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AACR2 and Catalogue Production Technology

by

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AACR2 AND CATALOGUE PRODUCTION TECHNOLOGY
The Relevance of Cataloguing Principles to the Online Environment

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1 INTRODUCTION

More than thirty five years have passed since the Paris Conference and cataloguers have witnessed profound changes in many aspects of catalogue production technology and also in bibliographic control and access during this period of time. In comparison to the past, cataloguers are less involved in the design and production of catalogues and bibliographic databases particularly in terms of the interfaces, the types of indexes and the ways in which records and retrieval results are displayed. These changes and developments (see Appendix one) have presented cataloguers with some basic questions about the fundamental principles of record creation and catalogue construction.

Although present online catalogues are benefiting from more advanced hardware and software, there are still considerable, serious problems in searching, retrieval, and display of bibliographic information in present systems, which influence their functions and usefulness. This, as has been highlighted in the literature, may be because some of the present cataloguing principles and rules are inadequate, less relevant or irrelevant to the new electronic environment. A review of the literature of the last two decades indicates that, parallel to the increasing developments in online catalogues, the cataloguing community has been addressing the need for a re-thinking of cataloguing principles and rules in light of the new environment.(1) It is often claimed that AACR2's rules are based on concepts and principles from the pre-machine period and that they do not serve us well in giving guidance in the construction of electronic catalogues.

1.1 The aim, scope and approach of this paper

Given the influence of all the changes and developments in the world of catalogues and cataloguing, a fundamental re-examination of our cataloguing principles seems very necessary. In this paper some of the basic principles of AACR2 which have been highlighted in the literature as those most likely to be influenced by the new technology will be re-examined in the light of both the present and the potential characteristics and capabilities of the online environment. The aim is to examine the extent to which AACR2 matches or fails to match the capabilities of present systems and those of the near future, for searching, retrieval and display of bibliographic information. In other words, to

address how catalogue form and production affects, or is in turn influenced by, the principles upon which AACR2 is based.

The approach used in this paper is to match individual capabilities of online catalogues with the basic principles of AACR2R. A major focus will be the basic concepts of the code's principles, the logic of their application and the relationship of these principles to the logic of the online catalogue, as well as an examination of the types of principles and rules that are likely to change when moving from a manual catalogue to an online catalogue. In this regard, the needs and expectations of the different catalogue users are also taken into consideration.

2 A RE-EXAMINATION OF AACR2 PRINCIPLES IN THE ONLINE ENVIRONMENT

In the following sections some of the basic principles of AACR2 will be analysed with regard to user expectations and the present and potential influences which the various capabilities of the new technologies might have upon them. These principles are:

- The objectives and functions of the catalogue which influence all other principles,
- The basis for description and its implications for other principles
- Structure of the catalogue and the concept of multiple entries,
- Uniform headings for works (i.e., uniform titles)
- Uniform headings for authors, and
- The form of personal name headings and corporate name headings.
- Presentation of bibliographic information.

2.1 Objectives and functions of the catalogue in an online environment

In our re-examination of AACR2's principles, major consideration should be given to the objectives and functions of the catalogue. Most other principles, such as the basis for description, the structure of the catalogue and the choice and form of access points are, to a great extent, influenced by the objectives and functions of the catalogue.

The objectives of the catalogue are not clearly stated in AACR2. Nevertheless, it can be inferred that the code has the same underlying principles and objectives as stated in its predecessors, mainly Lubetzky's Code of Cataloging Rules (1960) and AACR1. In fact, the code is based on ICCP's statement of functions of the catalogue and, historically, it follows Cutter's two objectives, the locational and collocational functions of the catalogue. The locational (i.e., the finding) function is predominant in the code and this is apparent from the treatment of rules for description. The optionality of uniform titles is another indication of this approach.

With respect to the different capabilities of the online catalogue there are a number of questions regarding the objectives and functions of the catalogue in the new environment. A general question raised is whether the objectives and functions of the catalogue as set forth in the Paris Principles and adopted in AACR2 are still valid in the online environment. Another question which needs to be addressed in this regard is: whether the catalogue in the online network environment should still maintain the same functions formulated for a pre-machine environment or should widen its scope to include new functions?

While the current objectives and functions of the catalogue continue to be valid in the new environment, the new technology may help fulfil them more comprehensively

and accurately. Nevertheless, these objectives and functions are surely inadequate for the new environment. Ayres (1990: 246) states that the scope of the objectives must be expanded to include the impact that online catalogues have on the content of the catalogue. Buckland (1994: p. A) goes further and discusses the need to change our basic assumptions about the catalogue's purpose in order to design the catalogue of the future. He claims that we should pay more attention to bibliographic access and selection and should design the catalogue as a selection aid. Heaney (1995: 135) notes that library catalogues operate not solely as descriptive lists of books but as elements of library management systems and as sophisticated information tools.

In addition to the finding and collocating functions, the online catalogue helps to better identify and characterise entities in terms of their nature, scope and orientation through different data fields such as intellectual level, document type, genre, language code, geographic area code and additional notes. Similarly, a fuller description of the item helps the online catalogue to be used as a selecting aid for different users to choose one item over similar items. The locating of items is another function of the catalogue and, in this respect, online catalogues are far more capable of showing the location and status of the item(s) being sought. The IFLA Study Group on Functional Requirements of Bibliographic Records (Draft Report for World-Wide Review, 1996) has identified four generic tasks performed by catalogue users: to find, to identify, to select, and to obtain access.

In the following section, the functions of the catalogue will be analysed with regard to the impact of some of the major characteristics of the catalogue production technology and the online environment. These are: 1) the integration of library operations, 2) developments in networking and in global access to catalogues, 3) access to the virtual copy, 4) access to other types of bibliographic databases, and 5) online search/retrieval/display capabilities. The future AACR should consider all these factors.

2.1.1 Integration of different library operations

The integrated online library system has made it possible for different library modules to use the same bibliographic records within the same database management system. Acquisitions librarians, cataloguers, circulation librarians, document delivery librarians, serial librarians and reference librarians all have access to the same database and use it for different purposes. Also in an integrated system, the end user may have access to parts of acquisition status, circulations and holdings information. In an integrated system it is therefore necessary for the catalogue record to fulfil the various bibliographic needs of different operations, from housekeeping functions to reference services. In this context, not only should the catalogue function as a finding tool as well as a collocating tool but it should also help in the choice between one work and others.

The combination of approaches to an integrated online library system not only makes it necessary for AACR to expand the current objectives but also to put more emphasis on principles for the choice and form of access points as well as for description, i.e., data elements beyond author/title information. In other words, description, access points, and additional housekeeping elements should satisfy the needs of different users. For example, a reference librarian may need to find a specific item and at the same time identify different editions and manifestations related to that item to provide more help to the user.

2.1.2 Networking and global access to catalogues

The fact that the resources and bibliographic information of hundreds of libraries participating in national and international networks are now accessible to any remote user calls for a reconsideration of the functions and objectives of the catalogue. The question arises as to whether a catalogue should serve in the first place its local users, that is, to identify the holdings of a particular library, or to enable any user to access the collections of other libraries available through the network. In such an environment, consideration should always be given to the fact that the item in hand for cataloguing may be an expression or manifestation of another work known under a different title being held in another collection.

With respect to the network environment, there is some support for the precedence of the collocating function of the catalogue over its finding function (Wilson, 1989; Ayres, 1990; Dempsey, 1990: 64). In a conceptual approach to a catalogue's functions as presented by Lubetzky to the Paris Principles, Wilson (1989) proposes that, with regard to the availability of different catalogues in an online network and with respect to the significance of 'work' over 'publication', priority should be given to the collocating objective. Dempsey (1990: 64) points out that a lack of sufficient attention to the collocating objective of the catalogue has resulted in two problems in large shared databases: difficulty in authority control and an increase in duplicate records. Ayres (1990) supports a similar concept.

On the other hand, while in a large shared database the potential number of expressions and manifestations of a work increases, it is more likely that access to a very specific bibliographic manifestation of a work, for example, a particular version, would be a common need for some end users and librarians (e.g., reference librarians, document delivery librarians). It is evident that in a shared system or network of catalogues there will be a good chance for the user to select those that suit his/her needs best among different representations of a work. Copy cataloguing through bibliographic utilities, which is usually a known-item search, is another example of such a user approach.

With the availability of catalogues to different remote users, it is hard to give absolute priority to either of the two traditional functions of the catalogue. While catalogues should serve their local patrons well, they should also be useful to remote users.

2.1.3 Access to the virtual copy

With increasing developments in information technology it has become possible, in many online catalogues, to link directly to the work (original or digital reproduction). In other words, online catalogues can also show virtual copies of an item. Access to full texts or digital reproductions through linking tags, such as USMARC field 856, has implications for the functions of the catalogue. In this case, through a useful description, the catalogue should help identify the characteristics of both the actual and virtual objects.

With respect to the volatility of electronic documents and the possible changes in the content of some of the fields it is important to take a consistent approach in description and the basis for description. In terms of their contents, size of the file, date of updating, layout, links to other sources, and even the title, electronic documents may change over time without any indication. These changes have implications for the different functions of the catalogue. They also make the bibliographic control of such documents very difficult. The contents (i.e., data elements) in some fields needs to be updated in order to describe and identify the document properly.

Another problem is, how to help the searcher to differentiate between virtual copies of works (such as various copies of “Hamlet” available on WWW), which may differ from one another just as printed editions differ.

2.1.4 Availability of different types of bibliographic database

With respect to the accessibility of different types of online and/or on-disk bibliographic databases (e.g., library catalogues, book trade bibliographic databases, national bibliographies and A&I databases) to various users, a combination of approaches in terms of the functions of the catalogue should be considered.

With access to book trade databases, the catalogue goes beyond providing holdings information and becomes a gateway to explore what is newly published, what is to be published and what is in print. In such an environment, emphasis is also put on functions such as the crucial choice of one item over another. This requires that, for further identification of the item, more descriptive elements, such as physical description, table of contents, and summary, should be provided in the bibliographic record. From a different point of view, the functions of the bibliographic database in the library world and book trade world are similar in many respects, such as the finding function, the selecting function and housekeeping function. Even the bringing together of works by a particular author and also collocation of series, are functions wanted by the two communities. A major difference is in the collocation of different editions and manifestations of a work, which libraries appear to consider important enough to control by rules of entry. All these similarities and differences in the functions have implications for other principles such as the basis for description, content of the bibliographic record, and the choice and form of access points. These will be discussed in the later sections.

2.1.5 Search/retrieval/display capabilities and functions of the catalogue

Through its extensive capabilities the online catalogue can fulfil different functions more effectively than the card catalogue. For example, keyword searching on name of authors, co-authors, editors, titles, series, etc. not only facilitates the finding function but it can also help in the choice of one item over another. Boolean searching can, to some extent, facilitate both the finding function (e.g., ANDing the author's name with date of publication) and the collocating function (e.g., ANDing the author heading with the uniform title to assemble different editions of a work). Hypertext searching on any term or a combination of terms (as offered in the University of Toronto Catalogue, the University of California Catalogue (Melvyl), the Library and Information Services of Western Australia (LISWA), HyperLynx, GoPAC (from DataTrek, Australia), OhioLink, and the Prototype Catalogue of Super Records, HyperLynx, GoPAC (from DataTrek), and OhioLink Central Catalog; visit the “Demonstration of OPAC Designs” at: <http://wilma.silas.unsw.edu.au/students/rfattahi/demo.htm>) can extend a known-item search to other items which may be unknown to the searcher but may have some kind of relationship with the item first found.

AACR2 does not address the problems resulted in response to queries for voluminous authors and works. For example, one of the major problems of the present online catalogues is that, in response to a search for voluminous authors and works, the searcher is represented with too many records to conveniently scan. This problem exacerbated with keyword searching, in that too many records including less relevant and irrelevant data are retrieved. A search in large catalogues under 'Hamlet' may retrieve too

many records, for different editions and manifestations, for works about Hamlet, as well as works with the title 'Hamlet' written by other writers.(2) The problem becomes more serious when the user searches in a large shared catalogue, such as a national union catalogue, in which there will be a greater number of editions and translations or manifestations of a work held by different libraries (see “Demonstration of OPAC Designs” at: <http://wilma.silas.unsw.edu.au/students/rfattai/demo.htm>). It can be said that the present approach in AACR2 toward the collocation of voluminous authors and works is not consistent with the search/retrieval/display capabilities of online catalogues.

2.1.6 Conclusion

The catalogue in the global online environment is used by a wide spectrum of local and remote users and, therefore, is supposed to satisfy different approaches. It can be concluded that the functions of the online catalogue go beyond the present objectives (i.e., locational and collocational functions) laid down in ICCP. It is therefore necessary that AACR2's principles should address all these different functions and should also take into consideration the implications of each function for other principles. In making the code relevant to the online environment, the principles and rules should be re-formulated with respect to both the functions addressed in the IFLA's study of the Functional Requirements for Bibliographic Records (1996) and the catalogue's search/retrieval/display capabilities. Although IFLA has not taken the relating function into account as much as it should, AACR should consider it because of the nature of some collections such as music, law, literature, and religions which require more control and display of the relationships between related entities.

2.2 The basis for description in the online environment and its implications for AACR

(This concept will also be addressed by another contributor. Here, the issue is examined in light of catalogue production technology and with respect to its implications for other principles)

The shift in different codes of descriptive cataloguing from 'work' to 'item' (and vice-versa) as the basis of description is, in fact, an indication of the relative importance of these two different approaches. In the networked, online environment the issue now requires a new look. While library catalogues remained isolated and served only their local users (i.e., were maintained at a local level), they could describe bibliographic entities on any basis they considered appropriate. On the other hand, where more than one catalogue is involved (e.g., in the case of shared cataloguing systems and union catalogues) and also where catalogues are increasingly becoming a part of the global online environment there must, as a first principle, be consensus regarding the basis for the description of bibliographic entities, that is, what entity should be regarded as the basis for bibliographic description in an online environment. Svenonius states that the development of USMARC format for Holdings and Locations, together with the ever-increasing trend toward union databases, has made it increasingly apparent that AACR2 does not deal adequately with the question of what constitutes a unitary object of library description (Svenonius, 1989: 131)

The basic unit of description (the cataloguing unit) in AACR2 is the physical item in hand (AACR2R, 1988: Rule 0.24). This is also apparent throughout the statements of the rules in part I (the title-page or its equivalent is chosen as the chief source of

cataloguing data for description). To consider providing access to the 'work', however, AACR2R maintains concepts such as main entries and uniform titles. AACR2R (1988: 305) prescribes that, although the characteristics of individual items are taken into account, the rules for choice and form of access points should apply to works and not generally to physical manifestations of those works. The following factors indicate the significance of both 'works' and 'items' and justify the need in AACR to maintain a hybrid approach when describing bibliographic entities:

- a) Users' needs vary a great deal. While some users may find any edition of a work useful, others may require a specific edition with a particular feature. There are also users who look in the catalogue for a particular manifestation of a work or a work in a particular format.
- b) Many users do not know that a work may have several different editions and/or manifestations; the catalogue may contain more than the user may be expecting and it is an objective of the catalogue to display other works or items related to the sought item.
- c) Based on the users' familiarity with or knowledge of books as known or seen by them, the item and the cataloguing data on the chief source of information (e.g., the title page) are usually more appropriate as the basic unit of description for most types of publication. However, the basis for the description of reproductions, e.g., equivalent and near equivalent entities, is a different case; reproductions, particularly in microform, can be described as notes on the records created for the original item.⁽³⁾ This approach would make access to both works and their reproductions more consistent.
- d) For acquisitions, current awareness services, circulation, placing reservations on books and ILL (interlibrary loan) and for the purpose of importing and exporting records (for example, for cataloguing) that usually deal with specific manifestations, the work cannot be a good means of bibliographic data exchange. For this reason, libraries and bibliographic utilities catalogue the item representing the edition rather than the work.
- e) Most functions of the catalogue (such as finding, identifying, choosing and locating), however, relate to entities lower than the 'work' in the bibliographic hierarchy. Works are accessible after they have been represented in any type of manifestation.
- f) If bibliographic records are to function in a co-operative environment and if we are to have the same or compatible principles for publishers and booksellers, their needs should be taken into account. In trade lists attention is focussed on the physical item as the object for sale and the description of individual items is therefore more relevant to publishers and booksellers' needs. Similarly, for national bibliographies, which focus on newly published items, the description based on the item is considered more important.

Choosing the piece in hand as the only basic unit of description, however, does not apply to all types of publication. For example, a single issue of a serial does not provide sufficient cataloguing data for the description and also bibliographic relationships of the whole serial. Crystal Graham (1995) criticises AACR2 for its approach toward describing serials and states that there are structural, philosophical and practical problems with that approach. It is also said that several aspects of AACR2R do not work very well, particularly the principle behind rule 0.24 (emphasising the physical form of the piece in hand (ALA CC:DA Task Force to Review Reproduction Cataloging Guidelines, 1993)).

Patrick Wilson (1989) proposes a redefinition of 'work' to be taken as the basic unit of cataloguing. However, to base description on 'work' has strong implications for AACR, in that it influences the choice and form of main entries and uniform titles, structure of the catalogue and the ways in which the relationship of different entities related to a work should be treated and displayed on the catalogue record. As has been

demonstrated in the Prototype Catalogue of Super Records (<http://wilma.silas.unsw.edu.au/students/rfattahi/super.htm>), it is possible to have a hybrid approach towards the basis for description in the online environment. While describing the item in hand can fulfil the finding, selecting and locating functions, a multilevel, super record for the description of and access to 'work' and its different expressions and manifestations would fulfil the identifying and collocating functions in a more meaningful way. Wilson (1989: 9) proposes somewhat a similar approach and argues "...there is no reason why a system cannot have both kinds of record: the conventional bibliographical record for particular publications, the work record for particular works." Next section deals with such new approaches toward the structure of the catalogue and that of the bibliographic record which the new technology can offer.

2.3 Structure of the catalogue and the concept of multiple entries

The structure of the catalogue has an important role in the fulfilment of its functions. The principles underlying the structure of the catalogue and choice of entries in AACR2 include rules concerning the determination and construction of necessary entries for a linear, alphabetical catalogue of main entries, added entries and references. An online catalogue based on such a linear approach has many problems in searching, retrieval and display of bibliographic sources.

To overcome some existing search/retrieval/display problems, the future AACR should take a new approach to the structure of the catalogue and the bibliographic record.

2.3.1 New approaches to the structure for the catalogue and the bibliographic record

In place of the single, unique, and self-contained main entry record, research (for example by Heaney, 1995; Ayres, Nielsen, Ridley, and Torsun, 1995; Fattahi, 1996a) has recently attempted to propose a new structure for the catalogue and catalogue record. Such new approaches imply that the existing cataloguing principles do not adequately address the retrieval and display problems of works that appear in many editions and manifestations. Re-analysing the nature of works and their publications, Heaney (1995) states that the major access to information is through the 'abstract work' and that cataloguing rules and MARC formats should incorporate radical changes, mainly in the content of the MARC tags, to address access problems of 'works' and their manifestations.

The experimental prototype OPAC (i.e., the Bradford OPAC) uses a manifestation concept to group together sets of items that are manifestations of the same work (Ayres, Nielsen, Ridley, and Torsun, 1996). In terms of display, the Bradford OPAC avoids repetition of the author heading and title. What the user sees is an economical display of manifestations which makes clear their differences. However, the catalogue is more concerned with the general concept of manifestations and does not distinguish between different subcategories within each manifestation.

In the Prototype Catalogue of Super Records, Fattahi (1996a) proposes a multi-level record structure which is more relevant to the online environment. Super Records would provide a uniform access to different instances of a work. The super record for a work would contain the uniform title of the work and the author heading, if applicable, along with a categorisation for different expressions and manifestations being linked to

actual records for items and copies available in the collection. This approach would result in a better syndetic structure. At its first level, the super record for a work expresses the abstract work only; it is not directly linked to any actual record for items or copies. This helps the searcher to identify and select the category to which an item may belong. With super records in place, online catalogues would be better able to reflect special sub-arrangements than are current catalogue structures.

Catalogue users will search and retrieve super records through name authority files and/or uniform titles authority files first, so that they can scan the record and decide on the type of edition or manifestation for which they are looking.(4) The reverse is also possible: once a record for an item has been retrieved in response to a specific query, the searcher can move from that record to the relevant super record through an assigned link. This bi-directional approach makes the navigation of the bibliographic universe easier and more understandable. In those cases where an item belongs to more than one category (for example, a translation from an adaptation of 'Hamlet'), the linkage can be created between the item and the two categories to which the item belongs. Other advantages with a multilevel record structure such as that of a super record are discussed elsewhere (Fattahi, 1996a).

A major requirement of a multilevel record is to incorporate links between different records for different expressions and manifestations of a work. A hypertext technique is feasible in the online environment and could provide such links.

2.3.2 New ways to link records in online catalogues

In online catalogues it is also possible to provide different mechanisms for the retrieval and display of different types of relationships. This depends, to a large extent, on both the structure of machine-readable records and the software to allow strings of fields and/or subfields to be organised so that the computer can retrieve and display all related records in a user-oriented manner. It is possible to link two or more fields or subfields in machine-readable records in such a way as to better identify relationships between entities. For example, the computerised catalogue can match the value of the field 'uniform title' with the value of the subfield 'Language' or 'Part' or 'Date' in all records so as to retrieve and cluster those records that have these data elements in common.

With regard to online catalogues, the question arises as to whether it is possible to have a special block in the Notes Area to include relationship information in such a way as to allow related records to be retrieved and displayed. Tillett (1989a: 161) proposes that relationship types be tagged and reflected through notes. This would avoid the need for a redundant tracing in a machine-readable record. To achieve this, as Tillett (Ibid) points out, "We would need to slightly modify some of the MARC tags and indicators for notes which incorporate links to another bibliographic record." Another possibility would be to use the Notes Area for relationship purposes by applying hypertext links.

Online catalogues and future computerised systems may provide new and more effective linking devices to help the searcher to navigate a catalogue. Using hypertext techniques for linking related records is a promising method in bibliographic databases for the enhancement of retrieval and access. This technique is developed through pre-coordination, in that the cataloguer consciously creates links between related records in user-oriented ways in order to maintain different kinds of relationships. Connecting related entities directly, hypertext links remove the burden of a further search (i.e.,

having to return to an index and entering a new query) which may still fail to yield the desired results. Examples of such applications are: the University of Toronto Catalogue, the University of California Catalogue (Melvyl), the Library and Information Services of Western Australia (LISWA), HyperLynx, GoPAC (from DataTrek, Australia), OhioLink, and the Prototype Catalogue of Super Records).

As demonstrated in the Catalogue of Super Records, data elements in bibliographic records can provide links to a variety of sources such as related records (for other works by the same author, other expressions, editions, manifestations, versions of the same work, other works about the same subject, other publications by the same publisher, etc.), name authority records (information about other forms of the author's name, author's affiliation and field of expertise), subject authority records (related terms, broader terms, narrower terms, etc.), holdings and status information, reviews in electronic format, full text and/or virtual copies available. For example, a link can be provided from the name of the author to the authority record for that author, to his/her other works, or to his/her homepage available on the World Wide Web. Another example: a link from the name of the publisher in the imprint area can be provided to the publisher's homepage, which provides information about other publications by that publisher. In a hypertext bibliographic record, notes will have a more important role in providing access to related documents, such as other versions, editions, or manifestations of a work. In a hypertext catalogue record added entries can act as additional linking devices.

AACR should take into consideration the complex structure of the multi-level bibliographic record and the various implications which new linking mechanisms, such as hypertext linking, have for cataloguing principles and rules.

In the following sections some of the basic principles of AACR2 which relate to the structure of the catalogue will be re-examined in terms of their relevance to the online environment.

2.4 The concept of main entry

Like its predecessors, AACR2 distinguishes between main and added entries. However, with the advent of computerised catalogues the value of the main entry concept, which developed in the context of book and card catalogues, has been questioned, but no satisfactory and practical solution has emerged as to how its functions can be otherwise fulfilled.

Developments in online catalogues have given the issue a new dimension and the number of those who advocate the abandonment of the main entry concept has increased (Fattahi, 1995b). To many writers (for example, Gorman, 1975, 1979, 1980a, 1980b, 1992; Kilgour, 1979; Ayres, 1978, 1981, 1990; Shoham and Lazinger, 1991; Jeffreys, 1993; Winke, 1993), the concept arose out of pre-machine systems and is said to be irrelevant in a developed online catalogue where the technology permits many more access points of equal value in the retrieving of bibliographic information. In contrast to those supporting the simple abandonment of the main entry principle, others argue for its continued use in computerised catalogues (Scott, 1976; Malinconico, 1977, 1980; Arokhaar, 1986; Carpenter, 1989, 1992b; Brooks and Bierbaum, 1987; Bierbaum, 1994; Martin, 1996a; Heaney, 1995). Exploring the definitions and functions of main entry, Carpenter (1989, 1992b) states that some of the functions of main entry, particularly its collocating function, are still valid in the online environment.

The reasons for retention of main entry in AACR2, as presented by the proponents of the main entry concept in JSC's arguments, are said to be that it is a central principle (Gorman, 1978: 218). However, for those catalogues not based on the main entry principle (i.e. which do not distinguish between main and other entries), AACR2 instructed the cataloguer to use the rules in chapter 21 as a guide to necessary entries (AACR2R, 1988: 2). Although AACR2 de-emphasises the traditional concept of main entry and encourages the use of 'access point' for any entry, it does not ignore its usefulness.(5)

The functions of main entry have been more than adequately discussed elsewhere (Lubetzky, 1963; Carpenter, 1989). As is stated, a major justification for the concept often lies in its collocating function, in bringing together both different editions of a work and the works of an author. As a collocating device, the concept of main entry has been retained not only in multiple-entry card catalogues but also with the same justification in automated catalogues. In terms of collocation, main entry has two specific functions: 1) Assembling and displaying works by an author, and 2) Assembling and displaying different editions of a work. The following section is an analysis of the main entry concept in terms of its functions in an online environment to see what influences the different capabilities may have on this principle. The focus of this section is only on main entries for personal names.

2.4.1 Online search/retrieval/display and the concept of main entry

Keyword searching. Keyword searching on names will retrieve only those records that match the term(s) keyed in by the searcher, whether the term appears in main entries, added entries or any other significant word indexed from the text of the record. Keyword searching capability cannot replace the main entry in terms of its collocating function. It can, however, facilitate the collocating function: once access to one or more specific items has been provided through keywords, the searcher can extend the search by keying the exact form of the author heading or the uniform title found on the retrieved record(s) to search for related editions with the same terms only. With hypertext links, as demonstrated in the University of Toronto Catalogue, the University of California Catalogue (Melvyl), the Library and Information Services of Western Australia (LISWA), HyperLynx, GoPAC (from DataTrek, Australia), OhioLink, and the Prototype Catalogue of Super Records).

Boolean searching. Boolean search is another capability for bringing together different editions of a work. This can be done by keying in two or more data elements such as the author heading and the title proper or the uniform title, by using the 'AND' operator. Since the titles proper of different editions of a work may vary, titles proper in conjunction with author heading cannot be a useful element for the collocating function. The 'author/title' search key, which many systems provide, is an implicit Boolean search which has the same limitation. Instead, a Boolean search on the author uniform heading and the uniform title, including relevant qualifiers, can achieve the collocating function more effectively. As will be discussed later, this approach is another justification for the main entry concept in a new form and structure.

Index browsing. Browsing, for example, the author index will display together all the works by an author irrespective of his/her type of contribution (e.g., primary author, joint author, editor, compiler). It can be seen that, even with browsing capability, a useful

collocation of different expressions and manifestations of a work is not possible with the present structure of entries. Browseable indexes can help solve the collocation problem if the author and the title indexes are pre-coordinated for meaningful arrangement and display of related entities. Also, for the uniform citation and display of entries in the browsable author index we need to identify the primary author. To link works, however, the primary author's name should be in a uniform heading. This is again another justification for the concept of main entry in an online environment.

Online display and the concept of main entry. Since the display format in online catalogues is independent of the storage format, when a number of records are displayed (particularly in brief displays) in response to a query, the retrieved titles need to be displayed in conjunction with a second primary identifier such as the author heading. Otherwise, not only is the identification of the retrieved items not complete, but different works by an author are also not distinguished and assembled. This primary element is necessary in online displays of related works. Online displays, for instance, default listings in brief displays (6), require that, in addition to titles proper, another principal element must be displayed. The following example may help to make this idea clearer:

As the convention now exists in many OPACs, when a work is entered under title or under a corporate heading, with an added entry for editor or compiler, this person's name would still need to be displayed in conjunction with the title proper in the brief display to uniquely identify the work and to differentiate between works with identical titles. From another perspective, that of the catalogue user who does not understand what main entry is, an editor or a compiler may seem to be the primary identifier or access point which should be displayed in conjunction with the title in brief displays and in single entry listings.

2.4.2 Networks, access to other catalogues and the concept of main entry

It is common for libraries of any size to participate in local, national, and/or international bibliographic networks such as shared catalogued systems and union lists. In such environments it is important that the same entity be catalogued under the same uniform entry. This is essential for different operations such as searching, checking duplicate records, copy cataloguing, adding new holdings, etc. A work and also different editions and manifestations of a given work should be presented under the same entry. Otherwise, different problems may arise for different users: inconsistencies between catalogues, difficulties in the identification of the relationship of different instances of a work, all leading to confusion for the cataloguer, reference librarian, and the end user. A uniform main entry heading, with variants appropriately linked, avoids such problems in networked environments.

2.4.3 Conclusion

As a concept, the main entry relates rather to the nature of relationships between entities (authors to their works or works to their expressions and manifestations) than to the physical medium through which those entities are to be described. Many works, particularly in the fields of literature, philosophy, religions, law and music, require such a uniform construct for identification and collocation. Even if technology provides catalogues with sophisticated devices, such as hypertext facility, to link two or more related entities to one another, it does not help the user if catalogues do not show

him/her the nature of these relationships. Without such a concept the catalogue, whether manual or computerised, loses its integrity and usefulness. It can be concluded that online catalogues still need a construct to carry out some specific functions which cannot be fulfilled thoroughly through other devices. Of great concern is the fact that the main entry concept is not meant to be a single function element but rather a concept that is essential to fulfil several functions. If the concept is to be retained in the future AACR, it is therefore in need of a re-definition that will focus on its rationale and multiple functions:

Main entry is a uniform construct for the naming and identifying of works and also for the useful collocation and arrangement/display of the different expressions and manifestations of a work.

In addition to the identification of the primary author, the concept of a uniform mode of identification, citation and collocation, as defined above, is dependent on two key identifying elements which are emphasised in AACR2: uniform titles for works and uniform headings for authors.

2.5 Uniform headings for titles

Any work can potentially be produced in different expressions (e.g., editions, translations) and/or in a variety of physical formats. This concept is intrinsic to the bibliographic universe and its control has been an essential principle for catalogues. In this context, the name of the work, i.e., the 'uniform title', has been devised in descriptive cataloguing to collocate different editions and manifestations of a work. AACR2R has devoted a full chapter to this concept; however, the use of uniform titles is optional in this code. Due to the role of uniform titles in library cataloguing, a considerable proportion of discussions in the AUTOCAT and USMARC lists circle around the rationale, implications, indexing and display of uniform titles in automated systems. As will be discussed later, many systems do not input and/or display uniform titles in their database.

The functions of uniform titles are: 1) to standardise the original title of a work, 2) to standardise the form of the main entry heading for anonymous works, 3) to group together all editions and manifestations of a work under one particular title, and 4) to identify the relationships between an edition and a work. Smiraglia (1989) and Velluci (1990) consider an additional function, i.e., a differentiating role, for uniform titles. In the 1993 amendments to AACR2R, a new provision for uniform titles has been added to the functions of the uniform title: "for differentiating between two or more works published under identical titles proper" (AACR 2R, Amendments 1993, Rule 25.1A). Nelson and Marner (1995) emphasise this third function and criticise AACR2 for its inadequate treatment of the differentiating role of uniform titles. The rules for uniform titles for serials were removed from AACR2 before publication. To make up for this lack the LC Rule Interpretations were developed to include procedures for differentiation among serials with identical titles. The rationale for the principle of uniform titles, however, rests mainly with two functions: 1) the uniform identification of a work and 2) the assembling of entities derived from or related to the same work. From a different

point of view, uniform titles support at least four types of bibliographic relationship: equivalence, derivative, whole-part, and sequential relationships (Tillett, 1987).

In the following section, the rationale and the functions of uniform titles will be examined in the context of the online environment. The aim is to see whether the structure and content of uniform titles, as formulated in AACR2, are appropriate for the catalogue's functions and are compatible with the different capabilities of online catalogues.

2.5.1 Online search/retrieval/display and the concept of uniform titles

A major problem in searching online catalogues is that in response to a query through the name of works, such as 'Hamlet', 'Bible' or an anonymous classic like the 'Arabian Nights', the searcher is presented with too many records to conveniently scan. This is an indication that in their present state uniform titles are not suitable for useful retrieval and display. In other words, uniform titles as access points or collocating elements are not useful for the effective retrieval and collocation of different expressions and manifestations of a work and that they should be re-formulated for such functions in accordance with the capabilities of online catalogues. Without the uniform title associated with the main entry heading, one can see that different editions of the same work are scattered among the retrieved records for other works by the same author. For example, different editions, translations or selections of a work may be scattered alphabetically among his/her other works and hence appear as if they were new works by the same author. This problem is highlighted in online catalogues: they may need a number of screens to list all retrieved items and the searcher may have to spend considerable time to identify the relationship of a sought item to a work and find what he/she is searching for.

While the occurrence of editions of the same work with different titles and different works with similar titles increases in large catalogues and union databases, the concept of uniform titles can help control this problem. With regard to the catalogue's collocating function, uniform titles can play a more important role in the online catalogue. In an online environment, the linking of different editions and manifestations of a work is essential for increasing recall in response to user queries and could be a critical part of the file structure for new system designs (Vellucci, 1990: 45). While uniform titles alone increase the search results (i.e., recall), the addition of other data elements (i.e., qualifiers), such as version (i.e., the physical format), language, date and part of the work, to the uniform title will narrow down the search results and will increase precision. AACR2 can prescribe additional qualifiers which would be functional in the meaningful retrieval and collocation of related entities.

In their present state, formal or conventional titles, such as "Laws, etc." and "Works", may not be useful in online retrieval unless in conjunction with other data elements such as a name or date. For example, the search expression "Laws, etc. AND New South Wales" is useful in an online catalogue. In such systems some of the qualifiers can be specified by Boolean means or can be simplified into natural language terms.

Another problem is that, unlike the card catalogue, many online catalogues do not include uniform titles (USMARC field 240) in record displays. While this approach leaves the relationship of the retrieved items to a work obscure, it may be an indication that, in their present state, uniform titles do not make sense to catalogue designers and/or users. In the context of searching a large bibliographic database, there should be a means

for the user to realise that what has been retrieved in response to his/her query may be different editions of the same work.

In an electronic environment with hypertext facility, uniform titles are needed to provide links between different occurrences of a work and to collocate and display, in a meaningful order, all the available expressions and manifestations of a given work, as has been demonstrated in the Prototype Catalogue of Super Records. Through the uniform title approach in super records, separate records for different versions of a work are grouped and linked to one another. As can be seen, since uniform title approach is used as a uniform identifier and a collocating device wherever a work has more than one edition and/or manifestation in the catalogue, the concept of multilevel records, in general, reinforces the principle of uniform titles (Fattahi, 1996a). In hypertext catalogues, a browsable uniform-title index or uniform titles authority file with the name of the author(s) of each work could provide easy access to works.

2.5.2 Conclusion

For the same reasons that a concept equivalent to the main entry will be needed in an online catalogue, the concept of uniform titles will remain a valid principle in the new environment. Even with the different search/retrieval/display capabilities of the online catalogue, there is still a need for a standardised form of the title of a work serving to identify, collocate and display different expressions and manifestations of that work. These capabilities can also help to simplify and make the application of the concept in online catalogues more understandable. With hypertext linking in place, uniform titles in bibliographic records for items can directly point to the “work” level in which links are provided to categories of expressions and manifestations. Nevertheless, to be useful for searching, retrieval and display in online catalogues, a re-structuring of the content and structure of uniform titles is an essential. Also an essential component of online catalogues would be a uniform-title index or uniform titles authority file, whether in the MARC format or an hypertext environment. A possible solution is to establish a uniform title authority file linked to bibliographic records. Also, a uniform titles index is useful for easy access to different expressions and manifestations of a work available in a catalogue. This is what AACR2 should address as a part of its provisions for the structure of the catalogue.

2.6 Uniform headings for persons

Another principle that is essential to the fulfilment of the collocating function and for the integrity of the catalogue is a uniform heading for each person.(7) A rigid ideal in modern cataloguing codes and one of the first principles in the Anglo-American cataloguing tradition has been to list all works by or about a given person under a uniform heading.(8; 9) As will be discussed in the following paragraphs, an examination of this principle in light of different capabilities of online catalogues reveals that the concept is still valid in the online environment but that the new technology may influence the content and form of name headings, as well as the scope and extent to which it would be possible to achieve collaboration in their standardisation.

2.6.1 Online search/retrieval/display and the principle of uniform headings

Keyword searching. Keyword searching facilitates the finding function of the catalogue through the form of an author's name that appears on the title page or in information sources, i.e., the form which is usually familiar to both the book world and the searcher. However, with keyword searching it is only possible to search names under the form in which they have been recorded in the bibliographic record. Keywords, not being subject to authority control, naturally do not always collocate all the works by or about an author if there are variant forms of name. However, keyword searching facilitates the collocation of an author's works: once access is made to a record through any form of the name, it is possible to assemble works by or about a particular author through a further search on the uniform author heading.

Truncation. With right-hand truncation, the online catalogue is able to retrieve those names which begin with the characters defined by the searcher. In other words, names must be entered uniformly, at least for the few beginning characters, to retrieve all the works by a given author. Obviously, however, truncation also the searcher to retrieve records which are not relevant to his/her needs. Therefore, the more complete the input heading is, the more chance there will be for retrieval precision. The closer we can get to 'natural' forms of name, the more efficiently successful will our catalogue searches be.

Authority control systems. In an online catalogue utilising name authority files, access to the works of a given author by variant forms of the name can be as effective as access by the uniform or preferred heading. The distinction between the established form of a name and any cross reference to it being invisible to the searcher. This apparent ease of consultation may render catalogue users (and library administrators) unaware of the professional effort which goes into collocating the various works by and about an author, etc. In fact more emphasis must be placed on this in the online environment than with previous forms of catalogue.

Adherence to the principle of uniform heading is a means of maintaining the one-to-many relationship (i.e., one name to many works) in bibliographic databases and, thus, to achieve the collocation of all works available by a given author in the catalogue. Even in authority control systems there is still a need to establish one form of a person's name as the uniform heading and others as references. In fact, uniform headings are still considered to be an important principle in authority work.

Index browsing. In systems allowing the browsing of name indexes, it is necessary, in general, that any name be presented in a uniform manner in the list to avoid confusion. It is also necessary that works by an author be retrieved through and assembled under a single form of name in browsable author-title indexes. More effective display could result from uniform indexing in browsable indexes. In systems (such as the Bradford OPAC), which do not repeat the main heading on every line in brief displays, uniform headings are an essential. The browsing capability thus reinforces the need for the principle of uniform headings.

Online displays and the principle of uniform headings. With regard to differences in the physical forms of the manual catalogue and the online catalogue, the very rigid ideal in the card catalogue of assembling *in one place* all the works a library has by a given author has shifted, in the online catalogue, to the ideal of the system's ability to retrieve all the works of an author through any searched form of his/her name and to display them together under one uniform heading for the author. Under whatever form of name

the works by a given author have been searched, the default listing of those works, particularly in brief displays, requires that the name of the author needs to be presented in a uniform manner. Similarly, in catalogues with an hypertext interface links can be provided from any form of a name to the records, but the name should appear under a uniform heading when records are displayed, otherwise, the catalogue may lose its integrity (consistency?) and the searcher may think that the works displayed are by different authors.

2.6.2 Networks, global access to catalogues and the concept of uniform headings

The communication of bibliographic records for cataloguing purposes, reference services, inter-library loan and document delivery services depends to a large extent on the uniformity of headings. An important factor concerning the value of uniform headings is the ever-increasing use of bibliographic utilities, such as OCLC and RLIN and national bibliographic agencies such as Library of Congress. Most libraries attempt to be consistent with Library of Congress for headings and contribute to the Name Authority Cooperative Project (NACO) initiated by that library.

In searching the different catalogues accessible in a network, the patron, the technical services librarian and the reference librarian usually expect to find the works of a given author under one form of heading. Except for differences in user interfaces, a first requirement is to conform to the concept of uniform headings at the national level. Links to national online name authority files, such Library of Congress Name Authority File (LCNAF), would be a most desirable answer to differences in authors' names and can provide consistent access to catalogues and other bibliographic lists.

2.6.3 Availability of different types of bibliographic database

A major problem in the online environment is that there are many different types of bibliographic databases and a wide variety of users. A difficulty in searching different databases is that, while there is a uniform approach in library cataloguing in relation to uniform headings, other communities such as the book trade and A&I services are less concerned with this principle, so that in many bibliographic databases the same person may have been entered under a variety of unlinked names.

2.6.4 Conclusion

It can be said that, although the very rigid ideal of uniform headings in Anglo-American cataloguing codes has undergone gradual modification, the principle is still valid and its maintenance can secure the integrity of catalogues particularly in shared cataloguing systems, union databases and network environments at the national level. Although name authority systems have made it possible to retrieve all the works of a given author through a one-step search in the catalogue, the necessity for collocation and particularly for display of an author's works together requires that one form of name be chosen as the uniform heading. Also as a basic principle in database management systems, normalisation of names is an essential concept as far as the person holds one bibliographic identity.

In summary, while it seems that there may be no solution to the problem of cultural differences giving rise to divergent forms of name heading between different communities, conformity with national name authority files should gradually bring about

more standardisation of catalogue headings. This process will naturally be greatly assisted, when the national name authorities are available online. This would bring more uniformity in the different environments and would make searching and retrieval of works by a given author easier in various files in the online environment. It would be desirable if the future AACR, therefore, provide rules for the construction of name headings for national name authority files extending beyond the library community to other bibliographical communities.

2.7 Content and form of name headings in an online environment

As emphasised by IFLA/Unesco in 1961, the content and form of names in headings, as well as the principle of uniform headings, should be agreed upon nationally and, to some extent, internationally. Over the last one hundred years the Anglo-American cataloguing codes have formulated necessary rules concerning the form of personal and corporate headings.

In the following sections, the content and form of personal and corporate headings will be re-examined in light of the searching/retrieval/display capabilities of computerised catalogues and with respect to searchers' expectations of an integrated online environment.

2.7.1 Content and form of personal name headings

According to the general rule (Rule 22.1), the name by which a person is commonly known should be chosen as the basis for the heading for that person.

The form of a name is an important factor in searching and retrieval, particularly in online systems in which the searcher has to key in the name as a search string. Research have shown that users often enter personal names in a form and sequence different from those prescribed for AACR2 headings (Drabenstott and Weller, 1996: 137). A rather different approach from that adopted in a manual environment is possible, in that searches under the names of authors no longer need to be phrased in the exact form and order of the author's name headings in online catalogues such as Okapi, MIRLYN and SULIRS. Cross-references and/or keyword access offer the possibility of entering the search names in any order. Keyword searching also reduces the need for complete "surname+initials+(full forenames)+dates" headings as in AACR2R.(10). Wajenberg (1992: 105) claims that, with keyword searching, the inversion of surnames and rules for the choice of entry-element in compound surnames and names with prefixes become unnecessary. He points out that the most useful form of name is the fullest form. The German code (RAK), which is being revised for online catalogues, takes a similar approach and strongly rejects any substantial reduction in personal name entries (Mšnnich, 1995: 1276).

Talking about known item searches, Kilgour (1995b) proposes that for a single-screen miniature catalogue author entries can be reduced to surnames alone. His survey of two online catalogues in the North Carolina State University, containing approximately 3.4 million entries, showed that surname searches produced mini catalogues of one screen 12.6% of the time, two screens 22.5%, and three screens 30.1%. He claims that his finding, that nearly two-fifths of the cataloguing of books in a large university library produces entries that will be displayed in mini catalogues of one screen, demands revision and simplification of cataloguing practices in large research

libraries (Kilgour, 1995b: 705) For example, he proposes that with keyword search function no added author fields will be necessary for multiple surnames (Ibid: 706).

As will be noted later in this section, there are other factors, such as the need for default listings of the works of an author and the needs of the book world, citation traditions and international exchange of bibliographic data, which require the standard order of 'surname, forename' in full form for personal headings. There is at present no consensus on the content and form of headings among the different creators of bibliographic records. There are, however, to some extent similarities between library cataloguing and the book world: both tend to use the best known form of name with library cataloguing more inclined to use the complete form.

Truncation of headings, especially automatic right-hand truncation, can help retrieve works by authors whose complete heading (i.e., surname, forename or initials) is not familiar to the searcher. Variations in the fullness of forenames seem unimportant in systems with a truncation capability. Using 'Price, H H' and 'Grossman, Allen R.' as examples, Arlene Taylor (1984: 11, 13) proposes that an online catalog with keyword searching of headings and automatic right-hand truncation needs rather different rules for the formulation of headings and references. It should be noted, however, that searching names through truncation may retrieve too many records to scan easily.

Another problem with personal name headings is that initials often cause searching and retrieval problems in online catalogues. According to Drabenstott and Weller (1996: 136), the middle names or initials users include in their queries for personal names are sometimes counterproductive in helping them find the heading used in the catalog.

Differentiation between identical names

Differentiation between identical names is an important requirement, particularly for large files and shared databases in which the frequency of such headings increases as files grow or merge.

The use of dates of birth and death, as in AACR, may not always be particularly useful to searchers, who might have no idea of when a particular author was born. Differentiation of author by discipline can be a more useful approach. The field of expertise at least lets the searchers guess which author they want to look at.

Another element which can help in the consistent association of a person with a given work is his/her role in the creation/production of the work. This approach, i.e., using descriptors, has been practiced by a number of A&I services for relatively a long time. It would help users if such differentiation were to become a principle associated with assigning name entries. AACR should address this issue in association with the principle of authorship.

2.7.2 Content and form of headings for corporate bodies

The issue of corporate headings was one of the problems on which there was considerable debate at the Paris Conference. Decisions made have not all proved to be entirely workable. Even today different national codes have different approaches toward the form of corporate headings. In terms of names of jurisdictions forming entry word of some government headings, AACR2R uses the English language form, while in the RAK a name in the official language of the country is preferred (Sule, 1990: 250-51).

Searching, retrieval and display of corporate names in online systems are often frustrating to the user. Many of the problems concerning the searching of corporate bodies' publications relate to the content and form of headings for these bodies.(11) AACR2 prescribes that, in general, corporate bodies should be entered under the name by which they are commonly identified, except when other rules provide for entering them under the name of a higher or related body or under the name of a government (AACR2, 1988: Rule 24.1). Some of the problems concerning the searching, retrieval and display of corporate headings in online systems are:

1) It is particularly difficult to search under the exact form of corporate headings in online catalogues because the user has to key in the search string. How much of the heading should be keyed in by the searcher to initiate the search, since corporate names are usually long, often similar to one another and appear in different forms such as acronyms, initials and subordinations (e.g., World Health Organization, WHO or W.H.O.)?

2) In some cases, headings for subordinate bodies associated with the same parent body do not follow a uniform approach. While the 'World Health Organization' appears as the heading for this body, a number of subordinate bodies incorporating the acronym 'WHO' are treated as headings in the catalogue; for example, 'WHO Collaborating Centre on Environmental Pollution Control', 'WHO Commission on Health and Environment', 'WHO Expert Group on Pesticide Residues'. The same problem exists with the 'Food and Agriculture Organization of United Nations' and some of its subordinate bodies beginning with 'FAO'.

3) Entering corporate bodies under the name of the higher body would often cause inconvenience for the searcher, especially in large catalogues and shared systems. The use of indirect corporate headings can sometimes appear meaningless to catalogue users. Names "can be considerably distorted because of re-arrangement of the elements of the name and, in many codes, by translating the name of the jurisdiction" (Greig, 1995: 387).

4) The addition of a geographic name to the beginning of headings for corporate bodies often does not make sense in the online environment. Exact searching and truncation on headings beginning with the name of a jurisdiction or geographic name often result in too many hits. Headings like 'Australia. Australian Parliamentary Observer Group', 'Canada. Canadian High Commission' and 'Canada. Canadian Armed Forces' which are problematic for searching could be more straightforward if 'Australia' and 'Canada', were omitted from the heading.

5) In most cases truncation on corporate headings does not make sense because of the similarity in the first few words at the beginning of such names particularly when corporate bodies are entered under a higher or government body or heading beginning with geographic names. Also in brief displays, because of screen limitation, the name of the parent body alone may fill the allotted space. A possible approach, which depends on the software used, is to avoid repeating the name of parent body but to display the name of subordinate bodies for better differentiation.

6) Clustering of all the publications of different departments and divisions of a corporate body is not usually sought by searchers. Also, it does not make sense in brief displays where, because of screen limitation, only the first few elements of the heading are displayed thus obscuring the name of the actual issuing body. Consider, for example, how frustrating the retrieval of publications of different subordinate bodies of the United Nations would be in an online catalogue).

2.7.3 Conclusion

It can be concluded that direct headings, i.e., subordinate bodies under their own heading, would lessen these problems, provided that the heading for the subordinate body is self-sufficient. There are a number of factors that also justify this:

- direct headings form a shorter string and are more suitable for online displays, especially for brief displays,
- most searchers are usually looking for the publications of a given subordinate body and are not interested in the parent body (12),
- truncation on direct headings (name of subordinate bodies) is more useful than on indirect headings (name of parent bodies).
- alternative approaches could be provided by means of authority control. As with advanced name authority files linked to the bibliographic file it is possible to search names in different forms, considerations should also be given to any form which may be looked under by catalogue searchers.
- The addition of geographic names or a general designation to corporate headings for their further identification or differentiation should be re-examined with regard to the difficulties of searching such names. The present approach in AACR2 rule 24.4, in that a general designation or a geographic name is added in parenthesis to the corporate heading for further identification or differentiation should be followed in other cases.

In general, while a fuller form of personal names seems more useful in the online environment, corporate names need a simpler approach in that, for example, direct headings for subordinate bodies are more responsive to the search/retrieval/display capabilities of online catalogues. Nevertheless, the problems of corporate headings in online catalogues such as the form and structure (e.g., official name versus name most frequently used; most frequently used versus conventional or modified name; language; transliteration; punctuation and display problems) require further research.(13)

2.8 Principles for online display of bibliographic information

Since cataloguing codes basically deal with providing description of and access to bibliographic entities, it is reasonable that they should also give guidance for data representation and identification, i.e., record displays and arrangement. Description and access are most effective if the information on the catalogue record is clear, useful and adequate for different users. This is in line with the objectives of the catalogue, in that the catalogue should help in the better identification of works/items.(14) While one of the major differences of online catalogues from card catalogues is their extensive ability for displaying bibliographic information in a variety of formats, AACR2 does not provide any guidelines for online displays and many problems in online display stem from the treatment of its rules. Also, many problems in online display could be attributed to lengthy headings prescribed in the code.

2.8.1 Problems in online displays

The ways in which bibliographic information is displayed online have often been criticised by cataloguers. Hagler (1989: 212) argues that output formats have floated somewhat adrift of cataloguing codes and seem to be considered by many to be independent of cataloguing rules. Coral (1992: 29) points out that the elements chosen for display can either bring users to the material sought or provide a bewildering array that turns them away. With regard to the shortcomings of current cataloguing codes in

relation to online display of bibliographic information, Crystal Graham (1995) criticises AACR2 as having been written for use in a card environment and points out that the code does not address the problems posed by the online display of entries for different types of publication. In a series of messages posted to AUTOCAT on 9 May 1995, the lack of uniformity in OPAC displays was criticised. McRee Elrod (<jelrod@IslandNet.com> in an Internet article posted to AUTOCAT, 16 January 1996, reviews some of the problems that diminish the value of catalogue records when displayed online. He states that many OPAC displays deconstruct the bibliographic record.

One of the difficulties faced by the user of online catalogues lies in the wide variations in possible format. This is largely due to the fact that, unlike card catalogues which had a fixed storage/display format and usually presented the same level of information, online catalogues differ from one another both in display formats and in the levels of information displayed. These variations may often confuse the user, particularly when moving from one catalogue to another, for example, in searching different remote catalogues through the Internet.

A common problem in online displays is related to the brief display, where the information is often the one-line record which is inadequate or confusing for identifying items. For example, in response to a query for a voluminous work by a given author (e.g., 'Hamlet' By Shakespeare), the brief display may show the author heading and the title repeated on every line, the only element being the date of publication (visit the "Demonstration of OPAC Designs" at: <http://wilma.silas.unsw.edu.au/students/rfattai/demo.htm>). This sort of brief display does not make sense to the user. To increase clarity and save space, it is desirable to include author statement (main entry heading) once only, where it applies to multiple retrieved records. The display of long corporate bodies also has implications for online catalogues, especially for brief displays: not only may heading displayed not be distinct enough to identify the body conclusively, but also the title probably cannot be displayed completely.

Another problem in online display of bibliographic information concerns the labels for different fields. In some cases not only do labels in the full display not help in the identification of the relation of a contributor to a work/record (e.g., the label 'Author:' for relations such as 'edited by', 'translated by', 'compiled by', 'narrated by', 'sponsored by'), but they may also confuse the searcher as to the relevance of the work to his/her information need. As another problem, McRee Elrod (<jelrod@IslandNet.com> points to the practice in some OPACs of displaying 245\$a\$b (title proper and subtitle), followed by all 1XX and 7XX (main and added entries) labelled 'authors'. Just what the relation of 'authors' to the work might be cannot be determined since 245\$c (statement of responsibility) is nowhere to be seen (Elrod, 1996: 2). To avoid such problems, AACR should prescribe the terms to be used in labels, the order of fields and subfields in the display.

Library materials are different in terms of their nature and the data elements necessary for their description and access. The case of serials is a notable one: the author/title/publication date contents approached generally useful for monographs is not applicable to serials; they are rarely entered under author, and the date of first publication can often be more confusing than helpful (Graham, 1995).

2.8.2 Principles for online displays

For the useful display of bibliographic information at national and international levels, AACR2 should develop guidelines for the minimum requirements for bibliographic displays at different levels, similar to those already provided for levels of cataloguing, but in greater detail. A more international approach toward online displays would be useful, since catalogues from many countries with different languages and scripts are increasingly accessible through the Internet. Online display of bibliographic information should take into account the potential retrieval of records by a variety of remote users. The ISBD, if re-examined thoroughly with regard to the above-mentioned problems, could offer a solution to some of the questions of bibliographic displays in an online network environment. The identification of appropriate headings and other data elements for online displays needs to be considered with respect to the capabilities as well as to the limitations of the online catalogue. In this respect, access points or headings need to be complete and, if necessary, provided with qualifiers. It is essential that the user should be able to interpret the information on retrieved records; for example, the relationship of any data element to the record should be displayed in a clear way that will be useful to the searcher.

In order to identify what data elements are needed for display, consideration should be given to the different functions of the catalogue. A major question in this respect is: which functions are to be considered important for each display level? For example, should the brief display fulfil the identifying as well as the collocating function, and how far? Further, the nature of the relationship between two elements, e.g., authors and titles, should be clear at each display level.

2.8.3 Proposed levels of display

In coping with the needs of a variety of users, bibliographic information could be displayed at different standard levels. Similar to the levels of cataloguing in AACR2R, the levels of display could vary in terms of how much information is to be displayed. The format and the minimum information (i.e., data elements) required for each level should ideally be defined and agreed upon internationally. The flexibility provided would allow for a choice of displays and for different catalogues to present bibliographic information according to their purposes, while keeping a degree of uniformity at the national and international levels. Online displays, at each level, should help the searcher to decide on the potential relevance to his/her need of the items retrieved. One proposed approach to the levels of display is as follows:

--**level one** may include, in one or two lines, the heading for the principal creator/responsible person, title, edition information and date of publication, if needed for better identification of the entity at this stage.(15)

--**level two** may include, in two lines, the heading for the principal creator/responsible person, title, statement of responsibility, edition information, date of publication, language, readership level and type of material. This would make it easier for the user to scan possible records before choosing one. The information, i.e., data elements, in levels one and two should also allow for the sorting and arrangement of retrieved records according to user requests. In online catalogues and in the case of first and second levels of display, it is possible to change the order of a retrieved record for sorting and display, for example, according to the authors' name, titles, dates of publication and language.

--**level three** may include the full bibliographic information with all descriptive elements, similar to level two in ISBD, plus holdings and location information.

--**level four** may include the full bibliographic information plus such information as the table of contents, a summary or an abstract, and full text, if available, or the Internet location for it.

2.8.4 Conclusion

The principles and rules for display should determine for each level what data elements need to be displayed and which functions are expected to be fulfilled. For example, at the first level when more than one record is retrieved in response to a query, the name of the principal author, truncated title and the date of publication do not provide enough information to the user to enable them to determine the relevance of the item. Cataloguing principles, and particularly cataloguing codes, should indicate other useful information such as the edition statement, the name of at least another joint author or contributor and the format of the item. In summary, all the above mentioned considerations emphasise the need for a formulation of relevant principles for online display, a concept that is essential to the integrity and usefulness of online catalogues.

3 SUMMARY AND CONCLUSIONS

This paper is aimed at re-examining the principles of AACR2 in light of the different characteristics of the catalogue production technology. The matching of some of the basic AACR2 principles against individual search/retrieval/display capabilities of the online catalogue revealed that, while a number of fundamental principles, such as the main entry, uniform titles and uniform headings, remain valid in the online environment, current principles are not entirely adequate for online search/retrieval/display requirements. There is a need for additional principles so as to secure more effectiveness in the searching, retrieval and display of bibliographic data, e.g. concerning the basic unit of description, bibliographic relationships and online display of bibliographic data.

The following conclusions are derived from the examination of a number of AACR2 principles carried out in the light of the various capabilities of the online environment.

3.1 Functions of the catalogue

Conceptually, the objectives and functions of the catalogue are independent of its physical form and arrangement. Technology can, however, influence the way in which these functions are carried out: the more developments there are in the technology of catalogue construction and in the online environment, the more possibilities there are of achieving those objectives and functions.

Due to the wide and varied use of bibliographic records in the online environment, the scope of catalogue functions should be expanded in AACR to encompass additional functions. The two basic functions (i.e., the finding function and the collocating function) remain valid, but the catalogue also can serve: to further identify entities, to choose one item over similar items, to locate items and copies of items and to maintain databases in terms of record updating. The relating (i.e., collocating) function is of particular importance in the online environment with hypertext facility. While the finding function is an approach common to almost all bibliographic

databases, the collocating function is more important to library catalogues and, to some extent, to publishers' databases than to other communities such as A & I services. However, in the online environment, with a variety of users, all the functions of the catalogue need to be given consideration.

3.2 The basis for description of bibliographic entities

In terms of the basis for description, AACR should consider all the different functions of the catalogue and should take a hybrid approach, in that both the work and the physical item should be taken into account. The multi-level record structure, as demonstrated in the Prototype catalogue of Super Records, can incorporate this hybrid structure without the need for radical changes to the MARC bibliographic format. To avoid online retrieval problems for works appearing in different editions and manifestations, as well as for a more useful collocation and display of such works, the concept of super records for works could be applied, particularly in those catalogues which consider the collocating function as being equally important to other functions. To achieve this, principles are needed concerning the structure of super records, categorisation of entities in the bibliographic hierarchy, the data elements associated with the entity at each level, particularly for uniform titles, and also principles for establishing and maintaining bibliographic relationships.

3.3 Structure of the catalogue

AACR should provide guidelines for the construction of different files (e.g., bibliographic, authority and holdings and also the links between them) and also for the indexing of different fields and sub-fields concerning access to required elements in the record. The principles should also suit the structure of a hybrid system including both MARC records for access to items and super records for providing a multi-level approach to works, their expressions and manifestations. In such a catalogue different indexes are needed for both string searching and browsing. A possible approach would be to provide guidelines for the construction of (hypertext) browsable indexes for names (personal and corporate) and titles (titles proper, uniform titles, and series). It is also useful to provide name authority files (like those offered by SIRSI and PALS systems (15)) and a uniform-title authority file for searching and browsing.

3.4 The concept of main entry

Rather than being the locus of complete information for the bibliographic record or the primary access point, main entry is an important concept that maintains some basic functions of the catalogue, that of identifying and collocating, in a uniform way, different expressions and manifestations of a work. In other words, if a major function of the catalogue is to identify and collocate works as well as their editions and manifestations, there is a need for a concept such as main entry. The lack of such a concept could result in failure to place a publication in the context of its bibliographic relationships. Main entry is particularly needed in the online environment for the useful retrieval, display and arrangement of search results. Unless we devise new mechanisms for the uniform identification and collocation of the different manifestations and editions of a work, it would be unwise to abandon the concept of main entry.

Nevertheless, in order to delineate the concept more clearly and to avoid confusion as to its functions, main entry is in need of re-definition. The new functional definition should address the validity of the concept in terms of its various functions, irrespective of the catalogue's physical environment.

3.5 The concept of uniform titles

Similarly to the concept of main entry, uniform titles are needed in online catalogues to perform some basic functions such as providing links between different expressions and manifestations of a work and to distinguish among works with identical titles proper. Because of present problems in the online retrieval of the various expressions and manifestations of works, a concept such as a standardised form of the title of a work can serve to identify and collocate them. In online catalogues (particularly with hypertext facility) uniform titles need to be simplified in order to avoid online retrieval problems.

3.6 The principle of uniform headings

It is difficult to maintain the integrity of the catalogue and to fulfil its collocating function without maintaining the principle of uniform headings. Uniformity of headings for authors and titles is especially important in network environments, where different catalogues and other bibliographic databases are accessible to the user through the same terminal. The principle is also of particular significance in shared cataloguing systems and union databases. Library cataloguing, book trade bibliographic databases and A&I services should at least be consistent or compatible in certain areas such as uniform headings. In effect, standardisation or compatibility in the form of headings, which has long been recognised as a highly desirable requirement for universal bibliographical control (UBC), becomes more critical in the global online environment.

3.7 Content and form of name headings

In terms of the form of personal and corporate name headings for effective searching, retrieval and display, online catalogues need a simpler approach. The form of headings needs to be reconsidered in terms of its suitability for different searching patterns (exact as well as keyword searching) and for display. For example, given adequate software, full forms of name should satisfy searchers seeking either that form, or only the surname plus initials. But searching under single letters, such as initials, is still a technical problem for many library systems. For corporate bodies, direct headings are usually more responsive to online search/retrieval/displays.

A new comprehensive study like the one carried out by Verona in 1975 is needed to address problems of corporate headings, this time, however, with regard to the different capabilities and limitations of the online environment, especially when remote access is available to a variety of collections in different languages.

3.8 Wider application of the principles

Current cataloguing principles are not based on the overriding requirements of different users in a variety of environments. There could be advantages if we could arrive at a body of principles which could serve to reconcile the bibliographical practices of

publishers and booksellers with those of libraries, bibliographic utilities, national bibliographies and the archival community. It would also be advantageous if A&I services and library cataloguing practices could come closer in terms of providing consistent access to bibliographic information, particularly in terms of the form of name and subject headings. Although the objectives and functions of book trade databases, A&I databases and library catalogues are different from one another, the entries created by each community need to be consistent or at least compatible for the purposes of record exchange and database searching. An ideal solution would be for each community to conform to national name authority files. For this to become a realistic goal, however, may require more technology, greater determination and more person-power than is currently available.

Cataloguing concepts are derived mainly from elements that represent the nature of bibliographic entities. In general, it can be concluded that there is not such a close relationship between the conceptual foundations of AACR and the technology of catalogue construction. Nevertheless, just as the physical limitations of paper or card technologies imposed some practices, such as the 'rule of three' limiting the number of access points, the search/retrieval/display capabilities of online catalogues require that some principles and rules should be modified to take advantage of the new technology whereby computers are able to manipulate, modify and organise or reorganise bibliographic data far more effectively than was possible in the manual environment.

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NOTES

1. For a full review of the literature on AACR2 and the online environment see Fattahi (1995). Also the relevance of cataloguing principles and rules to the online environment has been addressed elsewhere (Fattahi, 1996b).

2. A search in the University of New South Wales OPAC (dated 21/3/1996) under the exact title 'Hamlet' retrieved 108 records of which 10 records had no relationship to Shakespeare's Hamlet (see below). Another search under 'Shakespeare' and 'Hamlet' in cross-index keyword resulted in 148 records. A further search under the title keyword 'Hamlet' retrieved 170 records of which many records had no relationship to Shakespeare's Hamlet. Finally, a subject search under 'Shakespeare, William. Hamlet' resulted in a large number of records. A search under 'Hamlet' in the uniform title index in University of California's MELVYL resulted in 282 records:

Type of search	Number of matches
Exact title search	108
Cross Index keyword search	148
Title keyword search	170
Subject search	100

(Visit also *Demonstration of OPAC Designs* (<http://wilma.silas.unsw.edu.au/students/rfattahi/demo.htm>) for the results of the same search in different online catalogues.

3. It should be noted that LC has virtually repealed the force of AACR2R 1.11 as well parts of chapter 11 dealing with microform reproductions.

4. This depends on the ability of the system to point to the relevant index for authors or titles first (e.g., browsable name indexes).

5. According to AACR2R (1988: 2):

It will be necessary, however, for all libraries to distinguish the

main entry from the others when:
a) making a single entry listing
b) making a single citation for a work (as required for entries for related works and for some subject entries).
In addition, the concept of main entry is considered to be useful in assigning uniform titles and in promoting the standardization of bibliographic citation.

6. Default listing is the predefined display of data elements in that a value is automatically assigned by the system if no other value has been specified.

7. As an example, Chan (1983: 24) points to an author (Lauran Paine) whose name has been represented by sixty-five different headings in a catalogue! A search by this researcher in the catalogue of Universiteitbibliotheek Utrecht, Netherlands (accessible at <http://pablo.ubu.ruu.nl>) revealed that the name of the Persian epic poet, Ferdowsi, has been represented by 13 different headings; thus the catalogue is unable to display together all his works.

8. It is interesting to note that, in references and bibliographies at the end of books, dissertations, and papers, all the cited works of an author, which usually include both articles and books, usually appear under a uniform heading. Also in book indexing (i.e., providing back of book indexes) uniform headings are considered an important principle.

9. The exception is, of course, where authors writing under different names for different sorts of works can have these separate identities preserved by means of two or more author headings in the catalogue (Rule 22.2B2 in AACR2R).

10 This treatment is not common to bibliographic databases outside the library environment. For example, the heading: Lawrence, D. H. is more common in the book trade than the heading: Lawrence, David Herbert; whilst the form Lawrence, D. H. (David Herbert) is probably unique to AACR.

11. Little has been written on the form of corporate headings in an online environment. Some of the complications of searching corporate names in online systems have been briefly addressed by Arlene Taylor (1984), Brunt (1992) and more fully by Greig (1995). The result of a study by Henty (1986), concerning unsuccessful keyword searching, indicates that the reasons for the users' search failures are, to some extent, due to the implications of variant forms of corporate names.

12. According to Lubetzky (1953: 52), it is reasonable to expect that entry under the subordinate body will facilitate the location of its publications, since they are most frequently cited and looked for directly under the subordinate body's own name; and it will also prevent the congestion of entries under the name of the parent body. He proposes that if the subdivision has a proper and self-sufficient name of its own, it should be entered directly. Greig (1995: 387-388) point out that indirect headings can often be considerably distorted to users and can be a source of confusion to them.

13. It should be noted that the question of record displays and arrangement was in Cutter's rules. In a sense, we would be returning to his broader view.

14. As an example of perversities in online display of bibliographic data, some online catalogues do not display authors' name only titles, under subject headings.

15. A demonstration of SIRSI is available at: <http://www.sirsi.com/webcattoc.html>.
A demonstration of PALS is available at: <http://bingen.cs.csbsju.edu/pals/hyperpals.html>.

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APPENDIX ONE

A brief review of major developments and changes in descriptive cataloguing and in the technology of catalogue production since ICCP, Paris, 1961.

More than thirty five years have passed since the Paris Conference and cataloguers have witnessed profound changes in many aspects of catalogue production technology and also in bibliographic control and access during this period of time. In general, changes and developments in the technology of catalogue production can be summarised in three categories as follows:

1.2.1 Changes/developments in record creation and catalogue production

- Development of MARC formats and the utilisation of MARC records for different library operations in an integrated online library system,
- Development of ISBDs for further standardisation of bibliographic description,
- Growth of bibliographic networks such as shared cataloguing systems, bibliographic utilities, and union databases,
- Enhancements in the structure and content of records by incorporating full records augmented by information such as tables of contents, summaries, content notes, abstracts and links to full electronic texts, and considerable increase in the length of fields in bibliographic records,
- Wider range of applications of bibliographic records within library systems and commercial vendors such as publishers and booksellers.

1.2.2 Changes/developments in searching, retrieval and display

- More advanced and user-friendly interfaces, such as graphic user interfaces (GUIs)
- Access is no longer controlled by cataloguing principles and rules to the same extent as previously but, to some extent, is now governed by various search/retrieval capabilities that were not available in the manual catalogue. For example, access through keyword searching, truncation, Boolean searching, hypertext searching and, most importantly, access to the full text of items, lie outside of cataloguing rules.
- Larger number of access points to bibliographic records: authors, titles, author/title, subjects, call numbers, ISBNs and ISSNs,
- Ability to display bibliographic information in a variety of formats,

1.2.3 Changes/developments in availability and access

- Access to full texts and virtual copies,
- Integrated access to different types of bibliographic files, such as remote catalogues, A&I databases and bibliographic databases provided by publishers and book trade persons.
- Because of such facilities catalogues are used by a broader spectrum of users with varying needs and expectations.