General Classification Systems:
Structural Principles for Multidisciplinary Specification

Abstract: In this century, knowledge creation, production, dissemination and use have changed profoundly. Intellectual and physical barriers have been substantially reduced by the rise of multidisciplinarity and by the influence of computerization, particularly by the spread of the World Wide Web (WWW). Bibliographic classification systems need to respond to this situation. Three possible strategic responses are described: 1) adopting an existing system; 2) adapting an existing system; and 3) finding new structural principles for classification systems. Examples of these three responses are given. An extended example of the third option uses the knowledge outline in the Spectrum of Britannica Online to suggest a theory of "viewpoint warrant" that could be used to incorporate differing perspectives into general classification systems.

1. Introduction

Bibliographic classification systems organize the world of knowledge for storage and retrieval in information services and resources such as libraries and bibliographies. Classification systems are used not only for shelf classification, but also for classified bibliographies, for collection development and evaluation, and for catalogue searching. The major classification systems that have predominated in this century were originally grounded in standard academic fields, and that orientation has not changed to any significant degree. This disciplinary structural principle is no longer effective, however, because new methods and mores for knowledge creation, production, dissemination and use have overtaken more traditional disciplinary perspectives. New and diverse discourse communities cooperate to produce documents that cannot be adequately accommodated in disciplinary structures (e.g., Palmer, 1996). Advice on finding material that is not confined to one discipline may fail to mention classification systems because they are unsatisfactory for finding non-disciplinary materials (e.g., Klein, 1994). Those who suggest classification systems for multidisciplinary searching point out the shortcomings of existing systems (e.g., SantaVicca, 1986). We thus urgently need to address the increase of multidisciplinarity and computerization.

2. What the Theory for a General Classification System Needs to Account For

In this paper, the term "multidisciplinarity" describes any existing or potential merger, blend, subdivision, or splitting of established or emerging fields of interest, whether in academic, industrial, governmental or other information environments. Anthropology has been called "an intellectual poaching license" (Kluckhohn, quoted in Geertz, 1980), and it would be hard now to find a field to which that description did not apply. Pejorative terms like "poaching" are no longer used, however. A more common attitude was expressed in an Editorial in the Journal of Material Culture:

The fact that no discipline called 'material culture studies' exists may be regarded as a positive advantage....[We] have no obvious genealogy of

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ancestors to whom we should pay homage, and are not concerned to invent any....[We] remain firmly committed to a politics of inclusion. There are already enough constraints imposed on our ability to think and to write fresh and creative work without inventing any new ones ("Editorial", 1996: 1).

The view that the intersections between fields are where the most stimulating and dynamic work is being done has been commended as "creative marginality" (Dogan and Pahre, 1990) and the development of new fields from the core and fringe areas of old ones has been called an "inevitable process" (Iyer, 1995: 15). Some multidisciplinary domains have become so well-organized that they have evolved into established academic fields (e.g., biotechnology; women's studies; ethnobotany). Others are still evolving and have not yet been named (e.g., the collaboration between historians and climatologists studying the influence of weather on patterns of human evolution and settlement (cf Beghtol, 1995)). The intellectual context of this century encourages crossing, even eradicating, the disciplinary boundaries that existed as static givens a century ago and that formed the classification systems in use today. In consequence, no constraints can be placed on the possible topics to which we may need to provide access. This situation has previously been recognized in the literature of classification and accounts for the development of the theory and practices of faceted classification.

Like other emerging social phenomena, multidisciplinarity is tied to today's information intensive electronic environments. The electronic media have greatly enlarged and are constantly expanding and transforming the different communities of users who access every kind of knowledge source. In the same way that intellectual exchange is no longer limited by a static discourse community, the WWW can abolish barriers of space and of time that people have been compelled to honour throughout history. It is thus probably no longer possible to specify one clearly defined user group for an information resource. For this reason, classification research needs to curtail local emphases and to augment culturally neutral internationalization. These issues, too, are old ones for bibliographic classification, but the pace of change makes it critical to choose strategic research directions to meet evolving needs. It is useful to remember that bibliographic classification is neither definition (cf Becher, 1990) nor modelling (cf Bates and Peacock, 1989). Rather, it is a theory-based practical method of accessing documents or records for documents.

3. Strategic Options for Bibliographic Classification Systems

Two kinds of boundary dissolution--the intellectual boundaries of disciplinary inquiry and the physical boundaries of time and space--have radically altered the world of knowledge to which we have access. In a situation where the creation, production, dissemination and use of knowledge have profoundly changed, we need to rethink the foundations of bibliographic classification. Three possible strategic research reactions to the new information world appear to exist (cf Kyle, 1960). These are 1) using existing systems with little change; 2) adapting existing systems more or less radically; and 3) creating new systems based on new structural principles. The three options are discussed separately below.

3. a. Option 1: Using Existing General Systems with Little Change

The major systems offer various options for the treatment of multidisciplinary works. One informal example, described in depth previously (Beghtol, 1998), is summarized here. Geography and Literature: A Meeting of the Disciplines (1987) contains essays by geographers, literary critics, and creative writers that appraise both real and symbolic
landscapes and geographic features in various kinds of literary works. This book poses a relatively difficult classification problem because joining literature and geography is a fairly unusual enterprise. It is an area that is not rapidly growing and it does not have a composite name. For these reasons, it was chosen to show the state of the art for multidisciplinary works.

*Geography and Literature* was classified in the Dewey Decimal (DDC), the Library of Congress (LCC), and the Universal Decimal (UDC) systems. Of these, UDC classified the work the most accurately at 91.26:82 [91.26: Evaluation or interpretation of literature, maps and other documents from a geographical point of view; 82: Literature in general]. The colon indicates a relationship between the fields of geography and literature. UDC allows transposition of notational elements to provide multiple access points in a classified catalogue (i.e., 82:91.26), so the notation does not privilege one main class over the other. DDC and LCC both classified the work at a general level in their respective literature classes (800 Class and Class P). This example is not representative of whole extent of multidisciplinary work, but it serves to highlight the problems these kinds of documents pose for classification systems.

3. b. Option 2: Adapting Existing Major General Systems

Three projects with different methodologies are underway to adapt existing general systems to new intellectual and physical needs. These projects can be taken to represent some of the possible ways of revising systems appropriately. Most extensive is the redevelopment of the Bliss Bibliographic Classification (BBC2) (1977-) using the work of the Classification Research Group (CRG) as a basis for redesign. BBC2 uses retroactive notation, facet structures, and optional placements, and will eventually provide "phenomena classes" to allow gathering of chosen topics without disciplinary scatter (e.g., Thomas, 1995). The second project is McIlwaine and Williamson's work (e.g., 1996) to reconfigure UDC on the basis of BBC2. Beginning with UDC's Class 61 for Medical Sciences, McIlwaine and Williamson have developed a methodology and have begun revision of this class in relation to BBC2's Class H for Medicine. Third, Olson (e.g., 1997) is using the field of women's studies as an example of how a marginalized discourse area might be integrated into the existing structure of DDC. Olson's methodology can potentially be extended to other general classification systems and also provides a model for creating BBC2-like phenomena classes. All three projects represent important efforts to recreate existing systems to accommodate the realities of the information world.

3. c. Option 3: Creating New Structures at the First Level of Subdivision

Theoretical perspectives are needed to reorient classification research toward the pluralistic needs of multidisciplinary knowledge creation, electronic dissemination, and extended user groups. In this endeavour, the perspectives of different discourse communities must be accommodated (e.g., Albrechtsen and Jacob, 1997; Parsons, 1996; Watson, 1985). One way to achieve this goal is to base a classification system on some principle other than academic fields (e.g., Langridge, 1995), and some research has been done on basing a system on text types rather than academic fields (Beghtol, 1997). Another possibility is to develop a system using what might be called "analogous topics" or "homologous topics". This possibility is discussed below, using the Spectrum of *Britannica Online* (1998) to illustrate some of the potential qualities of such a system. Spectrum was called the Propedia in the printed version of the *Encyclopedia Britannica*.

Although the purpose of Spectrum is to provide access to the articles and the index of the *Britannica* [http://www.eb.com:180/help/genpropr.htm], it is based on concepts and principles similar to those in general bibliographic classification systems, i.e.:
Spectrum is a treelike arrangement of the various branches of knowledge...and their many divisions and subdivisions....Spectrum, or Outline of Knowledge, is an outline of those aspects of human knowledge traditionally associated with scholarship in the broadest sense. Matters that are the subjects of scholarly or scientific research or of academic instruction have been broken down into their constituent categories, subcategories, and so on.

Spectrum is initially divided into ten main groups, i.e.:
1. Matter and Energy
2. The Earth
3. Life on Earth
4. Human Life
5. Human Society
6. Art
7. Technology
8. Religion
9. The History of Mankind
10. The Branches of Knowledge

These classes show an orderly development from knowledge of the physical (e.g., Matter and Energy) to the biological (e.g., Life on Earth) to the social (e.g., Human Society) to the intellectual (e.g., The Branches of Knowledge). The outline is reminiscent of the CRG's attempt to use the theory of integrative levels as the organizing principle for a general classification. At this first level of subdivision into ten, the topics are those that might be addressed from the perspective of any social group/culture/civilization. For example, the content of documents on Life on Earth, on Human Society or on Technology could be expressed from the viewpoints of Ancient Greece, contemporary China, Medieval Europe, or Native American peoples.

At the next level of subdivision, however, Spectrum clearly reveals a perspective that depends on Western scientific rationalism and that privileges Western philosophy and history, much as do the bibliographic classification systems now in common use.

1. Matter and Energy
   Atoms: Atomic Nuclei and Elementary Particles
   Energy, Radiation, and the States and Transformations of Matter
   The Universe: Galaxies, Stars, the Solar System
2. The Earth
   The Earth's Properties, Structures, and Composition
   The Earth's Envelope: Its Atmosphere and Hydrosphere
   The Earth's Surface Features
   The Earth's History
3. Life on Earth
   The Nature and Diversity of Living Things
   The Molecular Basis of Vital Processes
   The Structures and Functions of Organisms
   Behavioral Responses of Organisms
   The Biosphere: The World of Living Things
4. Human Life
   Stages in the Development of Human Life on Earth
The Human Organism: Health and Disease
Human Behaviour and Experience
5. Human Society
   Social Groups: Peoples and Cultures
   Social Organization and Social Change
The Production, Distribution, and Utilization of Wealth
Politics and Government
   Law
   Education
6. Art
   Art in General
   The Particular Arts
7. Technology
   The Nature and Development of Technology
   Elements of Technology
   Major Fields of Technology
8. Religion
   Religion in General
   The Particular Religions
9. The History of Mankind
   Peoples and Civilizations of Ancient Southwest Asia, North Africa, and Europe
   Peoples and Civilizations of Medieval Europe, North Africa and Southwest Asia
   Peoples and Traditional Civilizations of East, Central, South and Southeast Asia
Peoples and Civilizations of Sub-Saharan Africa to 1885
   The Modern World to 1920
   The World Since 1920
10. The Branches of Knowledge
   Logic
   Mathematics
   Science
   History and the Humanities
   Philosophy
   Preservation of Knowledge

Thus, at the second level of subdivision and below, categories particularly relevant to each social group/culture/civilization would need to be individually developed. For example, the Matter and Energy subclasses would probably need reconstruction for the study of each social group/culture/civilization because each has its own (traditional and contemporary) cosmology and view of the physical universe.

The ten major classes would be appropriate to different multidisciplinary viewpoints as well as to different social groups/cultures/civilizations. For example, at the highest level of division, the topics of documents on Art or on Religion from the viewpoints of women's studies, of information policy research, or of biotechnology would need to be expressed. At the next level of subdivision, however, categories peculiar to each viewpoint could be specified. In some cases, not all second level classes would need redefinition. For example, the Matter and Energy subclasses as they stand would probably be appropriate for women's studies and for information policy research and the subclasses for Art and for the History of Mankind would not need redefinition for biotechnology because these fields appear to take no particular viewpoint on those areas. It is also probable that sub-groupings of the various knowledge domains would contain constituent sub-domains that could be analyzed with the

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same ten basic major classes (cf Becher, 1990). In this case, further analysis would be needed in order to focus on the specific lower levels of that sub-domain. In this way, each perspective would be analyzed in the same way at the highest level of subdivision, but have its own appropriate classes at the more detailed levels of analysis. The semantics of such a classification system could be said to be based on "viewpoint warrant" in much the same way that, for example, LCC is based on "literary warrant", BBC is based on "scientific and educational warrant", and the Broad System of Ordering is based on "institutional warrant" (cf Beghtol, 1986). The term «viewpoint» emphasizes that the «classificatory gaze» (Nelson, 1997: 32) of each domain examines every intellectual landscape from the vantage point of its own perspective. Such "contrasting analytic viewpoints should not necessarily be seen as contradictory: they may in fact usefully complement each other" (Becher, 1990: 333-334) by offering isomorphic structures for analyzing and in turn comparing different knowledge perspectives. The presence of analogous classes would act as an "Ur-classification" (Foskett, 1991: 87) and enable the classification system to behave as a "boundary object" (Albrechtsen and Jacob, 1997) by allowing viable communication between groups with differing perspectives and vocabularies. The structure of a "viewpoint" classification can be characterized as homologous in that viewpoints have underlying similarities (expressed, for example, in the ten major divisions of Spectrum) despite their surface differences. One writer noted:

Whether one emphasizes the differences or the similarities between homologous structures is...a political or aesthetic decision. Does one stress the differences between men and women, between Chinese cultures and Western cultures, between Serbs and Croats, between feather development and hair development, or does one emphasize their similarities? (Gilbert, 1997: 54, Note 46)

It seems theoretically possible, however, to accommodate both differences and similarities in a system based on "viewpoint warrant".

Developing this new kind of warrant would presumably have the advantage of providing infinite hospitality for adding any viewpoint--cultural, multidisciplinary, disciplinary, or sub-disciplinary--that might arise in the future. Traditionally, the desiderata of classification systems have been mutual exclusivity and joint exhaustivity. Neither of these has been achieved, however. Research into human categorization has shown that mutual exclusivity is not a natural human response to creating useful groupings, and the existence of an apparently infinite number of perspectives seems to mean that joint exhaustivity cannot be achieved for future needs. An adequate response to multidisciplinary research and electronic dissemination may mean replacing mutual exclusivity and joint exhaustivity with the principle of hospitality as the most needed characteristic of classification systems. This conclusion is supported by the work of, for example, Albrechtsen and Jacob (1997), Olson (1997) and Parsons (1996), all of whom argue that we need to be able to support multiple perspectives in a looser structure than can be attained with the analytico-synthetic principle combined with a hierarchical subdivision of knowledge on the basis of academic disciplines. The development of such a system would, of course, necessarily make use of the syntactic work on facet analysis and on notation that has been vigorously pursued by many individuals and groups since the work of S.R. Ranganathan. The semantic warrant and the intellectual basis of the system, however, would be different from those of previous systems and would encourage the integration of different domains at the first level of subdivision. According to one author:

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integration of knowledge is as critical to the understanding of the world as the discovery of new knowledge....We need scholars who can synthesize, look for new relationships between the parts and the whole, relate the past and future to the present, and ferret out patterns of meaning. (Blaisdell, 1993: 57)

It is possible that the development of a theory of viewpoint warrant would encourage such understanding and integration by making it possible to create systems that have infinite semantic, as well as notational, hospitality.

4. Conclusion

This paper addressed the problems bibliographic classifications face in the current information world. The response of general systems in use today to multidisciplinary work was outlined and some recent attempts to modify and/or revise general classification systems to accommodate multidisciplinary work more appropriately were discussed. A new semantic warrant for a general classification is suggested, that of viewpoint warrant. Both theoretical and practical work on the structural principle of viewpoint warrant remain to be done. We need to pursue as many alternative structural principles as possible in order to create classification systems that can respond suitably to the new information age.

References


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