The Problem of Subject Access to Visual Materials

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Abstract

This article discusses the problem of giving subject access to works of art. We survey both concept-based and content-based access by computers and by indexers/catalogers respectively, as well as issues of interoperability, database and indexer consistency, and cataloging standards. The authors, both of whom are trained art historians, question attempts to mystify fine art subject matter by the creation of clever library science systems that are executed by the naive. Only when trained art historians and knowledgeable catalogers are finally responsible for providing subject access to works of art, will true interoperability and consistency happen.

Keywords : *Subject access; Cataloging; Visual information; Vocabularies; Subject control*

The Special Case of Art

The problem of the bibliographic control of non-print media found its twin focus in content-based access by computers and in concept-based access by human catalogers and indexers over thirty years ago. In 1971 Oscar Firschen and Martin Alvin Fischler wrote their seminal *Describing and abstracting pictorial structures* in a major text on pattern recognition and optical data processing. This work clearly foreshadows the content-based access by computers of visual data that has been a pressing concern during the 1990s. In 1972 Bette C. Acuff and Joan Sieber-Suppes at Stanford University wrote *A Manual for Coding Descriptions, Interpretations, and Evaluations of Visual Art Forms*, an early work in the concept-based access of visual materials by human catalogers and indexers. The scope of this paper deals with the problem of giving subject access to art images. It is primarily concerned with the describing, cataloging, and

indexing of works of art. It is not concerned with popular or news imagery, nor with scientific imaging or imagery. But this paper is concerned with how to give access to both iconographical subject matter and to more formal visual processes such as shape, texture, and color. Art history is not driven by subject matter alone, although most of the studies of concept-based access have focused on the iconological theories of Erwin Panofsky. Formalism, or the concern with the purely visual qualities of a work of art, is best treated in our opinion by computer content-based access as qualified by the human cataloger's intervention. A recent Australian study of the problem has found that a mix of concept and content, of the iconographic and the formal, yielded the best search results for a web based search engine (Lu, Williams, & You, 2000). Since a work of art is a combination of both subject matter and more formal painterly characteristics, we take an approach to subject access that considers both dynamic elements. Moreover, since the advent of post-modern scholarship, issues of gender, society, multiculturalism, and colonialism transcend simple subject matter and make for a vastly more complex discipline in art history and therefore for greater intellectual demands on the cataloger and indexer.

Translating visual works into a verbal form is obviously difficult (Shatford, 1984, 1986, 1994; Markey, 1984, 1986, 1988; Svenonius, 1994). But this translation is just as obviously doable, or art history would not be an academic discipline with roots in the Renaissance artist biography of Vasari. Samuel Taylor Coleridge links the visual to language in his essay "On Poesy or Art." There he writes that "First, there is mere gesticulation; then rosaries or wampum; then picture-language; then hieroglyphics; and finally alphabetic letters. These all consist of a translation of man into nature, of a substitution of the visible for the audible" (Coleridge, 1965, p. 266). Picture language could be ornament, or any kind of representation of reality that is in effect beginning to substitute the visible for the audible by communicating information as ideas, concepts, and words to the beholder. These visual ideas grow increasingly abstract as the structure of language progresses from gesture (as for example in dance or mime) to the alphabet as the written word. Aleph, for example, the first letter of the alphabet in Phoenician, Greek and Roman, originates as the stylized head of an ox. Letters are themselves originally pictures; hieroglyphs are more pictures than words, but nevertheless convey information of a verbal and audible kind. In thinking about the problem of providing subject access to visual information, it is best to keep in mind the unalterable connections between the verbal and the visual and not to create dichotomies between the two where none effectively exist.

One of the major problems that arise when cataloging visual items concerns the issue of interoperability. More important even than uniformity of interfaces is the adoption of common vocabularies that will populate those interfaces. Users can adapt to different methods of searching, but they will probably learn certain search terms — the ones that bring results — and it is not fair to the users to have an infinite variety of terms or descriptors. However, since a variety of users' needs must be met (Spencer, 1995), it is generally acknowledged that limiting the vocabulary is difficult and may even be counter productive. At the moment, a number of nationally-recognized controlled vocabularies for concept-based subject access and utilities for authority control and cataloging standards exist.

A Review of Solutions

Perhaps the first systematic attempt to create subject control and access for works of art was begun by Prof. Charles Rufus Morey, an iconographically-oriented art historian at Princeton University, in 1917. He began the Index of Christian Art as a card file, one part of which was a listing of subjects. Initially only available at Princeton, three more copies were located in the U.S. and in Europe. The material covered is works of art in all media up to A.D. 1400 (with some recent expansion to 1600) that appears in a Christian context. Computerization of the Index began in 1991, and it is now partially available online at <http://ica.princeton.edu/>. The Internet version lags behind the vast card file and contains 20,000 records and 60,000 images as compared to the card file's 200,000 reproductions. The online version has 150 searchable categories. Three-quarters of the subject terms have been mapped to ICONCLASS notations. The database is available by subscription only, but most major academic libraries subscribe.

Most similar to Princeton's Index in its approach and content is ICON-CLASS, a subject indexing tool developed by Professor Henri Van de Waal beginning in the 1950s, left unfinished at his death in 1972, and completed by others in the 1980s. ICONCLASS has been available on line by subscription since 1995 (http://www.iconclass.nl). As its name implies, it deals only with iconography. The categories are created *a priori*, that is abstractly rather than in response to a need to describe a particular work of art. The 24,000 definitions of objects, persons, events, situations, and abstract ideas are hierarchically arranged. Each category is assigned an alphanumeric notation that can function in a way similar to a Dewey Decimal number. The creators of ICONCLASS assert that this form of notation makes linguistic barriers to the use of the system irrelevant. Karen Spencer counters that the
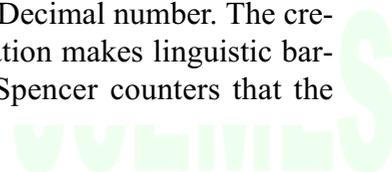
alphanumeric notations are frustratingly meaningless and have to be extracted and constructed from a seventeen-volume set of books. The numbers are interlocking, making it difficult to add new categories. The hierarchical system does, however, make it relatively easy to collocate similar subjects.

The Library of Congress Thesaurus for Graphic Materials was developed by Elisabeth Betz Parker for LC's Prints and Photographs Division. TGMI is a list of 6300 subject terms (http://www.oloc.gov/rr/print/tgm1). TGMII contains terms for genre and physical characteristics. Strings can be created as in LCSH using nationality, geographic, chronological, and topical subdivisions. Terms are provided for "activities, objects, types of people, events and places." Proper names for objects, people, events, and places are not included so that, for example, one can find "saints" but not "Saint Jerome". Neither does it provide terms for art historical or iconographical concepts. Abstract concepts such as might be exemplified in allegorical prints and editorial cartoons are represented. Indexers are guided by scope notes, and the arrangement of terms is hierarchical. It has been pointed out by Jorgensen (Jorgensen, 1999) that because of the scope of LC's collection, LCTGM contains a preponderance of terms relating to American history and institutions.

The Art and Architecture Thesaurus, originally developed by the J. Paul Getty's Art History Information Program (AHIP) in 1979 to provide access to architecture slides, is a hierarchical and faceted list of terms that can also be used to create a kind of string. Terms are fully defined and notes on usage are included. The AAT does not include terms for iconographical themes. Its seven facets are arranged from abstract to concrete concepts, and there are thirty-three sub-facets. Since it was developed to describe works of art, it tends to neglect people, events, and activities in favor of the physical attributes of objects. Jorgensen mentions that a study has found the AAT of varying usefulness to the naive user. Nevertheless, the AAT seems to be gaining in popularity, perhaps because of its breadth of coverage in comparison to the LCTGM, which is, after all, oriented toward graphic materials.

The utility for authority control of artists' names, the Union List of Artists' Names (ULAN) is also created by the J. Paul Getty Trust. Institutions submit forms of names as they find necessary. Each name is presented on line to the cataloguer in all its known variants, with one chosen as the preferred form. This is a conveniently accessible, but rather bare bones approach. Almost no information is given about the artist that would allow the cataloger to decide whether, in fact, artist X is the one with whom he/she has to do. Better in this last respect, but existing only in paper and CD-ROM (since 1995) formats is the traditional resource, the Allgemeine
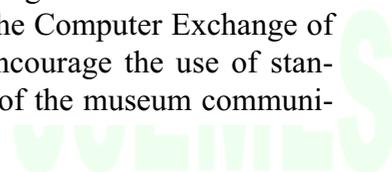
Kunstler Lexikon by Thieme-Becker.

The other cataloging utility developed by the Getty is the Thesaurus of Geographic Names (TGN) (http://www.getty.edu/research/tools/vocabulary/ tgn/about.html). It consists of one million names of places that have been contributed by participants. The names of continents, nations, cities, and physical features in their modern and historical forms are included. Each place is given a unique number and a considerable amount of information, both geographical and historical, is given about it. Its position in the hierarchy is shown, relationships to other places are given, as are geographical coordinates, notes, sources for the data, and place types (state capital, etc.). Its name in English, other languages, in history, and in natural and inverted order is given. The preferred form is the one commonly used by the local population of the place, but a preferred English form is also given. It is a very satisfying and even interesting resource to use.

Standards or schemata for image cataloging have been developed by the Visual Resources Association (VRA) and the J. Paul Getty Trust. The VRA's system allows both the object being cataloged, usually a slide, digital file, or some other reproductive medium, to be described along with the original work that it represents. This is a very complete and informative system that works especially well for slide libraries. The VRA itself asserts its commitment to advocating standards for documentation of and access to images. The VRA Core Categories, now in version 3 (http://vraweb.org/vra-core3.htm), are considered a starting point, a set of basic fields, that encourage interoperability but also allow flexibility and customization to fit the description of a particular collection. The VRA recommends the use of the Getty's controlled vocabularies and authority utilities.

The Getty's Categories for the Description of Works of Art is just that, a system for describing original works rather than reproductions, although surrogates can also be described. Its 231-plus fields allow for an exhaustive description of a work including its history, condition, and relationships to other works (http://www.getty.edu/research/institute/standards/cdwa). It was developed to serve professionals and scholars. Core categories are indicated. On its website, the Getty provides mapping or crosswalks to other systems, including MARC. MARC itself, of course, has been expanded to accommodate new kinds of media, but has done so primarily by means of the addition of subfields. It is still sometimes a difficult judgment call to determine where the varieties of information attached to an image fit.

CIMI, originally know as the Consortium for the Computer Exchange of Museum Information, was founded in 1990 to encourage the use of standards for description and access among members of the museum communi-

ty. It is concerned with the uniformity of electronic standards. The CIMI Standards Framework was published in 1993. The Framework advocated SGML as a means of structuring information and ANSI Z39.50 as the standard for search and retrieval. A test project, Cultural Heritage Information Online (CHIO), was designed to test these standards. Member databases were marked up using SGML, and a common set of access points and a tagging guide were created. This initial project focused on the technological aspects of information sharing rather than on the commonality of fields and their contents.

Recently, the Library of Congress has initiated a new schema for the Digital Library Federation. The Metadata Encoding and Transmission Standards (METS) is a standard for encoding descriptive, administrative, and structural objects within a digital library, using XML (http://www. loc.gov/standards/mets).

Two major organizations that have more or less successfully attempted to create on-going image databases large enough to test and establish universal standards are AMICO and the Library of Congress' American Memory and Prints and Photographs Online Catalogue (PPOC) projects. The Art Museum Image Consortium (AMICO) is made up of a group of institutions with art collections who all contribute to a common database as a way of making the educational use of museum material possible. Access is by subscription and is open to all educational institutions. Searches can be done by either concept- or content-based methods, making many types of searches successful. The site has recently been converted to Luna Imaging's Insight software which is very powerful for searching and for manipulating images once they are found. In fact, Insight is well on its way to becoming the preferred image database software here and abroad. Insight supports VRA, CDWA, MARC, and locally devised standards.

In 1998, the Library of Congress launched the site containing its enormous collection of prints and photographs, thus making it available to researchers online. At the moment, American Memory contains seven million images, and the PPOC contains 13.6 million (with one half online). As stated above, the LCTGM was created to provide access to the PPOC. Since the LCTGM is based on literary warrant, it is limited in usefulness for catalogers dealing with non-American materials or materials outside certain historical confines.

The amount of writing that has been done in the last fifteen years concerning the problems involved in cataloging images is overwhelming. Yet, the concept- and content-based schemas and standards have still to be universally adopted. There seems to exist the conviction that uniformity is nec-

essary, simultaneously with the conviction that freedom is desirable. Hence the existence of the situation among Luna Imaging's clients, each of whom is free to choose its own standards and controlled vocabularies. Luna hosts the sites of numerous major institutions and is encouraging simultaneous access to multiple collections and cross collection searching while supporting each of their standards and providing software allowing each institution to create its own authority files.

It is true that libraries have a century of cooperative cataloging behind them, and that each museum, slide library, or other cultural institution has gone its own way because, supposedly, of the unique objects they possess. It is true that the physical characteristics of an artwork require more detailed description than do those of a book. But is it true that the description of the subject of a work of art is more complex than that of a book? Does its subject matter necessarily defy verbal description? Only in the cases of non-representational works is this somewhat true, and in these cases the name of the artistic movement to which the work belongs could stand in for a subject, since in Modernism and even Post-Modernism the two are contiguous. Also, even though each institution may hold unique works, there is overlap among the artists represented. Many museums own different but similar works by Frank Stella or Eva Hesse, and cataloging information relating to subject access could be shared just as it is for books.

Content-based Access and Concept-based Access

Searching databases for purely formal and visual properties is already being done on content-based retrieval systems. These types of searches, for qualities of line, shape, texture, and color are pertinent to artists and to scientists alike, and someday the two systems, concept-based and content-based, should merge. At the moment there are a number of systems online or about to emerge. The most notable is IBM's Query by Image Content search engine. The QBIC system enables users to scan a visual database for color percentages, color layout, and textures. The State Hermitage Museum in St. Petersburg, Russia is the most famous patron of this particular content-based retrieval system. It claims that QBIC allows the user to search for artwork "using tools that the artist would use" (http://www.hermitagemuseum.org/fcgi-bin/db2www/qbicSearch.mac/qbic?selLang=English). By creating a virtual grid of colors, searches in the system match the required grid to other images in the Hermitage database.

Another successful online content-based retrieval system is VisualSEEk, created by John R. Smith under the supervision of Prof. Shih-Fu Chang at
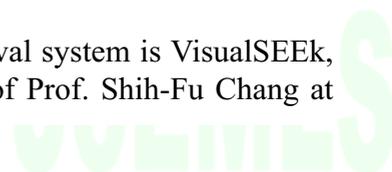
the Image and ATV Lab at Columbia University. The demo system at the Columbia University website (http://www.ctr.columbia.edu/VisualSEEk) has an archive of 12,000 images that also includes videos. Searches are conducted by specifying both color and spatial locations on a grid. New searchable features recently added to the system include texture, shape, motion, and embedded text. Yet another system, or approach, is Toshikazu Kato's Query by Visual Example. While this system dates to before 1990 when it was first described by Kato, it seems most useful today as software in retrieving Trademark logos for graphic designers and probably lawyers. QBVE functions on the basis of retrieving all images in a database that "look similar" to the one in question. Finally, there is Visual Information Retrieval (VIR). These systems are on the verge of providing significant user help in tracking down appropriate visual information, especially in the complex area of videos (Gupta and Jain, 1997). The real beneficiaries of these systems are likely to be the scientists and health care professionals, but VIR might also benefit the art historians who are searching for appropriate research images without knowing in advance what those images should be, especially in the realm of Modern and Post-Modern art whose subject matter is often difficult to discern.

For art that has readily identifiable subject matter, the AAT and LCTG-MI can provide a controlled vocabulary equal to the task of providing subject access to images just as LCSH does for books. Since both are based on literary warrant (unlike ICONCLASS), they are flexible. Both also address the physical characteristics of objects. Since that is the case, it is hard to understand why institutions assert that vocabularies peculiar to themselves are necessary. Within MARC one can indicate which vocabulary is being used, and one can even simultaneously use more than one. Use of these vocabularies within the MARC format would aid interoperability greatly.

Studies have been done of how much consistency can be achieved among catalogers of images, and a surprising degree can be achieved at the basic level of naming things in an image (Panofsky's first iconographic level) (Markey 1984, 1988; Shatford, 1986). The research that has been done on this has usually involved "naive" catalogers. In order to identify subject matter at more symbolic levels, a cataloger with subject training is necessary. Many studies employ naive catalogers, but why? Is it presumed that books are best cataloged by naive catalogers? When subject matter is difficult to determine, is the item given to the least experienced cataloger? Pictures are thought about and spoken about in words. They are created, because their creators want to express a concept visually. Why should concept-based subject access applied by a trained, experienced person not work

as well for pictures as it does for books?

Critics of concept-based access to visual information claim that it is too time-consuming and therefore too expensive (Hsin-Liang Chen and Rasmussen). On reflection, it does appear that indexers for visual materials have too often not been art historians or subject specialists, and this fact alone will have upset the consistency of the results. We would argue that for consistent, economical results, trained subject specialists should be employed for the indexing of visual information. Art historians are trained in the methodology of art history and know the issues that are most relevant to potential art history searches. Terms such as "metapicture, simulacrum, intertextuality, appropriation, commodification, historicism, essentialism, or remediation" (Roberts, 2001) are the products of art historical scholarship and would be familiar to an indexer or cataloger trained in art history. However, a naive indexer would be baffled by such terms and what they represent. Subject access provided by art history professionals would be the most efficient way to further unify the various indexes to visual collections of art around the world.

It has been nearly twenty years since Karen Markey Drabenstott wrote her first study on subject access to visual resources. Thanks to her study and to those of many others the problems of cataloging visual materials began to be discussed and understood. Between that time and the present the utilities and large scale projects discussed in this article have created and used the appropriate standards for image cataloging and have begun to provide a considerable degree of interoperability.

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Internet Resources

http://www.amico.org Art Museum Image Consortium

http://purl.oclc.org/metadata/dublin_core/ Dublin Core

http://www.oloc.gov/rr/print/tgm1 LC Thesaurus of Graphic Materials subject terms

http://www.loc.gov/standards/mets Metadata Encoding and Transmission Standards

http://www.ahds.ac.uk Arts and Humanities Data Service

http://adam.ac.uk Art, Design, Architecture & Media Information Gateway and the Visual Arts Data Service

http://severn.dmu.ac.uk/elise/ Electronic Library Image Service for Europe

http://www.vraweb.org Visual Resources Association homepage

http://vraweb.org/vracore3.htm VRA Core Categories

http://ica.princeton.edu/ Princeton Index of Christian Art

http://www.iconclass.nl ICONCLASS

http://www.getty.edu/research/tools/vocabulary/tgn/about.html Getty Thesaurus for Geographic Names

http://www.getty.edu/research/tools/vocabulary/aat Getty Art and Architecture Thesaurus

http://www.getty.edu/research/institute/standards/cdwa Getty Categories for the Description of Works of Art

http://www.getty.edu/research/institute/standards/intrometadata/index.html Getty Introduction to Metadata

http://www.hermitagemuseum.org/fcgi-bin/db2www/qbicSearch.mac/qbic?selLang=English The Hermitage Museum

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