within which those good for flopping (window wells, paddy wagons, and alleys, for instance [Spradley, 1972a]) may be found. It also presupposes a theory of the social world. The premises of these theories combine universal and culturally particular assumptions about the world in the construction of a culturally salient theory of flopping. The theory of flopping imposes a partial order on the whole set of all kinds of places according to their respective goodness for flopping. The conceptual category, flop, is more complex than basic distinctions such as red and grue in the domain of colors. Flop stands for an indefinitely large set of places whose members share some features in common and are maximally good for flopping. This conceptual distinction arises from the larger theory of flopping. The premises constituting this theory are not represented in the embedded, or constructed, concept of flop, yet this embedded concept is structurally derived from that larger theory.

Concepts defined with respect to constructed theories of particular domains are more complex than those defined independently of such orienting premises. The semantic features of embedded concepts need to arise as theorems (i.e., computations) in a domain theory. We suspect that it is primarily this phenomenon of conceptual embedding that gives rise to the

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1 Our example from kinship further illustrates conceptual embedding. If the algebra of primary genealogical space is allowed to underlie the algebraic structure (e.g., Read, 1984) of a culturally particular category and terminological system, it is clear that the whole apparatus of the algebra of primary genealogical space and the mapping rules collapsing this universal space into a more compact and culturally particular one cannot plausibly be supposed to be directly contained in the lexical specification of each, or any, particular kinship term. We have, rather, a proper domain of concepts (e.g., a Read algebra for a given kinship system) that arises as a category-theoretic morphism out of a quite different and more universal, hence comprehensive, algebra, that of primary genealogical space.
intuitive notion that metaphysical concepts are more complex than concrete concepts, because metaphysical concepts are typically embedded in larger theories, say, for example, of some aspect of cosmology. It is failure to attend to conceptual embedding in the case of culturally constructed domains that has frequently prevented cognitive anthropologists from producing adequate accounts of complex cultural distinctions. With respect to conceptual complexity, the degree of complexity will be defined as a partial function of the depth of embedding, for embedding may be recursive, requiring the successive specification of the formal theories for multiple domains in order to clarify fully some given concept, as the reanalysis of Spradley’s flops suggests.

Third, if a concept B is polysemously related, through a word or other sign that typically stands for it, to other concepts, then the concept B, by virtue of its connections to others, may be held to be complex. Witherspoon’s (1977) analysis of the Navajo concepts represented by the word shima provides an apt illustration. Among the concepts represented by this word are MOTHER BY BIRTH, THE EARTH OR EARTH WOMAN, THE SHEEP HERD, THE CORNFIELD and THE MOUNTAIN SOIL BUNDLE. Each of these concepts may be considered complex by virtue of its relation to the others. That these relations exist is made evident in part by the sharing of a common phonological image and, in part, by the Navajo theory of life. In fact, complexity resulting from polysemy is basically due to the conceptual embedding previously discussed, and adds the element of shared sound images to this. Specifying the nature of polysemous relations requires elaborating the premises upon which these conceptual distinctions and their interrelations rest. Furthermore, it necessarily requires more elaborate internal lexical machinery than simple direct pairing of sound and sense for each separate entry.

Finally, much discussed in the literature is the problem of word usage. If a linguistic sign referring to a particular concept C is used as a tool for expression in some context(s) in a sense other than some prototypical sense of concept C, then this linguistic sign, it has been argued, represents a complex conceptual unit definable by a prototype and rules for its extension (Cole-)

\[1\] We take the position that a natural lexicon must be ordered conceptually, with the concepts mapped to particular phonological strings, rather than as a listing of phonological forms, which leads to the idea of polysemous entries comprising a discretely branching taxonomic tree in the sense of Katz and Fodor (1963).

\[2\] Polysemic complexity is seen to lie in the way concepts map to phonological strings in the lexicon. Polysemy is a relation among words sharing a significant partial sense across arbitrarily distinct lexical domains, thus defying taxonomic treatment in most cases at least. We take the position that polysemy generally, and crucially, involves abstract generalization rather than being limited to metaphorical extension of usage or radial chaining (Lakoff, 1987; Lakoff & Johnson, 1980).

(continued)
man & Kay, 1981; Kronenfeld, Armstrong, & Wilmoth, 1985). We take the position that this phenomenon is not so much an issue of concept complexity itself as an issue of word usage applicable to more or less all words. This is the problem of mapping concepts to experience through the application of their linguistic signs. It is this mapping process that is complex here, contributing no doubt to what some have sensed as conceptual (e.g., cultural) complexity. For instance, let the default value of “drinkable liquid” be water; then the problem arises of how it is that, in this society, to offer someone “a drink” has a first reading of offering something alcoholic.

The issue of mapping introduces two separate problems. One is the instantiation problem that is, whether or not something is, for example, a chair if the raised flange at the back of the seat is too trivial in height to be worth noticing or trying to lean back against very usefully. The second is the problem of saliency of categorization, that is, whether it is as functionally, socially, or perceptually consequential that something meets the conditions for being in some category C as that it meets those of category C'. This itself has two aspects as well: whether something makes as good a table as it does a chair, and the relative social, cosmic importance of one category as against another—possibly a case such as that where the fact that something is, in a devout Christian community, a good example of a cross outweighs its also meeting the criteria for a post and beam architectural support. These aspects of mapping are interesting in themselves but have nothing at all to

The same point can be made with regard to metaphor more generally. Let us begin by agreeing to include metonymy with metaphor. The OED admits that it is almost impossible to keep them neatly apart, and in any case, metonymy (part for whole substitution) is only a special case of metaphor (the class of substitution figures generally). In the second place, it is useful to divide their notion of metaphor into at least two varieties. On the one hand, we have a term that starts out having a particular concrete domain of application and then, surely by some sort of relational analogy, becomes figuratively applied to some other domain. This is no doubt a metaphorical extension. But it often happens (see Johnson, 1987) that in the course of time, the term is taken to mean basically the abstract structural relation that motivated the extension to start with, so that now it would be wrong to claim anything other than that both applications are instances of that abstract idea as such, even if, as is also frequently the case, the more concrete application of the original pair may continue to be the default/prototype one. A good example is to be found in the obvious reanalysis of the time is money metaphor by Lakoff (1987). We think that continuing to use the word metaphor for this is somewhat confusing. It tends to give one the impression that somehow the historical origin of a range of uses of a word outward from a particular domain of application can never be surmounted. It seems, rather, at its historical end point, to become abstract generalization.

On the other hand, there is the notion of metaphor as a form of symbolic usage (Lehman, 1978). That is, a figure is employed in such a way that the properties motivating the extended usage are not finitely accountable. Indeed, the more imaginable connections there are, the better the figurative usage is. Now, whatever may turn out to be the relationship between the two senses of the word metaphor, it seems to us that it is to the second only that the classical distinction between literal and figurative meaning ought to apply.
do with the nature of concept definition. These are aspects of the application of conceptual distinctions to the world.

We define conceptual complexity, then, as primarily having to do with two kinds of things: the formal specification of internal semantic representations and conceptual embedding, with polysemy as a derivative that may compound either of the primary forms of complexity. Any or all of these facets of complexity may be involved in any particular instance. In fact, it is likely that the two primary forms of complexity are often (though not necessarily) correlated, that is, that formal complexity tends to increase as conceptual embedding becomes increasingly complex, and vice versa.

THE ANALYSIS

We shall take two metaphysical concepts from West Futuna, Vanuatu, in Oceania, which, by intuitive standards, are complex. Using these concepts, we will explore the issues of complexity previously identified. The research site is a Polynesian outlier. The targeted concepts are ones that traditional cognitive anthropology would ordinarily have shelved for attention only after more basic conceptual distinctions had been adequately specified.

* Except that word usage may indirectly affect concept definition through the acquisition process, in which one's extensional applications may affect the process of abstracting intensional definitions.

The notion of classical categories for meaning can be preserved without supposing that in some objectivist sense the world is really or unproblematically and decidedly cut up into these as real, natural kinds. This has the important advantage of allowing for a comprehensive (and nonFregean) idea of quantification. This has been demonstrated elsewhere (Lehman, 1985); also, the members of such categories are entirely conceptual entities, so that, in particular, the apparent fuzziness of the notion of membership comes from an instantiation problem. This entails that fuzziness has to do with whether any object of sense, any perceptual thing, any item of experience (or even of the imagination, in the colloquial sense, as when one has a weird dream and attempts to describe or characterize something in it) is taken as plausibly meeting or not meeting the conditions of some schema/theorem or some concept/theory. It may not be clear whether or not there exist reasons to take an entity, in this special sense of entity, as meeting those conditions of membership (not at all necessarily the same thing as just a checklist of perceptual features). For example, one simply may not know whether a certain mutilated carcass is or is not the body of a dog; is it a dead dog or not? Or it may be undecidable whether the membership of an entity that technically meets such conditions of membership is really worth considering as salient when its membership in some competing category is far more important, relevant, interesting, or the like. This, of course, accounts nicely for the apparent fuzziness, or membership gradience, of the category of lies in English (Coleman & Kay, 1981), the problems with which cannot be overcome by Lakoff's (1987) treatment or that of the references there cited. None of the foregoing need be taken as supposing that the phenomena of fuzziness/gradience necessarily implicate graded category membership. It is only necessary to remember that categories in the mind can be classical in the membership sense without its being required, as in the objectivist view, that they correspond to objective natural kinds, especially in the sense of discrete taxonomies of such natural kinds. It is at this point that the remarks (in Footnote 1) about sets and proper classes has its application.
We will proceed in a manner at odds at many points with traditional cognitive anthropology, although often in line with directions already being taken in contemporary research by some scholars in that field and in cognitive science generally. We proceed in the direction, however, of the subdiscipline's expressed goals of developing a theory of meaning equally applicable to all languages and all cultural contexts. In the concluding section, we will explicate some of the revisions to standard cognitive anthropology and their implications for cognition and theories of concept definition more generally.

The concepts targeted for study here are MATERIAL ESSENCE and EFFICACIOUS IMAGE. These concepts are central to the traditional cosmology of the islanders of West Futuna, Vanuatu. They are called *hkano* (MATERIAL ESSENCE) and *ata* (EFFICACIOUS IMAGE). Save for one brief excerpt (Capell, 1958), no discussion of these concepts appears in the literature on West Futuna prior to the work of Keller (Dougherty, 1983), though the labels and similar concepts frequently appear in other Pacific ethnographies. There are no other West Futunan words that refer exactly to these conceptual distinctions. The Appendix illustrates the use of these terms and concepts in natural conversation.

MATERIAL ESSENCE and EFFICACIOUS IMAGE each require three levels of representation. Each of the three senses, of either of these concepts is referred to by the same label, creating a polysemy by proper inclusion. We assume throughout that there does not exist any necessary one-to-one relation between labels and the concepts they are used to name (see Footnote 4).

Inverting the usual approach of cognitive anthropologists who focus on labels and their use in context, we shall begin with a radically intensional account of these concepts. MATERIAL ESSENCE and EFFICACIOUS IMAGE are central contrasting concepts in traditional West Futunan cosmology. MATERIAL ESSENCE is the obvious, basic component of culturally significant, perceptible, typically (in a default sense) living kinds of things such as pigs, coconuts, and people, but also includes speech, song, canoes, and playing cards. MATERIAL ESSENCE is the basic substance and form of something that is either human, or stands in a special relationship to human beings. The *hkano* of a human being or a pig is the human or animal body; that of a tree, its trunk; that of a coconut, its edible flesh. The *hkano* of a root crop plant is its edible root or corm; that of any fruit, its edible portion. And the *hkano* of an outrigger canoe is its main hull as opposed to its outrigger.

* These lexical items (etyma, more properly) are widespread throughout Polynesia (e.g., Biggs, 1975). Meanings associated with them in other Polynesian languages are often related to their senses on West Futuna, and yet, the particular lexico-semantic conceptual structure discussed in this article is nowhere exactly replicated. Capell (1958) recorded these distinctions for West Futuna, and our work builds on this earlier record. Guiart (1961) translates *ata* as "the spirit of a dead man" for Aniwa. In addition, the concept labelled *ata* in Tikopia as discussed by Firth (1967) is similar to the similarly named concept in West Futuna.
EFFICACIOUS IMAGE is something that shares recognized perceptible attributes with the typical representation of a culturally significant thing having a MATERIAL ESSENCE. The shared perceptible attributes creating a link between a *hkano* and its *ata* indicate an intrinsic sympathetic connection between the MATERIAL ESSENCE and its EFFICACIOUS IMAGE. By virtue of this connection, magical performances involving the EFFICACIOUS IMAGE can produce effects in the thing itself. Typically, but not exclusively, EFFICACIOUS IMAGES are recognized in rock formations. The EFFICACIOUS IMAGES present in rock formations on the island of Futuna are fixed, having been given by the supernatural at the time of creation. In like manner, the highly potent *navela* were given by *Nobu* to the people of neighboring Eromanga (Humphreys, 1926/1978). As Codrington (1891) said of Melanesia in general, these stones are “vehicles to convey” power. In addition, a shadow, the chorus of a song as opposed to its verses, or the outrigger of a canoe as against its main hull, are among the other significant EFFICACIOUS IMAGES.

Examples of the perceived similarities that constitute pairing of a MATERIAL ESSENCE and an EFFICACIOUS IMAGE include a rock that emits a noise like the grunting of a pig and is recognized as the *ata* of the pig, or a rock with three equidistant depressions resembling those on the inner shell of a coconut: the *ata* of the latter. Humphreys (1926/1978), citing Gunn (1914), commented with regard to West Futuna, “of belief in spirits, ghosts, or a superior being or beings, no accounts have been given, of magic almost nothing has been written, although magical stones in the shape of breadfruit are mentioned” (Gunn, 1914, cited in Humphreys, 1926/1978, p. 221).

What sort of a theory of conceptual representation might account adequately for these distinctions? The classical theory can only characterize these distinctions descriptively at best. It fails to provide any explanation that would motivate the particular conceptual distinctions observed. Prototype theory is equally inadequate. There is no prototypical image central to the concepts labelled *hkano* and *ata* that could be extended to delimit class membership (on class membership and the argument that prototype theory is empirically too open-ended, see Lehman, 1985; see also Footnote 1).

What we need is a theory of the domain that will generate the targeted conceptualizations, motivating the particular feature descriptions. We propose that the conceptual distinctions of interest are derived from a cosmological theory, for which we hypothesize the following candidate axioms:

1. *That there exist material things.*
2. *That one class of these material things are “living” in some culturally particular sense, and/or importantly connected with (human) life.* (The essential quality of living things seems to be their efficacious potential. This class includes human beings themselves, culturally significant animals and plants, and canoes; the latter category is identified with...
humanity through the tree spirit that originally inhabited the trunk from which the canoe hull was carved and which animates the hull. Canoe hulls are designed and ornamented to reflect this. The canoe stands metaphorically for the human body. Speech, song, and playing cards are likewise included in this class by virtue of their connection to the supernatural, to human beings, and to the discovery and creation of order. Speech and song are exclusively a human or supernatural product. These phenomena are inherently powerful. It is through speech and song that society’s history is represented, decisions are articulated, chiefly edicts are handed down, and values preserved. Cards fall into this class possibly by virtue of an association with divination. Alternatively, still again, the fact that the face cards represent human images may have been a factor. In any case, cards, like songs, canoes, and so on, seem to be, or to represent, what is, efficacious with regard to human affairs, which appears to be the essence of living.

3. *That a second class of material things are nonliving.*

4. *That there exist immaterial things.* (These include spirits, or souls of human beings now living and ghosts of those who are dead. There are also spirits that have never inhabited a human body that are associated with nonliving things, and magical forces based upon contagious and sympathetic connections. See Codrington, 1891 for a related discussion.)

5. *That material things may resemble one another. One thing may be an image of another.*

6. *That resemblance in material things may be indicative of an immaterial connection between them that is either spiritual, as evidenced through descent (i.e., within a given domain), or magical, as evidenced in the relation between a living and a nonliving thing (across distinct domains).*

7. *That a resemblance between a rock and a living thing may be indicative of a magical connection between the two such that the health, physical robustness, and productivity of the living thing can be optimized by a knowledgeable person working upon the efficacious image.* This is the most powerful and, traditionally, the most typical instance of the pairing of material essence and efficacious image, and it forms the focus of traditional increase rites (Capell, 1958).

In terms of the formal mechanisms required for the specification of the two concepts, material essence and efficacious image, the lexico-semantic features are whatever abstract notions constitute what it means to be material essence or efficacious image. Such features arise from the larger theory of cosmology as constructed by the people of West Futuna, as given in the candidate axioms, above. Here we draw upon the distinction between encyclopedic and semantic knowledge (Sperber, 1974, 1985), or cultural and linguistic knowledge (Keesing, 1979), which will be relevant...
again as we pursue the issue of conceptual embedding. We take encyclopedic knowledge to be, minimally, the theory of a particular domain, technically, a particular knowledge structure. The definitions of concepts that arise within this domain theory must be minimally specifiable in some finite way. Therefore, the minimum lexico-semantic "feature" definition of a category has to be formed from material arising in and from encyclopedic domain theories, yet not directly incorporating the encyclopedic knowledge itself in the concept definitions.

In addition, there is a hierarchical polysemy that surfaces as soon as one attempts to specify the internal representation of these categories. MATERIAL ESSENCE is specified in the abstract on the basis of a theory of the nature of culturally significant living things. It is whatever constitutes the unique and obvious qualities of a "species." By the very nature of this theory, MATERIAL ESSENCE must be represented at two additional levels. At a second level, MATERIAL ESSENCE in the abstract is coupled with a theory of the typical member of some targeted class of living things. This theory of the typical member of some species is not a template or prototype against which examples in the world are judged, but rather a set of default characteristics of the class. Some particular feature, or cluster of features from the default values is designated the MATERIAL ESSENCE of that species: the trunk of a tree, the edible meat of a fruit, the flesh of a pig, the body of a person, the hull of a canoe. At a third level, a token of the MATERIAL ESSENCE of some particular individual member of the targeted class is represented: the particular trunk of a particular tree, for example. The label *hkano* is used for each of these

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1 Such a theory could be either grander, or more particular, than Johnson’s (1987) metaphors, but quite possibly could subsume them. Encyclopedic knowledge may ultimately encompass many, and quite possibly all, domain theories for two reasons. First, it seems likely that for any given culture, certain axioms may be common to more or less every domain/knowledge structure. These premises constitute less than a holistic, or *global*, structure for a culture, but may be sufficient to account for the ubiquity of certain theorems and category relations across knowledge structures. Second, domain theories, knowledge structures in their minimal specification, may intersect, so that embedded concepts in one domain may call up the theories of other domains. In any case, the distinction between encyclopedic and lexico-semantic knowledge is motivated by an explicit theory of the organization of the natural lexicon and the way it necessarily interfaces with the rest of our cognitive capacities.

2 For reasons gone into elsewhere concerning the infinite regress problems and parsimony problems connected unavoidable with collapsing the distinction between encyclopedic knowledge and lexico-semantic representations (Lehman, 1985), and in spite of Johnson’s (1987) arguments linking what he called background to meaning indissolubly, it seems necessary to maintain this distinction. We need a finite version of lexico-semantic meaning as an account of the linguistic/lexical coding of understanding. This is consistent with the program of embedding linguistic knowledge within a broader theory of cognition and is important for that part of the program intended to overcome the not uncommon tendency for extension of linguistic semantics to cover all of cognition.
concepts. We might designate the most general representation \( h'kano_0 \), the MATERIAL ESSENCE of some particular species as \( h'kano_1 \), and the representation of a particular token as \( h'kano_2 \) (see Jackendoff, 1985 for our use of the type/token distinction).

The specification of EFFICACIOUS IMAGE is, if anything, even more complex. It is abstractly defined as a distinguished and significant way in which some object in some class, \( C \) (possibly the whole category \( C \)), bears a resemblance to (something in) another class, \( C' \), that has a MATERIAL ESSENCE. The pairing of an EFFICACIOUS IMAGE and a culturally significant entity having a MATERIAL ESSENCE constitutes an inherently dualistic theory of existence. This is not a mind/body dualism, nor yet a body/soul dualism, but rather a MATERIAL ESSENCE/EFFICACIOUS IMAGE dualism. The EFFICACIOUS IMAGE of a given species involves some single trait from among the default traits. This trait has to be something other than that which constitutes the MATERIAL ESSENCE of the species: a pig’s grunt, the three depressions resembling those at the base of the coconut shell, the shadow of a human being, the outrigger pontoon of a canoe that resembles, in overall shape, the hull proper. For some species, notably for human beings, there are several EFFICACIOUS IMAGES, each identified with some characteristic other than that which constitutes the MATERIAL ESSENCE. In every case, the default feature or features indicative of an EFFICACIOUS IMAGE are not called \( a'fa \) (EFFICACIOUS IMAGE) when instantiated in the targeted living thing itself, but only when instantiated in (a member of) some other domain such as rocks, shadows, or pontoons. The concept EFFICACIOUS IMAGE is inherently relational, cross-referencing categories of diverse domains: foods and rocks, human beings and rocks, or human beings and shadows, hulls and pontoons. The pairing of \( hkano \) and \( ata \) presupposes that life has a dual nature. This dualism exists in the magical relation between a MATERIAL ESSENCE and its EFFICACIOUS IMAGE.

Three levels of representation are also involved for EFFICACIOUS IMAGE. \( Ata_0 \) labels the general theory of significant likenesses and implied magical connections. \( Ata_1 \) labels the coupling of this theory with some particular species and the resulting selection of particular characteristics of that species as indicative of an EFFICACIOUS IMAGE. \( Ata_2 \) is the token representation of the EFFICACIOUS IMAGE in some particular object.

By now it is surely obvious that specifying the internal representation of these concepts is formally complex. In addition, it should be clear that these

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11 We have to allow for at least the possibility that these may include traits filled in by redundancy rules from the larger encyclopedic base. Although it is true that all coconuts, or at least all well formed and mature ones, have three depressions at the base of the inner shell, it seems counterintuitive to suppose that this particular identifiable feature of the stereotypical coconut (stereotypical in the sense of Wierzbicka, 1985) has to be a part of the minimal lexico-semantic definition of COCONUT.
concepts are complex in our second sense as well. For, in specifying their internal representations, we cannot get away from articulating the larger theories in which these concepts are embedded. Discovering their meaning is emphatically not a process of simple pointing to the world, but is rather a matter of being provided with an elaborately constructed world view within which these concepts arise, and become meaningful.

MATERIAL ESSENCE and EFFICACIOUS IMAGE are complex by virtue of their embedding in a theory of a domain. Their definitions must arise as theorems of this domain. Some elements of such a theory are given in the premises above. According to the people of West Futuna, when speaking with respect to their traditional cosmology, material things are governed by metaphysical forces that can only be controlled by an intelligent being, typically a human being with the proper knowledge and means of expression through speech and song that have been handed down ultimately from the supernatural. Such a knowledgeable individual may direct magic to ensure the health, great size, and/or abundance of things with a MATERIAL ESSENCE by acting upon the appropriate EFFICACIOUS IMAGE. One ensures the abundance, great size, and health of island pigs by acting upon a rock that makes a piglike sound when struck. When people fail to perform the necessary rituals associated with the ata of culturally significant things, these things decline in health, size, and number. The ata are typically quite particular things, which have been present from the time of creation, either as an original gift from the supernatural, in the case of rocks, or as an inalienable part of a larger whole, in the case of shadows, choruses, and canoe outriggers. Experts today know of their existence from having learned from previous generations.

These concepts, then, labelled hkano and ata, are theorems with respect to some larger, encyclopedic theory of the world. Although this theory employs universal elements, it is a culturally particular construction in which selected universal, and possibly also purely parochial, elements are combined. What is the domain to which hkano and ata belong? Possibly the theory of the principles of life is the most basic metaphysical theory in which these concepts arise, yet as we have seen, their complete specification entails other domains as well. Whatever the most basic theory is, hkano and ata are defined with respect to one another within this domain, but not by anything as simple as direct binary contrast. Identical features with opposite binary values are certainly not centrally involved here. Nor, to speak in terms of traditional cognitive anthropology, is there a larger contrast set for which proper analysis would yield such a paradigmatic relation between

12 Quite possibly more than one such theory can be constructed to account for the observations regarding hkano and ata. This likelihood does not alter the requirements for a general theory of complexity. It does, however, introduce the interesting problem of determining which is the most correct theory from among the set of possible accounts.
these two concepts. Rather, these concepts are paired exclusively with one another and are “causally” related within a theory of the fundamental principles held to govern life. Their constitutive features at the most abstract level may or may not all be orthogonal to one another. The lexico-semantic features for *hkano* and *ata* are derived by shared access to theories of the typical characteristics of particular species, but the features themselves of the two categories bear no necessary or predictable relation to one another save for the fact that they must not be the same. *Hkano* and *ata* share a cross-referencing of domains that is integral to their conceptual representation, but this cross-referencing is considerably more complex than any mechanism of binary contrast can specify.

*MATERIALESSENCE* and *EFFICACIOUSIMAGE* are not related by polysemy at an immediate, or superficial level to other concepts, although, as we have shown, there is a hierarchical polysemy constituting the conceptual representation. Indeed, these concepts, although central to traditional cosmology, do not appear to be easily subject to further direct polysemous elaboration. In fact, there appears to be a constraint against just this sort of conceptual complexity with respect to *hkano* and *ata*, as evidenced by the following observations.

Christianity was introduced to the island of West Futuna late in the 19th century. The Reverend William Gunn, who came to Futuna at the turn of the century and remained on the island for more than a decade, worked during that time to translate biblical stories and many hymns into the native language. Gunn encountered difficulty in translating the Christian concepts *BODY* and *SOUL* and ultimately settled on the traditional words *ata* and *hkano*, respectively. The reason behind this particular choice seems to have been the obvious perception that the concepts labeled by these words were central to traditional cosmology and, Gunn thought, contained elements of the Christian concepts. Perceiving the symbolic importance of *MATERIAL ESSENCE* to the traditional cosmology, Gunn, it seems, hoped to retain the connotations of centrality and significance from the traditional notion *MATERIAL ESSENCE*, and yet, replace the denotation with the concept *SOUL*. *Ata* then, by contrast, became *BODY*, the less important element of life by Christian standards and, Gunn believed, the less important aspect of the traditional cosmology as well (Capell, 1958). This translation, although retaining the central traditional labels, completely alters their definitions and imports them into an entirely different domain and theory, those of Christianity. In fact, part of what is wrong is precisely that Gunn imagined the two to form a superficial binary contrast set.

From what is reconstructible historically, it appears that *hkano* and *ata* in the Christian context were rapidly modified in linguistic form by the islanders themselves in order to avoid polysemic complexity. The process was a relatively simple one linguistically. Concepts like *BODY* and *SOUL* fall into a paradigm of inalienable things, which should properly be marked as
possessed with a third-person-inalienable morphological form. These con-
cepts, like body parts and things that envelop the human body, always occur
in West Futunan with a possessive pronoun from one of the inalienable pro-
noun paradigms. In the case of BODY and SOUL the appropriate third person
form is tano. Therefore, in the Christian context hkano and ata always
occurred as tano hkano and tano ata. The definite article in West Futunan
is ta. A reanalysis of these forms as ta nohkano and ta noata (one's SOUL/
BODY, inherently possessed) followed quickly, differentiating the Christian
terms from the traditional West Futunan words hkano and ata. In fact,
these two Christian usages today amount simply to near homonymy with re-
spect to the traditional terminology. The Christian concepts are now marked
as possessed by a different possessive pronoun, one from the paradigm for
alienable relationships of possession. HIS SOUL or SPIRIT is tiona nohkana
and HIS CORPOREAL BODY is tiona noata. The traditional concepts occur in-
alienably possessed, as tano khano and tano ata (see Appendix). Although
some confusion does occur over the similarity between the two indigenous
concepts and their labels, and the introduced concepts of Christianity and
their labels (see Dougherty, 1983), the relevant domains of knowledge are
kept remarkably distinct and the linguistic change just described is one pro-
cess in the maintenance of that distinction.

FURTHER PROBLEMS

One of the more difficult problems that this analysis raises is the specifica-
tion of the class of living things to which the concepts hkano and, derivat-
ively, ata apply. Hkano, for example, occurs in natural conversation in
expressions such as the following: tano hkano iai, “What is its essential
idea?” or jikai ta hkano iai, “There’s no coherent essence in it”—more
colloquially, perhaps, “There’s no sense in it”—with regard to speech or
human action, which of course have hkano. It also refers to verses of a song
as opposed to the refrain, to the voice as opposed to its echo, or to the
moral or point of a story as against its surface episodes. Hkano can be used
to express “the meat of something,” meaning its ESSENCE. A few other ex-
amples are: hkanonea, literally MATERIAL ESSENCE THING, meaning “naked
human body” (viz., an embodiment of hkano); hkuno, “taste” derived
possibly from something like the ESSENCE OF A PROTOTYPICAL THING THAT
HAS A HKANO (i.e., edible meat and fruit).

Ata is used to refer to SHADOW, REFLECTION, IMAGE AS IN A PHOTOGRAPH,
although other terms may be used to refer to these things as well. It also
refers to the SOUND OF SPEECH as against its meaning; the EPISODES of a
story as opposed to its moral, the REFRAIN of a song as against its verses. A
MODEL or a MINIATURE version of something may be referred to as ata, for
example, a doll. The OUTRIGGER of a canoec is the ata of the main hull.
This surface complexity is best handled, we argue, by a coherent West Futunan theory of the principles of life. This requires further analysis of the internal representation of both MATERIAL ESSENCE and EFFICACIOUS IMAGE, and it requires a fuller analysis of the domain theories relevant to these concepts. Without this fuller analysis at hand yet, we still would argue that the class of culturally significant living things to which the distinction between MATERIAL ESSENCE and EFFICACIOUS IMAGE applies includes human beings and their primary food sources. It also includes canoes because of their mythological derivation from tree trunks, which embody living spirits. (Incidentally, coconuts also have a human origin, growing originally from the buried head of an ancestor.) The class also includes speech and song because of the unique association of these phenomena with human beings and the inherent power attributed to speech and song in the construction and maintenance of order. (Possible reasons for the inclusion of playing cards in this class were previously discussed.) Anything referred to as having a hkano always has, as a counterpart, its ata. The MATERIAL ESSENCE is the direct form of something; the EFFICACIOUS IMAGE is an indirect way of accessing the true essence of something, primarily in the context of increase rites, but also in the abstract realm of linguistic meaning. For example, the episodes of a story (ata) are an image or reflection of its basic moral (hkano), what makes it possible, indirectly, to get at that moral or point. Or, in the metaphorical language of chiefs, ia furifesou, utterances indirectly suggest a meaning; the former are the ata of the latter, which are the hkano of a chief's speech. The basic West Futunan theory of life governs the more prototypical cases of culturally significant things and their magic rocks. We do not find a prototype or central concept (Lakoff, 1987) being extended here, but rather an abstract theory of entities and their interrelations. Class membership for those entities for which hkano and ata are relevant is fixed by the theory of culturally significant living things. Outside this class, extension is altogether inappropriate. A house, for instance, has no hkano or ata. Nor is there any context in which such an extension would be appropriate. Although we are aware of Malinowski's caution regarding the risk of hypostatization through lumping homonymously symbolized concepts, our claims rest upon careful ethnography through which homonymy is distinguishable from true generalization. However, though we argue that such an abstract theory is, in principle, specifiable, the problem of actually specifying this domain theory adequately remains with us still.

It has been suggested (Atran, 1988; Boyer, 1988) that this larger domain of "culturally significant living things" is a sort of pseudonatural kind, that is, an extension of universal assumptions about the essence of natural kinds, roughly, classes of things linked by the (biological?) processes of self-reproduction, to the realm of cosmology and religion. Relevant to such a claim, ethnoscientific investigation for West Futuna reveals a basic taxonomy of living things in the universalist sense (Dougherty, 1983). Yet, although
extension may well be the issue here, reference to assumed essence and typical properties fails to provide an account of the principled basis for such an extension. It is towards the construction of just such an account that our research, reported here, is directed. When we consider extension from a domain of natural kinds, we must look for clear evidence that the relations among classes in the domain of such an extension has the structure of a proper taxonomy rather than that of a network of interclass cross-references. More precisely still, unless the otherwise rather vague notion of "extension" is clarified, any such claim is largely unassessable. For instance, taking extension as plausibly some kind of map from a kind of structure (say, that of a taxonomy) to another structure, is that map structure-preserving (in which case alone it will necessarily follow that the domain of the map is itself a taxonomy)?: Is it a homomorphism, an isomorphism, or perhaps something as loose as a category-theoretic morphism? In the latter case, particularly, the domain of the map (of the extension) need not be itself understood as some sort of natural kind.

IMPLICATIONS

The approach developed above requires profound revisions to standard views and assumptions of traditional cognitive anthropology:

1. A domain is not a collection of objects, possibly closed under the operation of binary feature contrast. It is to be accounted for, rather, under a much richer conceptual theory, a domain theory or knowledge structure within encyclopedic knowledge more generally. Any domain of interest, in the case exemplified, maybe the principles of life or resemblance and its significance, need not be given a priori. A domain need not be universally defined in any obvious way; the one in question is unlike "animal," "plant," or "color" in this sense. We have found it necessary in analyzing concept definitions to start with an intensional description of the domain(s) governing them. Unlike domains such as color, where anthropologists and informants can immediately play the language/concept game together, the body of knowledge relevant to *hkano* and *ata* had to be discovered through long and tedious hours of questioning by the anthropologists. The islanders set the rules for the game and it was up to the anthropologist to discover them. Possibly, comparative study would allow some sort of universalist analysis, but we cannot assume this as our starting point.

The common focus of traditional cognitive anthropology on contrast sets, which, it was argued, were empirically given, such as kinds of beer (Hage, 1972) or *flaps* (Spradley, 1972a, 1972b), prevented elaborations of these studies in the direction of clarifying the culturally significant domain theories in which the contrast sets were embedded.
2. The number of domain-constituent output categories is highly variable; in the case previously analyzed, the number may be just six, that is, those conceptual distinctions labelled by *hkano* and *ata*. The relations between these concepts are not simple contrasts as given by opposite values of binary features in a matrix whose dimensions are nothing but such features (usually orthogonal to one another), but rather a form of effective relations (a generalization of the idea of “cause and effect” to such cases; see, especially, Weathers, 1985) given by the theory of the domain.

3. Concepts such as these may arise as theorems of a domain and be taken on faith, rather than empirically motivated.

4. The formal mechanisms required for stating concept definitions here are far more complex than a simple listing of features. Minimally, hierarchical polysemy is required for concept definition in this case, but other formal mechanisms will certainly be required for specifying fully the intensional definitions and relevant domain theories.

5. The approach developed here argues for more complex and intersecting knowledge structures (domains) in the universe of cognitive constructions and computations, rather than neat, isolable, mutually exclusive taxonomies. Intersection among knowledge structures, however, is no argument against some form of the modularity hypothesis with regard to cognition, an issue we do not pursue here, however, save for pointing out that the idea of a distinction between knowledge structures and lexico semantic representations is understood by us as being motivated by the need for a modular language faculty to access, and be accessed by, the wider range of cognitive systems (see Chomsky, 1985).

6. The candidate axioms proposed here as the basis of a part of West Futunan metaphysics generate categories in addition to MATERIAL ESSENCE and MATERIAL IMAGE. Both EFFICACIOUS ESSENCE and MATERIAL IMAGE are generated also, and occur in West Futunan thought. These latter concepts are not, however, independently lexicalized. EFFICACIOUS ESSENCE is a restatement of Axiom 2. It falls together with MATERIAL ESSENCE under the label *hkano*. The property of having an essence is distinctive of culturally designated “living things,” which are further characterized by an efficacious quality. MATERIAL IMAGE follows from Axiom 5. It is a more inclusive category than that of EFFICACIOUS IMAGE, and it is lexically referred to as *ata*. We suspect that a photograph of a person constitutes a MATERIAL, but not an EFFICACIOUS, IMAGE. Finally, one category that might, at first, appear to be generated by the theory predictably, fails to occur. *ESSENTIAL IMAGE* is a collocation of two concepts in direct mutual contradiction under the axioms. Having an essence is a quality of living things, whereas being an image is possible only for nonliving things. The framework for which we have
argued, therefore, allows us to discover new conceptual distinctions relevant to a domain, and to predict the impossibility of certain imaginable constructions.

Some more general implications of this research are summarized below:

- A priority in the study of conceptual organization must be the development of a formal theory of the constraints on concept definition.
- All concepts, with the exception of those defined exclusively in terms of primes, must be analyzed with respect to the theory of knowledge within which they are embedded (and, if Atran and Boyer were right, the theory of natural kinds upon which they are modelled).
- These two facets of concept definition, formal specification and conceptual embedding, subsume a theory of concept complexity.

REFERENCES


APPENDIX

We append here some ethnographic data illustrating the use of the key terms *hkano* and *ata*, and the concepts associated with them, as they occur in natural contexts of conversation.

1. *kaina ano* hkano *towaki ano kirk.*
   - eat its flesh, discard its skin.
2. *Mojijiki neiamoa tano ata, ngaifo i ta mahmiji.*
   - Mojijiki (a mythical hero) took his own shadow/image and laid it down in the ocean current.
3. *hkano mata*—the eye, essence of the face.
   - “rough” and “bumpy”: the meaning (essence) of these is the same.
5. *tou ata*—your shadow
6. *ta vaka ma ti ama neiamoa ata ki Futuna.*
   - [The rocks below represent the original] canoe hull and outrigger pontoon which brought the *ata* to Futuna.
8. *a noata tagata nigkomari maki*
   - Our bodies have truly sickened [because we have abandoned our customs]
9. *nohkano sa* the devil, bad spirits or souls
10. *ta nohkano ma ta hkano e ke.*
    - nohkano and *hkano* are distinct.
11. *kaie ta noata ma ta ata e ke foki.*
    - And *noata* and *ata* are also distinct.
12. *pe komata, ta noata ni takere kopohpopo,*
    - When one dies, the body in the ground rots.
    - However, the soul goes above.