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Multidimensional Bibliography and Classification

"Multidimensional Bibliography and Classification, Eröffnungsvortrag": *Anwendungen in der Klassifikation. Proceedings 8 Jahrestagung der Gesellschaft für Klassifikation eV*, ed. Rolf G. Hensler (Teil I), (Hof Geismar, 1984), (Frankfurt: Indeks Verlag, 1984), pp. 57-75. (*Studien zur Klassifikation,* Bd. 14 SK 14)

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0. Introduction

Last month a trip to America took me to libraries such as Brigham Young, the New York Public, Stanford and the Library of Congress. What I saw there so transformed my ideas of the possible that this paper has taken on a rather different shape. In part one an outline is given of how computers, databases and retrieval services are transforming approaches to knowledge both verbal and visual. The main part of this paper outlines how existing technology could be adapted to create a multivalent approach to classification and bibliography.

1. Recent Developments

1.1 Verbal Knowledge

With respect to verbal knowledge in traditional book form only some developments in major library systems and commercial databases in the United States, Great Britain and Germany will be mentioned. For the purpose of acquisition, cataloguing interlibrary loan and serials control a number of systems are now available in North America. Of these the Online Computer Library Center (OCLC) is the chief non-commercial network. By means of a cable link it is also available in Great Britain. As of June 1983 the system had 5,144 terminals,[1] with a total of 9,564,590 full MARC records. This database is expanding at a rate of 25,000 titles per week. The titles thus far are mainly of literature[2] since 1901. Retrospective Machine Readable Cards (REMARC) for the purposes of retrospective bibliographical control are rapidly becoming a reality thanks to developments by the Carrollton Press. With their system the Library of Congress plans to have its entire old catalogue of ca 7,500,000 titles on REMARC by the end of 1984.

Field	Definition	Example

1

090	Locally-assigned LC-type Call No.	F 2161 b.B63
092	Locally-assigned Dewey Call No.	220.2
096	Locally-assigned NLM-Type Call No.	WZ 100 R1254H
098	Other Classification Schemes	
099	Local free text call number	Microfiche No. 12

Fig. 1: Classification schemes in OCLC

OCLC began by using the Library of Congress Classification system but it is now equipped to deal with other systems also (Fig. 1). However, methods such as Bliss or Ranganathan still pose difficulties.[3] The Research Libraries Independent Network (RLIN) is the second major non-commercial network. Of March 5, 1984 it contained 12,563,115 books and nearly 4 million other records. There are other non commercial systems such as the Washington Library Network (WLN) which offer similar services within the limits of a given region. Parallel with the above are a series of commercial systems. Chief among these is the California based DIALOG system which is available all over the U.S., in Great Britain and as of 1984, in libraries such as Göttingen in Germany. In addition there are at least two other major commercial systems in the U.S., namely, Bibliographic Retrieval System (BRS), Systems Data Corporation (SDC). More important for our purposes are the so-called distributed systems which individual libraries use for their on-line public catalogues. As is typical in the computer world these short forms (acronyms) too have catchy titles:

BERKELEY	GLADYS
LIBRARY OF CONGRESS	MUMS, SCORPIO
NEW YORK PUBLIC	CATNIP
NEW YORK UNIVERSITY	BOBCAT
STANFORD	SOCRATES

How do these systems function? In the Library of Congress, for instance, adjacent to the main reading room, there is an area with a number of terminals. If we are interested in a term, we first check the two-volume Subject Catalogue which provides both standard and related terms (Fig. 2):

Perspective (NC749-750; Geometry, QA515; Mechanical drawing, T369)

sa	Anamorphosis (visual perception)	xx	Drawing
	Architectural rendering		Geometrical drawing
	Drawing		Geometry, Descriptive
	Projection		Optics
	Proportion (Art)		Painting
	Shades and shadows		Projection
x	Architectural perspective		Proportion (Art)
	Linear perspective		Shades and shadows
	Mechanical perspective		Space (Art)
			Space perception

Fig. 2. Terms related to perspective in the Library of Congress Subject Catalogue

Here *sa* (see-also) indicates a reference to a related or subordinate topic; *x* (see-from) indicates a reference from an expression not itself used as a heading and *xx* (see-also-

from) indicates a related term or broader heading from which a see also reference is made. We can then go to a terminal and use the Subject Content Oriented Respective we are given a list of titles in abbreviated form. Alternatively we can "browse", as it is called in the system. If we enter a related term such as drawing, a screen page with full titles appears.

On command a second, third, fourth and fifth page appear. Accompanying each of these detailed subject headings is a reference to the number of titles listed under that heading. On command, these titles can be called up on the screen in abbreviated form. We can also have them printed out. Methods such as SCORPIO provide access to titles in one classification system. In part two I shall suggest how such methods could be applied to a number of classification systems at once. Britain has access to three major U.S. systems: the non-commercial OCLC and the commercial Dialog and Lockheed systems. It also has access to the Toronto based GEAC system.

Within Britain itself[4] the chief system is the BRITISH LIBRARY AUTOMATIC INFORMATION SERVICE (BLAISE). Another, the Birmingham Libraries Cooperative Mechanization Project (BLCMP) was the first UK cooperative automated cataloguing service. It serves both public and academic libraries (including one in Denmark). A third, the South West Academic Libraries Cooperative Mechanization Project (SWALCAP) first served Bristol, Exceter and Cardiff Universities, but now includes Aberystwyth, Leicester, Reading, Swansea and Trent. A fourth system, Oriel Computing Services, is Oxford based but has branches in Antwerp, Belgium, where it is used by two Universities and the union catalogue of serials in Belgian academic libraries, the Antwerpse Inventaris van Lopende Periodeken (ANTILOPE), which now has 24 contributing libraries. Oriel Computer Services also have a branch in Middleburg in the Netherlands. Thus Britain is using its data bases to create links with European countries.

In addition to the above systems three more deserve mention: the London and South Eastern Regional Library Bureau (LASER); the Scottish Libraries Cooperative Automation Project (SCOLCAP) and Interlib, a cooperative group of government libraries. In contrast to the U.S. where most libraries follow the standards of OCLC and RLIN, there are as many more regional and local project in Britain, with correspondingly greater problems of compatibility of systems. In Germany regionalism plays an even greater role. Although there is officially a National copyright library, there are still seven major regional libraries, namely:

Berlin	Berliner Gesamt Katalog
Cologne	Zentral Katalog (ZK) Nordrhein-Westfalen
Frankfurt	Hessischer ZK
Göttingen	Niedersächischer ZK
Hamburg	Norddeutscher ZK
Munich	Bayerischer ZK
Stuttgart	ZK Baden-Württemberg

An interlibrary loan request in Germany needs to be sent to each of these seven places in turn which can take more than two months.[5] Of these seven regions, Lower Saxony is the

most advanced with respect to new technologies. At the state library in Göttingen there are two computerized databases, one for monographs, the Niedersächischer Monographien Nachweis (NMN); a second for serials, the Niedersächischer Zeitschriften Nachweis (NZN). Plans are underway to make the handwritten systematic catalogue available in REMARC form. It is estimated that this may take up to ten years. Some of the newer university libraries have been fully automated from the outset, as, for example, Augsburg, Bielefeld, Passau and Regensburg. With the aid of regional networks (Verbundsysteme), libraries are being connected on line. The Bavarian network includes 10 libraries.

At the national level there are efforts to coordinate these projects in individual states and universities by the Gesellschaft für Information und Dokumentation (GID) which is linked in turn with the Direct Information Access Network for Europe (DIANE). Sponsored by the GID is INFORUM which covers a series of projects in subjects including philosophy, theatre, linguistics and oriental studies. In addition there are specialized data banks in medicine (DIMDI, Germany's equivalent to the NLM) and other sciences, such as chemistry.

Fig. 3 Sample card from the Ohio State project.

1.2 Visual Systems

Systems are also being developed for computer access to visual images: photographs of paintings, illuminated manuscripts etc. In the U.S. the J. Paul Getty Center is in a leading position. They have their own copies of major collections such as the De Witt at the Courtauld, the Photographic Collection at the Warburg Institute and the Princeton Index of Christian Art. They are said to be using a modified version of Iconclass to enable computerized access to these collections. At the Ohio State University there is a Center for Experimental Activities in the Arts which has recently produced a Thesaurus of Coodinate Index Terms for Literature Related to Experimental Research in the Arts. This is essentially a list of about 1750 terms which is gradually being expanded to about 5000 terms. The catalogue cards developed in connection with this thesaurus contain the usual information of author, title, publication, pp. etc., plus an abstract, a list of terms in the thesaurus which will retrieve this card, plus accession numbers of later publications citing this publication (e.g. Fig. 3):

In Paris at the Bibliothèque Ste Geneviève,[6] in a project in coordination with the Philips Corporation, computerized video-discs are being used in connection with illuminated manuscripts. These permit automatic recall of either entire images or specific details. In Essen at the Audiovisuelles Medienzentrum a variant of such computerized video discs is being used for projects in medicine, linguistics, art history and technology transfer. Thanks to generous support from the Stiftung Volkswagenwerk, the Marburg Index is being made available by computer using Iconclass classification system. Mention should also be made of Professor Eisenbeis' *Bildschirm Projekt*.[7] Although these computerized images are still too primitive to be of interest for art historical purposes, the project is of great interest because it will eventually be linked to university and other libraries and at some time be accessible through everyday television sets at home. High level research from one's study at home will thereby become possible.

The above all too brief survey of recent developments has indicated what is presently possible in computerized access to verbal and visual knowledge. It has also pointed to problems with existing data banks. When a search is made titles are usually presented in either alphabetical or chronological order. In the case of a term such as 'perspective' there is, as yet, little discrimination between primary sources (i.e. treatises) and secondary literature on the history of 'perspective', technical problems or methodological applications. As yet there is no systematic approach to knowledge involving different systems of classification. A model for such an approach is the theme of the main part of this paper.

2. A Multivalent Approach

Underlying this new method is a simple idea. Knowledge in books and articles has traditionally been arranged according to a single method of classification. Given recent developments it is feasible to create a multivalent system which permits comparison of classification methods, definitions, and allows one to trace where a particular book can thus serve to reflect changing cultural viewpoints involved in the organization of knowledge. To see how such a system might work let us imagine ourselves in front of a terminal of the future. Let us assume that we wish to search the term 'perspective'.

As users we are given a choice whether we wish to study 'perspective' in

  THEORY
  PRACTICE
  THEORY AND PRACTICE

Each of these will be considered in turn.

2.1 Theory

On entering the command for PERSPECTIVE.THEORY we are given the option of five stages:

  PERSPECTIVE.THEORY
    CLASSIFICATIONS
    DEFINITIONS
    RELATED TERMS
    TEXTS - PRIMARY
         - SECONDARY

We shall again consider each of these in turn.

2.1.1 Classifications

If we ask for CLASSIFICATIONS we are first offered a general choice:
  PERSPECTIVE.THEORY.CLASSIFICATIONS
    INTERNATIONAL
    NATIONAL
    REGIONAL
    LOCAL

If we choose INTERNATIONAL we are presented with a list of major systems such as the following:
  PERSPECTIVE.THEORY.CLASSIFICATIONS.INTERNATIONAL

    BLISS
    DEWEY
    GÖTTINGEN
    LIBRARY OF CONGRESS
    RANGANATHAN
    RIDERS

Let us say we choose Library of Congress. We are then shown how perspective is theoretically subsumed within that system. Similarly if we choose Dewey, Göttingen, Riders etc. A search through these classification systems would also include that of the

late Professor Martin Scheele (who was still with us last year) and reveal how he approaches 'perspective'. Such a comparative approach to these systems of classification brings to light fundamental problems in classing a term such as perspective which involves both science and art. Most systems try to resolve this by listing it at least twice: once under mathematics, a second time under art or drawing technique. In mathematics, as of the early 19th century, 'perspective' was listed under descriptive geometry. As of the twentieth century, descriptive geometry has, in turn, been subordinated to algebraic geometry which is non-visual. The question arises why perspective, our chief means for creating the third dimension in the visual world, should be classed under a non-visual heading. Underlying this question is a deeper problem. Knowledge is mathematical, visual and verbal. Knowledge is classed verbally which often tends to obscure both connections and differences between kinds of knowledge. Systematic access to classification system brings into focus alternatives to be considered, and makes clear the multivalent possibilities.

2.1.2. Definitions

To understand a specific term well it be necessary to know the terms used to define it. Stage two therefore involves DEFINITIONS of perspective and begins with three options:

PERSPECTIVE. THEORY. DEFINITIONS
        STANDARD
        OTHER
        TRANSLATIONS
The command for STANDARD definitions provides a survey of basic types:

PERSPECTIVE. THEORY. DEFINITIONS STANDARD
        PARALLEL
        ISOMETRIC
        AXONOMETRIC
        ORTHOGRAPHIC
        ONE-POINT
            LINEAR
        ORTHOGONAL CENTRAL
            RENAISSANCE
            BRUNELLESCHIAN/ALBERTIAN
            TWO-POINT
            OBLIQUE
            ANGULAR
            THREE-POINT
            INCLINED PICTURE PLANE
          CURVILINEAR
Definitions of each of these could then be provided, first from a standard source such as the OED, then from earlier sources which would show more clearly how these definitions have changed with time. The command DEFINITIONS, OTHER provides a corresponding list of pseudo-perspectival terms:

PERSPECTIVE. THEORY. DEFINITIONS. OTHER
      NEGATIVE
      OPTICAL ADJUSTMENT
      VISUAL ANGLES
      AXIAL
      FISH-BONE
      VANISHING VERTICAL AXIS
      INVERTED

The command DEFINITIONS. TRANSLATIONS provides equivalents for a specific term in various languages. For purposes of simplicity our list is restricted to five languages:

PERSPECTIVE. THEORY. DEFINITIONS. TRANSLATION
      ENGLISH   INVERTED PERSPECTIVE
      FRANCH   PERSPECTIVE INVERSEE
      GERMAN   UMGEKEHRTE PERSPEKTIVE
      ITALIAN   PROSPECTIVA ROVESCIATA
                   PROSPETTIVA TOLOMAICA
      SPANISH   PERRSPECTIVA INVERSA

If pictures were added this would effectively be an extension of the approach used in the Duden Pictorial Encyclopaedia in Five Languages.

2.1.3. Related Terms

A basic problem with any important term such as 'perspective' is that it involves a series of related terms with which it overlaps. For this reason a bibliography on perspective must also include a partial bibliography on Drawing, Geometry, Projection, Scenography etc. At more thorough level, bibliographies of each of these related terms are required. A bibliography of each of these will overlap differently with the original term. For instance, geometry must include a partial bibliography of drawing, perspective etc. To this end a search for related terms is required. At the outset are offered a simple choice:

PERSPECTIVE. THEORY. RELATED TERMS
      STANDARD
      OTHER

If we choose STANDARD we again have a simple choice:

PERSPECTIVE. THEORY. RELATED TERMS. STANDARD
      GENERAL
      PARTICULAR

If we choose GENERAL we have a choice if eight alternatives:

PERSPECTIVE. THEORY. RELATED TERMS. STANDARD. GENERAL
                DRAWING
                GEOMETRY
                INSTRUMENTS
                PROJECTION
                PROPORTION (ART)
                SCENOGRAPHY
                SHADES AND SHADOWS
                SPACE AND TIME

If we choose PROJECTION we are provided with a list of more specialized related terms or if we choose DRAWING, we are first provided with a preliminary list of alternatives, then with details concerning each of these. In addition to such standard lists of related terms we can also choose from other alternatives in bibliographies, book lists and library catalogues. The result of such efforts is that we arrive at a cluster or family of related terms which need to be grasped to greater or lesser degrees if we are to gain a thorough understanding of our particular term. Thus far we have examined 1) classifications, 2) definitions and 3) terms related to 'perspective'. A fourth and crucial category involves primary literature.

2.1.4. Primary Texts

Here we are presented with three choices at the outset:

        PERSPECTIVE. THEORY. TEXTS. PRIMARY
                CHRONOLOGICAL LIST
                GENERAL
                SPECIFIC
                DESCRIPTION
                COPY

A classification system and a bibliography are traditionally both static. However the terms and words with which they deal are dynamic in at least three respects: they 1) change with time, 2) vary with place and 3) involve related terms that also change with both time and place. The author of a classification system or bibliography usually sees three alternatives. Let us again assume that the term in question is 'perspective'. One choice is to begin with a modern definition of the term. Thereby one is forced to ignore earlier historical connections such as those between 'optics ' and ' Perspective'. A second choice is to start with a sixteenth century or other definition of the term. Thereby one must distort later historical realities because one cannot, for example, include connections between descriptive geometry and perspective, which evolved in the nineteenth century.

A third choice lies in a compromise solution which combines elements form historical and present-day definitions under the motto that one will recognize a relevant title when one sees it. The problem with this pragmatic approach in that one's criterion becomes

more subtle with experience and the titles that one recognizes change in the process. Hence one ends with a different definition from that with which one began, and subsequent readers have no way of tracing the change. We are concerned with a new multidimensional approach that goes beyond the limitations of the three alternatives mentioned above, by incorporating dynamic aspects of knowledge within its structure.

The general chronological list contains all titles involving linear perspective including a) standard titles; b) titles which were included in earlier bibliographies but might be excluded in terms of a modern definition; c) titles which were excluded in earlier bibliographies but might be included in terms of a modern definition of perspective. In the general list these titles are given in abbreviated form: year, author, title, place of publication, publisher and format. Books of which no copy has been traced are identified as spurious:

       PERSPECTIVE. THEORY. TEXTS. PRIMARY

        1494   PACIOLI, Luca
        Summa de arithmetica geometria proportioni e proportionalita
        Venetiis: Paganinus de Pagninis. fol.

        1504   PELERIN, Jean (VIATOR0)
        De artificali perspectiva. Tulli: petri iacobi.fol.

        1508   GAURICUS, Pomponius
        De sculptura. Pisauri: 8 (Spurious)

We may wish to know which of these titles in the general list were included in earlier bibliographies and excluded from later bibliographies or conversely. For this reason specific lists give in chronological form the contents of all significant earlier bibliographies. In this way we can explore how the horizons and contents of a field change with time. Let us say that we have before us a short title of the 1546 edition ascribed to Rodler:

        1546   RODLER, Hieronymus
        Perspectiva. Eyn schon nutzlich buchlin und underweisung der
        Kunst des Meessens. Franckfort: Cyriacus Jacob zum Barth. fol.

If we wish to have information concerning this work we can command DESCRIPTION which provides a standard loaction, call no., full title and comments:

PERSPECTIVE.THEORY.TEXTS.PRIMARY.CHRONOLOGICAL LIST
DESCRIPTION

Author Rodler, Hieronymus
Title   Perspective Ein schon nutzlich buchlin und underweissung der Kunts des messens mit dem zirckel, richtscheidt oder linial. Zunutz zllen Kunstliebhabern, furnemlich den malern, bildhawern, goldschmiden, seidenstickern, sich der Kunst

des messens (perspectiva zu latein genant) zu gebrauchen lust haben. Darin man auch solche Kunst leichter danauss ettlichen hiervor getruckten buchern begrieffen und lernen mag, mit viel schonen darzu dienenden figuren

Zu Franckfort, Truckts Cyriacus Jacob zum Bart 1546. 89 p.

illus. diagrs. 32 cm. Illus. tp. First edition 1431

Standard Location   Washington, Library of Congress Call no.

NC 749   R7   1546   Rare Bk. Coll.

Comments. This work is also ascribed to JOHANN II von PFALZSIMMERN see: Schuling, 1973, n. 60

Given the latest developments in microfiche discettes it is possible to record 100,000 pages on a single role. It would therefore be possible to make a copy of each primary text. The standard location in the above description would be the source used for this copy which can be displayed on command. To learn more about these works we would turn to a parallel list of authors where we would again need to choose:

PERSPECTIVE, THEORY , TEXTS, PRIMARY
    AUTHORS, EDITORS, TRANSLATORS, VARIANTS
    ALPHABETICAL LIST
    DETAILS

The alphabetical list provides a simple register of names, variants and their dates:
PERSPECTIVE, THEORY. TEXTS. PRIMARY
    AUTHORS, EDITORS, TRAHSLATORS, VARIANTS (1400-1600)
    ALPHABETICAL LIST

AGOSTINO (DI BRAMANTINO) MILANESE	
AGOSTINO DELLE PROSPETTIVE	fl. 1525
AGOSTINO VENEZIANO	c. 1490- post 1536
ALBERTI, Leon Battista	1404- 1472
ALBERTUS NOSTER	
ALEOTTI , Giovanni Battista	

If we wish to have details concerning these authors we are first offered five alternatives:
PERSPECTIVE. THEORY. TEXTS, PRIMARY
    AUTHORS, EDITORS, TRANSLATORS, VARIANTS
    DETAILS, TREATISES, MANUSCRIPTS, EDITIONS
    LOCATIONS, FURTHER INFORMATION

We shall consider each of these in turn. Let us assume we wish to know about Leon Alberti. Under treatises we find a list of his works and those attributed to him:

PERSPECTIVE. THEORY . PRIMARY. TREATISES
ALBERTI, Leon Battista	1404- 1472
De pictura	
Della pittura	
Elementa picturae	

Elementi di pittura

Attributed
Della prospectiva
Trattato di prospectiva

From this list we can choose a particular work, say De pictura and command
    MANUSCRIPTS:

PERSPECTIVE. THEORY	MANUSCRIPTS
ALBERTI, Leon Battista	1404- 1472
De pictura	1434
Chapel Hill Univ. of N. Carolina, Rare Book Room	
Florence Bibliotheca Nazionale, Magl. II. VIII., 58 1r- 26v	
Florence Bibliotheca Riccardiana, 767	65r- 103v
Lucca Bibliotheca Statale, 1448	
Vatican Codex Ottoboniani Latini, 1424	1r-25v
Vatican Codex Ottoboniani Latini, 2274	1r-42v
Vatican Codex Reginensis Latini, 1549	1r-32v

For the same treatise we can also command EDITIONS and receive the following list:
    PERSPECTIVE. THEORY...EDITIONS
        ALBERTI, Leon Battista
    De pictura; Della Pittura

1511	Nurnberg?	1803	Milan
1540	Basle	1804	Perugia
1540	Basle	1804	Milan
1547	Venice	1827	Madrid
1547	Nurnberg	1840	Milan
1558	Nurnberg	1841	Florence
1565	Monte Regale	1868	Paris
1568	Florence	1877	Vienna
1568	Venice	1888	Vienna
1582	Basel	1913	Lanciano
1649	Amsterdam	1934	Lanciano
1651	Paris	1950	Florence
1726	London	1956	New Haven
1733	Naples	1963	Warsaw
1739	London	1966	New Haven
1751	London	1970	Osnabruck
1782	Bologna	1971	Forest Grove
1782	Madrid	1972	London
1786	Bologna	1972	Forest Grove
		1975	Bari

With respect to any of these editions we then command where known copies are located:

PERSPECTIVE, THEORY...   LOCATIONS
       ALBERTI, Leon Battista
       De pittura; Della Pittura
       Venice 1547

       La pittura
       tradotta per M. Lodovico Domenichi
       Con gratia et privilegio
       Vinegia: Appresso Gabriel Giolito de Ferrari
       Baltimore   F A C
       Cambridge   Trinity College Library
       Cambridge   University Library
       Florence   Biblioteca Nazionale Centrale
       London   British Library 1043. f. 3 etc.

If the above details do not suffice we can request further information in terms of three alternatives:

      PERSPECTIVE. THEORY..   FURTHER INFORMATION
         Classification
         Contents
         Literature

If we choose classification we are given a series of sources:

      PERSPECTIVE. THEORY. ... PRIMARY FURTHER INFORMATION
         CLASSIFICATION
         BIBLIOGRAPHIES
         BOOK LISTS
         SUBJECT CATALOGUES
         OTHER
         INDEX OF HEADING

We then explore how a given edition of the book, which interests us has been classified in one of these sources. Because these sources are also available for reference we can insist on seeing the rest of the contents under that particular heading. This serves both as a bibliographical aid and to give insights into different mentalities. The various heading under which a given edition has been classed are collected together in an index.

2.1.5. Texts- Secondary

Secondary literature constitutes the fifth section of theory. As in the case of primary literature there are again three alternatives at the outset:

      PERSPECTIVE. THEORY. TEXTS. SECONDARY
         CHRONOLOGICAL LIST
         AUTHORS, EDITORS, TRASLATORS, VARIANTS

PUBLISHERS, PLACES OF PUBLICATION

The subheadings of these are again parallel to those for primary literature with one significant difference. Here description of the title also includes a list of standard descriptors under which a book or an article is classed. Under further information standard headings are listed under three classes:

PERSPECTIVE. THEORY...SECONDARY FURTHER INFORMATION
   CLASSIFICATION. STANDARD HEADINGS
         Historical
         Metaphorical
         Technical

Historical headings are subdivided into a number of areas and eras. Technical headings are subdivided into a number of key terms:
PERSPECTIVE. THEORY...SECONDARY FURTHER INFORMATION
CLASSIFICATION. STANDARD HEADINGS. TECHNICAL

Anamorphosis	Intarsia
Architectural Rendering	Inverted Perspective
Astrolabe Projection	Map Projection
Astronomy	Pantograph
Camera obscura	Perspective Box
Camera	Photography
Cartography	Planisphere Projection
Conic sections	Quadratura
Curvilinear Perspective	Scenography
Depth Perspective	Time Perspective
Geography	Trompe L'Oeil
Instruments	Vision

Likewise, metaphorical heading are further subdivided:

PERSPECTIVE. THEORY...SECONDARY FURTHER INFORMATION
CLASSIFICATION. STANDARD HEADINGS. METAPHORICAL

Aesthetics	Philosophy
Anthropology	Psychology
Linguistics	Semiotics
Literature	Sociology
Music	

Under each of these specialized headings chronological lists of dated of publication and surnames of authors would serve as cross-references for the detailed chronological list

above. If not content with these standard headings then additional search words can again be found through other sources:

PERSPECTIVE. THEORY...SECONDARY FURTHER INFORMATION CLASSIFICATION
        Standard Headings
        Bibliographies
        Book lists
        Subject Catalogues
        Other
        Index of Headings

The lists in Humanities and Arts Citation Index or the Science Citation Index offer good examples. We have examined how perspective theory could be analyzed systematically in terms of classifications, definitions, related terms, primary texts and secondary texts. Theory is, however, only the first of a three part approach involving theory, practice, theory and practice. For our purposes we can skip part two by noting that perspectival practice, involving drawings, paintings, sculpture etc. would be organized in a correspondingly systematic way.

2.2. Theory and Practice

Why, it might be asked, should one go through so much trouble in tracing the theory and practice of a term? Only with the help of such detailed analysis can we begin to understand how concepts are dynamic which change with time and place. And only with such an analysis would the way be prepared for a comparative study of how theory and practice interplay with one another.
Imagine a system with six screens:

TRANSLATION TRANSCRIPTION PAGE OF DETAIL CAD MODEL
                              ORIGINAL
                              TREATISE

We could then examine a given page of a treatise, its transcription, and translation on the one hand and on the other hand a detail showing a diagram, its equivalent in CAD and in a model. With twelve screen it would be possible to compare texts and diagrams in two editions of a given work or two closely related works:

TRANSLATION TRANSCRIPTION PAGE OF ORIGINAL DETAIL CAD MODEL
TRANSLATION TRANSCRIPTION PAGE OF ORIGINAL DETAIL CAD MODEL

With as few as ten screens we could use six for a treatise as above and then compare a detail from this treatise with a detail from a painting, thus confronting practice and theory.

TRANSLATION TRANSCRIPTION PAGE OF ORIGINAL DETAIL CAD MODEL

PAINTING   DETAIL CAD MODEL

Perspectival practice involves buiding bridges between geometry and nature, such that one could reasonably conceive of a history of mimetic art in terms of increasing stepping stones between the two (Fig.4).

	Object
Geom. Form	Object
Geom. Form - Drawing	Object
Geom. Form – Drawing	Model - Object
Algebr. Formula - Geom. Form - Drawing	Model - Object - Microsc. Drawing

Fig. 4: Steps in the bridging of abstract and concrete.

In other words the history of perspectival practice and theory ultimately needs to be told in terms of different levels of abstraction; it is not just a question of mastering spatially a seventy two sided figure which Euclid described. It is a question of tracing how such a figure is employed at different levels in different media (Fig. 5-8)
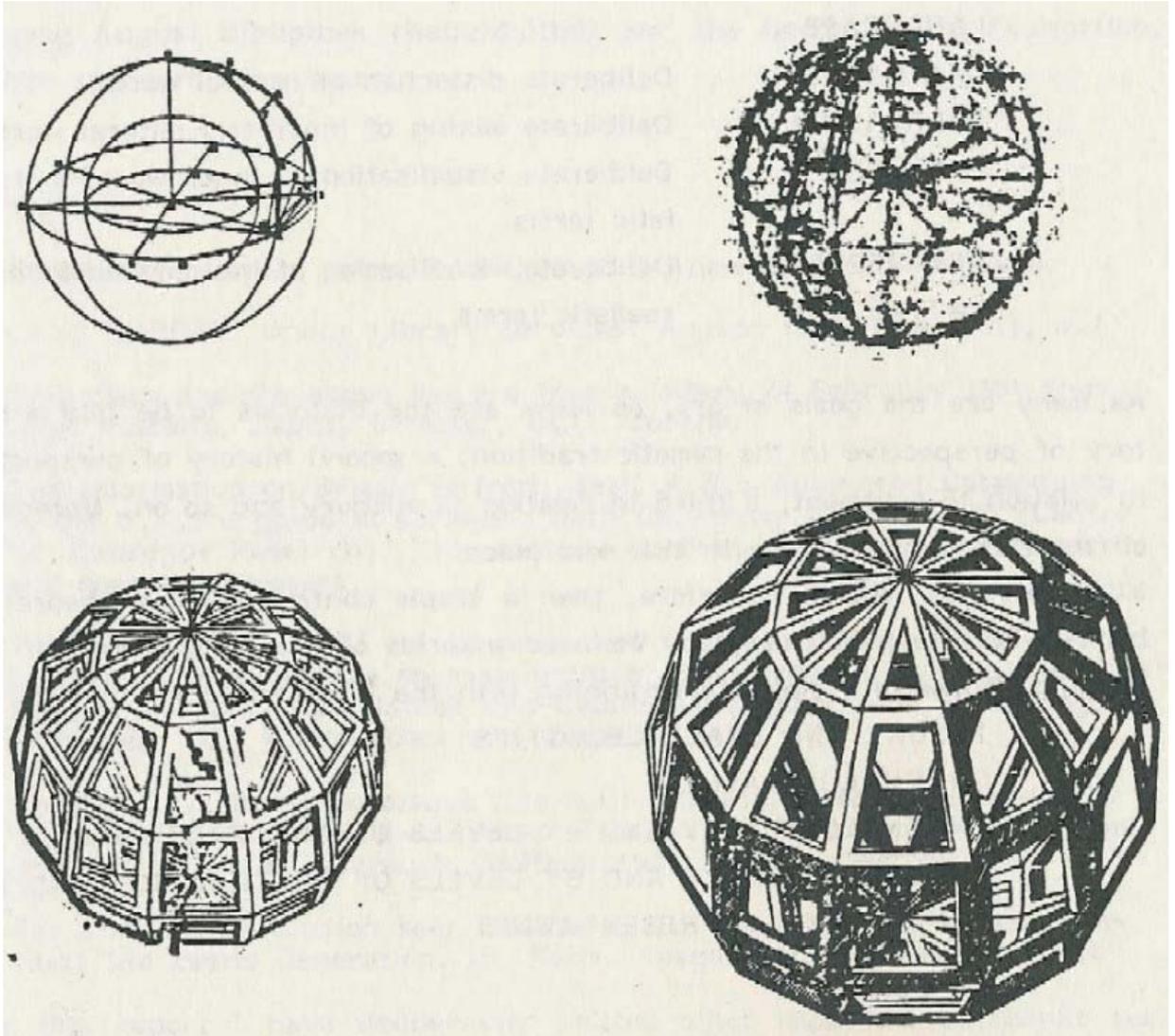
Fig. 5-8: A seventy two sided figure from Euclid' Elements XII:17 and Renaissance versions of the same by (or based on) Leonardo da Vinci. An example of the bridging process.

The situation is more complex still for there are also types of representation to be taken into consideration. Too many assume that the domain of art is limited to mimesis, to a commitment to imitate and if possible copy the natural world. But this, in fact, is one of a number of goals of art:

TYPES OF REPRESENTION

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PRIMITIVE ART	Unverbalized mixing of inner and natural world
ORNAMENT	Pattern from inner and/or outer, natural world
MIMESIS	Deliberate imitation of aspects of natural world
PORTRAITURE	
LANDSCAPE	Deliberate distortion of natural world
SURREALISM	Deliberate mixing of inner and natural world
ALLEGORY	Deliberate visualisation of inner world in realistic terms
NON-REPRESEN-TATIVE ART	Deliberate visualisation of inner world in non-realistic terms

As many are the goals of art, as many are the histories to be told a history of perspective in the mimetic tradition; a second history of perspective in relation to ornament; a third in relation to allegory and so on. Moreover, all these factors change with time and place. Much more is needed, therefore, than a simple confrontation of theoretical books with practical examples. We need a series of confrontations in an ascending degree of complexity beginning with the time factor:

THEORY AND PRACTICE. MOTIFS
CHRONOLOGICALLY
CHRONOLOGICALLY AND BY LEVELS OF ABSTRACTION
CHRONOLOGICALLY AND BY LEVELS OF ABSTRACTION
 AND BY TYPE OF REPRESENTATION

3. Conclusions

In our imaginary tour we have limited ourselves to a single word, one crucial discovery of man. The treatment of persons, places and things, either animal, mineral or vegetable would entail other problems beyond the scope of tonight's talk. None of us can reorganize the whole of knowledge in one hour. Nonetheless I hope that the past 60 minutes may have conveyed to you a little of what exists and of that which might be done.

Note

In this report I have deliberately omitted other important Databanks such as LEXIS. TERMIUM, EURODICAUTOM, BTQ, TEAM and ASITO which are discussed by Krommer-Benz and Nedobity elsewhere in this conference.

Acknowledgements

References

[1] These statistics are taken from the OCLC Annual Report 1982/1983.

[2] OCLC EUROPE: Online Library Services. August 1983 (Pamphlet), p. 3.

[3] This claim and the above list are from a letter, 24 February 1984 from Nigel Metcalfe, Deputy Director, OCLC Europe.

[4] The information on Britain is from : Seal, A.W.: *Automated Cataloguing in the U.K.: a guide to services*. Bath University Library 1980 (Centre for contact addresses).

[5] Personal experience: If one knows where the book is beforehand a direct request is possible. For an assessment of the German Library system see: Fabian, B.: Bull, *Bibliothek und Geisteswissenschaftliche Forschung*. Göttingen: Vandenhoeck and Ruprecht 1983.

[6] Baryla, Ch.: "Un video disque interactif a la Bibliotheque Sainte-Geneiève. In: *Bull. Bibl. France*. Paris. Tome 28 (1983) No. 4, p. 373-382. I am grateful to Dr. E. Weyrauch (Wolfenbüttel) for this reference.

[7] For a brief introduction see: Eisenbeis, M.; Marschall, M.: "Bildschirmtext: Die zweite Generation." In: *Form,* Ausgabe 102 II, 1982, p.30-34.