Jeremy J. Shapiro
Fielding Graduate Institute, Santa Barbara, California, U.S.A.

Interdisciplinary Knowledge Integration and Intellectual Creativity

Abstract: The use of culturally prominent metaphors, symbols, archetypes, myths, and narrative patterns as metadata is explored and analyzed as a method to facilitate the discovery and retrieval of information and the integration of knowledge across both disciplinary and cultural boundaries in order to promote intellectual creativity and interdisciplinary innovation. The rationale for metaphorical and symbolic metadata is to be found in recognition of the role of metaphorical and analogical thinking in intellectual creativity as well as in limitations of classificatory and disciplinary subject languages and the ontologies on which they rest. A Universal Cultural Symbol Thesaurus is described as a potential enumerated subject language for a usable lexicon of metaphors and symbols that have cognitive connotations as well as cultural and psychological resonance. Such a thesaurus could be employed to classify and index information objects in a symbolic dimension that would complement and run transverse to existing analytic and disciplinary modes of classification and fit easily into Boolean search logic.

1. Introduction

That the volume of stored and networked digital information is not only growing exponentially but being made interoperable - not only within the library world through such developments as Z39.50 but in the entire world through the spread of XML and the development of the Semantic Web (Berners-Lee, Hendler, & Lassila, 2001) -- poses a twofold and contradictory challenge to knowledge integration. On the one hand, clarity, coherence, and universality are crucial to the organization and representation of knowledge in order to make it maximally accessible and discoverable in useful ways. On the other hand, since all knowledge organization reflects ontology, more universal means of organization may squeeze all the knowledge in the world into a hegemonic ontology that is at odds with the creative, improvisatory, and serendipitous processes through which new knowledge is created and possibly with the ontological assumptions and commitments of local cultures, despite the Semantic Web project's explicit commitment to preserving the ontologies of particular communities.

We know that intellectual creativity often occurs through processes of analogical and metaphorical thinking that step over the neat boundaries of official and inherited disciplines and classification schemes. Certainly, in the humanities and social sciences, new knowledge arises as much from the bricoleur, who patches things together out of often dissimilar materials that are at hand, as from the instrumentally rational "engineer" of knowledge. In what follows, I address, through a particular take on universality, the ISKO conference objective of proposing new models, methods, and techniques of integrating knowledge across both disciplinary and cultural boundaries. My focus is on creating a metadata set of universal or at least widespread and well-known cultural metaphors and symbols,
whose use would amount to a new method of knowledge organization and retrieval and might contribute to interdisciplinary knowledge creation in the social sciences and humanities. In particular, a Universal Cultural Symbol Thesaurus is described as a potential subject language: a lexicon of metaphors and symbols that have cognitive connotations as well as cultural and psychological resonance and that would enhance bricolage and serendipity as paths through the gigantic storehouse of digital information.

2. Theoretical background

An important body of theory and research in psychology, cognitive science, sociology, anthropology, and philosophy, from a variety of conceptual frameworks and points of departure, identifies a duality - or more accurately a set of related and analogous dualities -- in human cognition, culture, and social organization that is of immense significance for the theory and practice of classification: the duality that Goody calls the "Grand Dichotomy" (Goody, 1977). This encompasses such dichotomies as rational/mythical, instrumental/expressive, scientific/narrative (Bruner, 1986), system/lifeworld (Habennas, 1988), disembodied/embodied (Dreyfus, 1992), engineer/bricoleur (Lévi-Strauss, 1966), high-focus/low-focus (Gelernter, 1997), allegory/analogy (Stafford, 1999), and related conceptual pairings, including of course modern/premodern (and modern/postmodern). In general, modernity has involved privileging or emphasizing the first member in each of these dichotomies and defined rationality and progress in its terms, de-emphasizing, suppressing, or eliminating the second.

The Grand Dichotomy is relevant to the organization of knowledge and information and to classification for two reasons: first, because it bears on the underlying ways in which knowledge and the world are structured and how they should be represented; second, because it bears on how people seek, acquire, and use information and knowledge. Every scheme for classifying or ordering information is grounded in or implies a philosophical ontology or cosmology. Overall, modern information organization is based on the first term in the above pairs. It is grounded in an "ideology" (Svenonius, 2000) based upon general systems theory, positivistically oriented philosophy of science, and linguistic philosophy that privileges instrumental and scientific rationality. Its dominant classification schemes (e.g. the LCSH and DDC systems) inherit from the Aristotelian Tree of Porphyry and Neo-Platonic, realist ontology and theology, the "Great Chain of Being". Especially in the Neo-Platonic version, this ontology asserts the priority of the universal over the particular and of the abstract over the concrete and sees the individual or particular as merely an emanation or instantiation of the abstract and the universal. Furthermore, the knowledge or information seeker has tended to be construed as an instrumentally rational, "disembodied" cognitive being pursuing clear, known information goals. This is reflected in conventional library profession definitions of information literacy.

Certainly, this model of knowledge organization and of the knowledge seeker corresponds to a genuine and important dimension of cultural reality and social, scientific, and individual needs. However, postmodern awareness of the limitations of objectivistic and rationalistic frameworks for representing and structuring knowledge has delegitimized the philosophical systems and assumptions that underlie it and points to the unstable and socially constructed nature of modern
information organization and classification schemes (Bowker & Star, 1999). Furthermore, the progress of the sciences leads to taxonomic complexification that is in principle unlimited (Rescher, 1998), which diminishes the utility and relevance of both linear and hierarchical models of classification and gives rise to new modes of cognitive inter-relationship and ordering. The new structure "is not that of a hierarchy at all, but rather that of chain-mail-work interlinkage reminiscent of medieval armor" (Rescher, 1979). This trend is amplified by the sheer volume of accessible digital information and by the emergence of hypertext as a novel and characteristically postmodern method of information ordering that, through the World Wide Web, has become a global system for organizing information and knowledge with a simple and viable, although associative, technical infrastructure. Through its use in personal publishing on the Web, hypertext has taken on tremendous cultural and psychological force for individuals, organizations, social groups, and information producers and managers. In its technical structure, it has given rise to two principles of organizing information: through properties of the text itself and its connection to other texts, and through properties of the individual who makes the links, either through construction and publication of the text or through its reception and deconstruction. Hypertext mirrors postmodernism's thesis of the personally and socially constructed nature of reality.

A core feature of the postmodern intellectual situation is a re-evaluation and critique of the dominance of the first term in the above dichotomous pairs and an attempt to rehabilitate or recognize the legitimacy of the second member or restore it to its rightful place: thus Habermas's attempt to undo the colonization of the lifeworld by the system and restore communicative rationality, Dreyfus's and others' attempt to restore embodiment to epistemology and to our relation to technology, Bruner's attempt to rehabilitate and legitimate narrative knowing, Stafford's rehabilitation of analogical thinking, Gelernter's design of computer systems capable of "low-focus", metaphorical, analogical functioning, and so on. In general, these postmodern approaches are based not on reversing the hierarchical ordering of the dichotomy but finding an appropriate, balanced relationship between what must be seen as two vital dimensions of individual, cultural, and social existence.

In this context, recent research emphasizes the metaphorical and analogical substructure of rational/conceptual thought, whether in the form of the evolutionary survival in the brain of the cognitive analog of the mythic phase of cultural evolution (Donald, 2001); Lakoff and Johnson's work on embodied thought and the metaphorical infrastructure of thought (Lakoff & Johnson, 1999); Fauconnier's work on conceptual blending and the role of metaphor in mapping between mental spaces; Durand's "transcendental fantastic" and general archetypology (Durand, 1992); or Stafford's argument that "by recuperating the sophisticated workings of ancient analogy for modern science, I believe artists and art, architecture, design, film, and media historians, in particular, can contribute a cross-cortical model of the complex processes of mental combination" (Stafford, 1999, 144) Thinking metaphorically and analogically is fundamental to creative thinking and intellectual innovation (Root-Bernstein & Root-Bernstein, 1999). Creativity and knowledge integration also involve serendipity and receptivity as well as the directed pursuit of specific cognitive goals. In the humanities and social sciences intellectual innovation often occurs through the synthesis or mutual amplification of ideas and information from disparate domains, sometimes linked associatively. There is reason to believe that this is true to some extent in the natural sciences as well.
Metaphors and symbols are often key vehicles for analogical thinking, the bridge of resemblance among diverse areas and phenomena.

3. Metaphorical and Symbolic Metadata

In postmodern, complex, multi-cultural society, any semblance of a universal, background cosmology, cultural system, or generally shared lifeworld that could serve as an accepted common basis for structuring knowledge and information has dissolved, leaving in its place a multiplicity of diverse lifeworlds, orientations, and individual meaning schemes (Habermas, 1992). Thus, it would be futile to try to invent a new, more encompassing and universal classification system or taxonomy that would hierarchically subsume all conceptual frameworks. Metaphors and cultural symbols, on the other hand, provide ways of linking across lifeworlds and cultural systems while expanding intercultural understanding, especially if they are drawn from a variety of cultural traditions.

What is metaphorical or symbolic metadata? In brief, they are conventional signs or symbols attached to data in order to ascribe metaphorical or symbolic meaning to it. In the present context we limit ourselves to signs or symbols drawn from culturally significant symbol systems or sets, such as the I Ching, the Tarot, astrology, the Kabbalah, Yoruba mythology, Christian iconography, etc. that have known traditional meanings. Thus, Kant's Critique of Pure Reason could be described by the sun, a symbol of light and enlightenment; a biography of Gustav Mahler could be described by a red rose, a symbol of martyrdom. There are really several kinds of symbols that are candidates for use as metadata, some of which overlap: symbols (e.g. the sun or a rose), concepts (as in the I Ching hexagram for "the creative"), archetypes (e.g. the Virgin), myths (e.g. the myth of Sisyphus), narrative patterns (typical story structures), and narrative or action characters (e.g. the journeying hero). In general, symbolic metadata would classify the knowledge element or information object (book, article, Web page, art work, etc.) as belonging to the semantic field connoted by the symbol or metaphor in question.

The aspect of a metaphorically or symbolically based classification system that is most difficult to swallow is the inevitable element of arbitrariness and subjective interpretation involved in assigning a symbolic descriptor to an information object or bibliographic record. While ambiguity, interpretation, and subjectivity are involved to some extent in classification generally, a principal merit of standard classification systems is the existence of conceptually and analytically specifiable criteria for the assignment of terms. Metaphors and symbols do have identifiable and specifiable meanings, recorded in symbol dictionaries such as (Fergenson, 1954), that could serve as a model for a symbol thesaurus; otherwise, they would not preserve their meanings and identities. However, by their very nature and use their boundaries are fuzzy or porous. It is precisely this that enables them to be applied to new things and to be used creatively and in analogical thinking.

The tension between metaphorical terms and the analytical descriptors of conventional subject languages derives from underlying ambiguities and difficulties in the fundamental notion of "aboutness", as expounded so well by Svenonius (2000). She differentiates between the grammatical model of aboutness, oriented toward subject analysis as a process of summarization and based on the logical positivist idea of propositions as providing a picture of what there is, and a model
that recognizes that language is often used non-propositionally and non-referentially and that subjects do not always have names. In Svenonius's words, "the scientific model of aboulness is limited, as indeed is subject analysis itself" (2000, p. 48). Of course, the fuzziness of metaphors and symbols is an impediment to automating subject determination, since every act of classification is an act of interpretation in the emphatic sense, and the tremendous social, cultural, and technological pressure to automate will be a potent factor in limiting receptivity to or enthusiasm for the idea of a metaphorical subject language. In the limiting case in which the sentences in a document provide no basis for determining what metaphors or symbols might be used to describe it, it is currently impossible to envision automating subject analysis. Nevertheless, if we follow Svenonius in taking a painting or a piece of music as an information object about which the subject is difficult to determine, even with such works there is often critical agreement about the range of meanings that can be attributed to them. Non-existent or rare are those music critics who would describe Beethoven's Ninth Symphony as "cute" or his Sixth Symphony as "morose". Non-propositional meanings and symbols may be fuzzy and ambiguous, but they are not empty or arbitrary.

How would one use metaphorical and symbolic metadata? For bibliographic and information classification and retrieval they would rarely be used on their own, but rather transversely or orthogonally to standard classification schemes. For example, a scholar venturing into disciplines other than her own might search for information that was indexed under a symbol of personal, cultural, or intellectual interest, or might use such a symbol, through a Boolean AND, to select data, on analogical grounds, out of a large set of information objects: locate a journal article with author x AND keyword y AND symbol z. An individual who had identified her own creativity as particularly focused on or stimulated by a particular symbolic theme might use symbolic or metaphorical metadata to find material to nourish her creativity or imagination. Communities attempting to formulate their concerns and influence the political process might use symbolic or metaphorical metadata to search for relevant information. Students trying to articulate or formulate the motivations guiding their studies might find that congenial symbols serve as a path of entry into a mass of unfamiliar material. It is worth noting that symbolic metadata could be assigned for both cognitive/denotative reasons, i.e. to denote the semantic content of the information object, and expressive/connotative ones, for example to characterize the subjective meaning of the knowledge element to its creator. This could be handled by assigning two symbolic metadata fields to a bibliographic record, one for each, thus enabling individuals to search for information objects based on their subjective meaning to their creators as well as on meanings determined by professional librarians or classifiers. Of course, as in standard classification systems, a number of symbolic descriptors could be ascribed to a single information object.

4. A Universal Cultural Symbol Thesaurus

How could metaphorical and symbolic metadata be implemented in a usable manner? A model suggested by the tradition of both folk and scholarly symbol dictionaries is a Universal Cultural Symbol Thesaurus (UCST). This would draw on the symbol traditions of diverse cultures representing different geographical, ethnic, language, and religious groups. Like existing symbol dictionaries, the UCST would,
for each symbol, provide a number, an image, and a short description of the meaning - or multiple meanings - of the symbol, which would need to be determined by folklorists, anthropologists, and scholars of religious and cultural traditions. As discussed above, such meanings cannot be exhaustively specified or definitively bounded, since they are always mediated by hermeneutic expansion and subjective interpretation; nevertheless, recurrent and semi-stable meaning patterns have been identified. Ideally, the UCST would need to contain enough symbols to capture major elements from multiple traditions and yet be short enough so that individuals could become familiar with it in its totality, for purposes of either classification or retrieval: 256, a good, round computer number, suggests itself for an initial implementation. It could take as its point of departure a universal "archetypology", such as Durand's "anthropology of the imagination" (1992), which already draws on a vast cross-cultural literature, and amplify it with other cultural materials under the guidance of anthropologists and folklorists. To test the potential value of such a thesaurus, it should be used to classify a corpus of information objects. Usage and retrieval patterns could then be studied.

Since creative thinking, intellectual power, and theoretical innovation in the humanities and social sciences often occur through trans-domain, cross-literature, or interdisciplinary leaps or through serendipitous discovery based on analogy or parallelism, the addition of metaphorical or symbolic metadata to standard classificatory schemes could facilitate such leaps and discovery. For a researcher would be able to search for and retrieve information based not only on categories derived from familiar domain ontologies, thesauri, and classification schemes but also on shared symbolic or metaphorical meanings, both cultural and personal.

Acknowledgments
I am grateful to Shelley K. Hughes, Lydia Foerster, Linda F. Crafts, and Michael F. McCullough for discussing with me the issues raised in this paper and helping me clarify my thinking, and to Bob Silverman for his constant insistence on the "in-between." although the profession seems to be moving toward a more open-ended definition as "the ability to locate, evaluate, and use information to become independent life-long learners" (Kirk, 2001).

References


