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FRBRization: A Method for Turning Online Public Finding Lists into Online Public Catalogs

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In this article, problems users are having searching for known works in current online public access catalogs (OPACs) are summarized. A better understanding of AACR2R/MARC 21 authority, bibliographic, and holdings records would allow us to implement the approaches outlined in the IFLA Functional Requirements for Bibliographic Records to enhance, or "FRBRize," our current OPACs using existing records. The presence of work and expression identifiers in bibliographic and authority records is analyzed. Recommendations are made concerning better indexing and display of works and expressions/manifestations. Questions are raised about the appropriateness for the creation of true catalogs of client-server technology that deliver records over the Internet.

To judge from the multiple projects afoot to try to FRBRize the display and indexing of cataloging records, there seems to be a general recognition these days of the problems catalog users are having with multiple-expression (edition) works in our online public access catalogs (OPACs). Among these projects are those by VTLS, OCLC, RLG, and the Library of Congress Network Development and MARC Standards Office.¹ However, these projects appear to have been designed without complete awareness of the degree to which our existing records could be used to FRBRize catalogs, and they sometimes seem to be based on misunderstandings of how the existing records work and what they were designed to do. (See appendix A for a brief review and critique of FRBRization projects.) This paper is an attempt to explicate the hidden complexities of our millions of existing bibliographic and authority records and to show ways to improve catalog design based on a better understanding of these records.

I would like to emphasize that my focus is on recommending more intelligent use of our millions of existing MARC 21 bibliographic, authority, and holdings records in order to improve system design and to FRBRize OPAC displays and indexes. There are other ways in which our practices could be changed to create better and more FRBRized catalogs, such as changes in the cataloging rules, the MARC 21 format, and the whole infrastructure of the shared cataloging environment, but these other approaches are beyond the scope of this paper.

I will begin by trying to describe the types of problems users are having now because of the fact that our catalogs do not seem to recognize that the work a user is seeking is rarely represented by a single bibliographic record; instead it is usually represented by multiple authority records for its author, subsidiary

authors (such as translators), and for the work itself, as well as by multiple bibliographic records for its various expressions/manifestations. Then I will briefly review the FRBR entities with emphasis on the entities work, expression, and manifestation. Next, I will point out where work identifiers exist in our current AACR2R and MARC 21 bibliographic and authority records. I will then discuss the difficulties of using computer algorithms to identify expressions/manifestations (formerly known as editions), as some of the FRBRization projects do, since the records were designed to impart such information to humans, not to machines. Finally, I will suggest some possible solutions to the problems users are having with our current display and indexing of works that exist in multiple expressions/manifestations.

Users' Problems with Current OPACs

Probably one of the most common OPAC searches is for a work of which the author and title are known. FRBR's entities, as well as AACR2R itself, owe a great debt to the work of the cataloging theorist, Seymour Lubetzky.² Lubetzky warned us repeatedly of the problems that arise for library users due to change and variation of work identifiers, both authors (corporate and personal) and titles. Given that fact, one would think that a well-designed catalog based on Lubetzky's principles and the FRBR model derived from them would:

1. allow a user seeking a particular work to do so using both the author's name and the title in combination;
2. take the user's search and match author terms against authority records for authors, as well as title terms against authority records for works, so as to pick up any name or title variants or changed names or titles the user may have used in his or her search; and
3. produce a list of all expressions/manifestations of the work (Lubetzky would have used the word "editions"), with separate lists of works about the work and other related works, so that the user could be free to make his or her own decisions about which expression/manifestation is of interest and whether or not works about the work or related works might be of interest.

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Surprisingly, we still do not have catalog software that can do any one of those three things. I take the Library of Congress's (LC) OPAC as an example, but I want to make clear that no other catalog software is any better. We are all in the position of having to choose among undesirable alternatives when it comes to selecting OPAC software, due to the fact that it is designed by people who have apparently never heard of Lubetzky or FRBR and who have not, therefore, understood the principles that underlie the AACR2R records that are indexed and displayed in their software.

When you access LC's OPAC, at catalog.loc.gov, you are first asked to choose between a basic search and a guided search. Additional information tells you that the basic search includes a search by "Title or Author/Creator," while the guided search allows you to "construct keyword searches." Because we want to search using both title and author or creator, it appears that neither one of these searches will work for us.

Now we insiders know that, in fact, if you want to use both an author and a title in a search, you can construct a keyword search to do so. This fact is not self-evident to anyone but us; however, as we know from experience at UCLA, where there was a faculty rebellion over the loss of the old name-title search in our last OPAC, despite the fact that the default search on the initial screen of our current OPAC was always a keyword search, and if someone entered author terms and title terms, the result would be the rough equivalent of the old name-title search, with somewhat less precision. UCLA faculty did not recognize that keyword was roughly the same as name-title; I suspect that means most other catalog users would not recognize it, either.

However, if we use our inside knowledge and put our author words and our title words into a keyword search in the LC catalog, we get some results. But are we getting all the expressions of the work we desire? Consider the case of a user who wants to look through all available editions of *Tom Sawyer*; perhaps this user wants to get an idea of the bibliographic history of this important work of American literature, or perhaps he or she wants to select an edition to read or purchase but does not know what editions have been published. This user has a vague memory that librarians use an author's real name in the catalog. Indeed, we used to do this long ago, and it is the rare user or librarian, who makes it a habit to keep up with the latest cataloging rules. Consequently, this user is going to search for *Tom Sawyer* using the name Samuel Clemens.

When we do a guided keyword search for Samuel Clemens as author keywords and *Tom Sawyer* as title keywords, we get but six results, the first of which is a motion picture, despite the fact that motion pictures did not even exist in the time of Samuel Clemens, and his work was a novel, not a motion picture. Nowhere

is there any indication that there are many more editions of *Tom Sawyer* under the name Mark Twain. The sad fact is that whenever you do a keyword search in most current OPAC software, your search will not be matched against authority records. I should observe that SIRSI is a possible exception, as it gives libraries the option of a keyword search that searches authority records, an option that unfortunately many libraries do not implement.

Perhaps our imaginary user will realize that it doesn't make sense for LC to only have six editions, related works, and so on, of *Tom Sawyer*, and he or she will retry the search using "Mark Twain," thus doing the work the authority records should be doing.³ When we do this, we get 239 results. The first twenty-five to display do not include a single edition of *Tom Sawyer*. In other words, sound recordings, motion pictures, adaptations for children, and works about Tom Sawyer are listed higgledy-piggledy with editions of the work, and there are so many of the former that none of the latter display on the first screen.

To use Lubetzky's terminology, rather than a catalog, this is a finding list. We should refer to these not as OPACs but as OPAFLs! Call me Cassandra, but the fact that we can't carry out the objectives of the catalog so eloquently described and urged upon us by Lubetzky does not bode well for our future as a profession. The rest of the world has become enamored of Google. Google cannot carry out the objectives of the catalog, either. But if our choice is between OPACs, which are expensive but cannot carry out the objectives of the catalog, and Google, which is cheap and cannot carry out the objectives of the catalog, I know what the choice is likely to be. When we try to argue for the continuing existence of our profession on the basis of our expertise in the organization of information, what scholar in the humanities is going to stand up for us, after spending a career trying to navigate the chaos we have created in our online catalogs for those who are looking for known prolific works?

What can we do about this situation? The rest of this paper is an attempt to provide an answer to this question. It requires complex indexing and displays in order to make catalog use appear simple to the user. Unfortunately, this type of system design could apparently be done more easily back when we had the use of powerful mainframe computers than it seems to be able to be done nowadays in a client-server environment in which records are served up (slowly!) over the Internet.

To solve the problem, it is essential that we find and educate system designers who can grasp the fact that the complexity of our records is a direct result of the inherent complexity of the bibliographic universe; that a work is created over time, as its various editions (expressions/

manifestations) are published; and that as that work is created, the work and its author can come to be known and identified by a number of different names. It is critical that we educate a generation of system designers to the point that they can recognize that the fundamental assumption that our current software makes—that its job is to find one record at a time—is antithetical to the work of a real catalog.

FRBR Entities

Section 3.2 of the *Functional Requirements for Bibliographic Records* defines the following entities: work, expression, manifestation, item, person, corporate body, concept, object, event, and place. However, FRBRization projects being considered here have focused only on the entities work, expression, manifestation, and item.

Work is defined in FRBR as “a distinct intellectual or artistic creation” (3.2.1). Three examples of three distinct works given in FRBR include J. S. Bach’s *The Art of the Fugue*, William Shakespeare’s *Romeo and Juliet*, and Franco Zeffirelli’s motion picture *Romeo and Juliet*. The last two works, a play and a film based on that play, will be referred to as *related works* in this article.

Expression is defined in FRBR as “the intellectual or artistic realization of a work in the form of alpha-numeric, musical, or choreographic notation, sound, image, object, movement, etc., or any combination of such forms” (3.2.2). Examples of expressions given in FRBR include the following:

- w1 Ellwanger’s *Tennis—bis zum Turnierspieler*
 - e1 the original German text
 - e2 the English translation by Wendy Gill
- w1 Franz Schubert’s *Trout quintet*
 - e1 the composer’s score
 - e2 a performance by the Amadeus Quartet and Hephzibah Menuhin on piano
 - e3 a performance by the Cleveland Quartet and Yo-Yo Ma on the cello

Manifestation is defined in FRBR as “the physical embodiment of an expression of a work” (3.2.3). One example of two manifestations of a single expression of a single work given in FRBR is:

- w1 J.S. Bach’s *Six suites for unaccompanied cello*
 - e1 performances by Yo-Yo Ma recorded in 1983
 - m1 recordings released on 33 1/3 rpm sound discs in 1983 by CBS Records
 - m2 recordings re-released on compact disc in 1992 by CBS Records

Item is defined in FRBR as “a single exemplar of a manifestation.” Thus, if the library had two copies of

the 1992 Yo-Yo Ma compact disc, each copy would be an item.

Work Identifiers in Bibliographic Records

By way of preliminary discussion, it should be noted that not all catalogers identify works in their bibliographic records other than in an incidental or accidental way. There are a number of reasons for this. One is the steady deprofessionalization of cataloging; there are a number of catalogers working in the field who were never given a proper cataloging education. Another is the discouragement offered catalogers over the years by OPAC (OPAF) software that did not properly index and display works; catalogers would justifiably ask what is the use in investing effort in identifying works properly in our records if users never benefit from our labor?

I would submit that this situation should not discourage us from trying to FRBRize our catalogs; rather, it should provide a stimulus to our efforts. If we can design catalogs that make proper use of our records, the records that are not yet correctly done will stand out and will call for revision. Also, there may be an impetus to reprofessionalize cataloging to ensure that everyone who catalogs receives a professional education grounded in the principles of cataloging.

AACR2R Chapter 21 calls for the identification of works of single personal authorship by means of the author and the title in conjunction. Works that do not have a single personal author may be identified by a corporate body and a title in conjunction (for example, an annual report or a law), or by title alone (common with films, for example).

Therefore, while the work will consistently be identified by the same alpha-numeric string (once known as the main entry, but more usefully called a work identifier), as will be seen in the following, this alpha-numeric string may be tagged several different ways in the MARC 21 format, may occur in either one MARC 21 field or two, and may occur in several different kinds of MARC 21 records (either bibliographic records or authority records). It should be noted also that a work can have several different relationships to a particular bibliographic record.

The bibliographic record may represent an expression of that work. This is signalled by a MARC 21 record in four different ways. The following are all examples of work identifiers in bibliographic records that represent expressions of the work identified:

- The first is a 245 work identifier, exemplified by Michael Moore’s film work:
245 00 \$a Fahrenheit 9/11 / ...

- The second is a 130 work identifier, exemplified by the 1954 film work *A Star Is Born*:

130 0_ \$a Star is born (Motion picture : 1954)
245 02 \$a A star is born / ...

- The third is a 1XX plus 240 work identifier, exemplified by a German expression of Shakespeare's work *As You Like It*:

100 1_ \$a Shakespeare, William, \$d 1564-1616.
240 10 \$a As you like it. \$l German
245 10 \$a Wie es euch gefällt / ...

- The fourth is a 1XX plus 245 work identifier, exemplified by an expression of Shakespeare's work *Macbeth*:

100 1_ \$a Shakespeare, William, \$d 1564-1616.
245 00 \$a Macbeth / ...

The bibliographic record may represent another work that is a compilation of several works, including an expression/manifestation of the work in question.

- Example of single field work identifier in a bibliographic record for an anthology that contains Arthur Miller's work *Death of a Salesman*; this contained work, too, is an expression/manifestation of *Death of a Salesman*. The example appears in boldface:

100 0_ \$a Miller, Arthur, \$d 1915-
245 00 \$a The portable Arthur Miller / \$c edited, and with an introduction by Harold Clurman.
260 __ \$a New York : \$b Viking Press, \$c 1973, c1971.
505 0_ \$a Death of a salesman — The crucible — Incident at Vichy — The price.
700 12 \$a Miller, Arthur, \$d 1915- \$t Death of a salesman.
700 12 \$a Miller, Arthur, \$d 1915- \$t Crucible
... [etc.]

It is also possible that a bibliographic record may represent another work that is *about* the work in question.

- Example of single field work identifier in a bibliographic record for an anthology of critical essays that discuss Arthur Miller's work *Death of a Salesman*. The example appears in boldface:

245 00 \$a Twentieth century interpretations of Death of a salesman : \$b a collection of critical essays / \$c edited by Helena Wickham Koon.
260 __ \$a Englewood Cliffs, N.J. : \$b Prentice-Hall, \$c c1983.
300 __ \$a 115 p. ; \$c 21 cm.
...
600 10 \$a Miller, Arthur, \$d 1915- \$t Death of a salesman.

The bibliographic record may represent another work that is *related* to the work in question.

- Example of single field work identifier in a bibliographic record for a film that is an adaptation (dramatization) of Margaret Mitchell's novel *Gone with the Wind* (a related work). The example appears in boldface:

130 0_ \$a Gone with the wind (Motion picture)
245 00 \$a Gone with the wind / \$c Selznick International Pictures, Inc. ; in association with Metro-Goldwyn-Mayer Corp. ; produced by David O. Selznick ; directors, Victor Fleming, Sam Wood and George Cukor ; screenplay, Sidney Howard ; contract writers, Ben Hecht, Oliver H.P. Garnett and Jo Swerling.
500 __ \$a Based on the novel by Margaret Mitchell.
511 0_ \$a The players: Thomas Mitchell (Gerald O'Hara); Barbara O'Neill (Ellen, his wife); Vivien Leigh (Scarlett O'Hara Hamilton Kennedy Butler); Evelyn Keyes (Suellen O'Hara) ...
650 _0 \$a Plantation life \$z Georgia \$v Drama.
700 1_ \$a Mitchell, Margaret, \$d 1900-1949. \$t Gone with the wind.

- Example of single field work identifier in a bibliographic record for a sound disk that is the sound track recording for Woody Allen's *Manhattan* (a related work). The example appears in boldface:

100 1_ \$a Gershwin, George, \$d 1898-1937.
240 10 \$a Selections; \$o arr.
245 10 \$a Manhattan \$h [sound recording] : \$b music from the Woody Allen film, including selections from the original soundtrack / \$c music by George Gershwin.
260 __ \$a [Holland?] : \$b CBS, \$c p1979.
300 __ \$a 1 sound disc : \$b 33 1/3 rpm, stereo. ; \$c 12 in.
511 0_ \$a Gary Graffman, piano; New York Philharmonic Orchestra; Zubin Mehta, conductor; Dick Hyman, piano; Milt Hinton, string bass; Eric Cohen, drums; Lewis Eley, violin; Brian Koonin, guitar.
500 __ \$a Music orchestrated and adapted by Tom Pierson.
505 0_ \$a Rhapsody in blue — Land of the gay caballero ; Someone to watch over me ; I've got a crush on you ; Do, do, do ; Mine — He loves and she loves ; Bronco busters ; Oh, lady be good ; 'S wonderful ; Love is here to stay — Sweet and low-down ; Blue, blue, blue ; Embraceable you ; He loves and she loves ; Love is sweeping the country ; Land of the gay caballero ; Strike up the band ; But not for me.
730 __ \$a Manhattan (Motion picture)

To summarize, figure 1 (see appendix B for this and all subsequently referenced figures and tables) shows how to read work identifiers in MARC 21 records.

Work Identifiers in Authority Records

There are two kinds of work identifiers in authority records, both of which are single field work identifiers:

- The first is a 1XX plus subfield t work identifier, exemplified by Tchaikovsky's work *Nutcracker*. The example appears in boldface:

```
010 __ $a n 80056438
100 1_ $a Tchaikovsky, Peter Ilich, $d 1840-1893. $t Shchelkunchik
400 1_ $a Tchaikovsky, Peter Ilich, $d 1840-1893.
$t Casse-noisette
400 1_ $a Tchaikovsky, Peter Ilich, $d 1840-1893.
$t Nussknacker
400 1_ $a Tchaikovsky, Peter Ilich, $d 1840-1893.
$t Nutcracker
```

- The second is a 130 work identifier, exemplified by the motion picture work *Gone with the Wind*. The example appears in boldface:

```
010 __ $a n 79066095
130 _0 $a Gone with the wind (Motion picture)
430 _0 $a GWTW
430 _0 $a G.W.T.W.
```

Curiously, most of the FRBRizing projects so far have seemed determined to work with nothing but bibliographic records, with little recognition that it is the authority record that represents the work in current AACR2/MARC 21 cataloging. The VTLS project goes so far as to try to add local linking fields to bibliographic records (001 and 004 fields) rather than recognizing that our AACR2R/MARC 21 records already contain a mechanism for pulling together all of the expressions/manifestations of a work in a shared cataloging environment—the work identifier in each bibliographic record that should link to the work authority record on the basis of textual matching. The FRBR researchers at OCLC, however, explicitly note that “looking authors and author/titles up in the authority file has a significant positive impact on the matching of works.”⁴

There is some evidence that there is a desire to add subject and genre indexing at a level higher than that of the manifestation or expression level represented by a single bibliographic record (for example, the VTLS Project adds them to their work records). If that is the case, then perhaps we should be exploring the addition of subject and genre headings to work identifier authority records. For that matter, subject headings could also be useful on

other authority records, allowing us to categorize authors by gender, cultural and ethnic group, religious and political affiliation, and so on, or to categorize corporate bodies by function, geography, and so on.

For this to work, however, we would have to develop systems that were capable of recognizing complex hierarchical inheritance relationships among records. Karen Coyle discusses such a system as possibly being an object-oriented design.⁵

Expression Identifiers in Bibliographic Records

Some of the FRBRization projects appear to assume that a computer can differentiate among the various expressions of a work. These projects seem to be unaware of the fact that all of the elements in the entire bibliographic record can potentially be discriminatory between two different expressions of a work. The elements of a bibliographic record were put there for that purpose, based on hundreds of years of observation on the part of librarians concerning which pieces of data tend to provide clues about expression differentiation. However, they were designed to be read and comprehended by human beings, not by machines. Thus, the discriminatory data is usually not normalized. The FRBR researchers at OCLC state that “the information in existing bibliographic records is, in general, insufficient to reliably divide a work into expressions.” In other words, while it is sometimes the case that the information is lacking, usually it is there but not in a form designed for interpretation by computer software algorithms.⁶

Remember that all of the following can potentially vary among expressions or manifestations (editions) of a work (and this is not an exhaustive list).

1. *Title*, as when a work changes title between editions (this may be linked to expression-change or to mere manifestation-change):

```
Expression 1
Smollett, Tobias George, 1721-1771.
The expedition of Humphry Clinker ...
```

```
Expression 2
Smollett, Tobias George, 1721-1771.
Humphry Clinker ...
```

2. *Statement of responsibility*, as with translators, editors, illustrators (subsidiary authors, associated with a particular expression of a work), and as with an author who uses different pseudonyms across the various editions of one work:

```
Expression 1
The expedition of Humphry Clinker / by the author of Roderick Random.
```

Expression 2

The expedition of Humphry Clinker / by Dr. **Smollett**.

Expression 3

The expedition of Humphry Clinker / by **Tobias Smollet, M.D., with 10 plates by T. Rowlandson**

Expression 4

L'expédition d'Humphry Clinker / **traduction de Jean Giono et Catherine d'Ivernois**.

3. *Publisher and publication date* (manifestation-change, if this is all that has changed, but often associated with other changes that represent expression-change):

Expression 1

The expedition of Humphry Clinker / by Tobias Smollett, M.D., with 10 plates by T. Rowlandson. — **London : Printed for H.D. Symonds and T. Kay, 1793.**

Expression 2

The expedition of Humphry Clinker / Tobias Smollett ; edited by Peter Miles. — **London : Everyman, 1993.**

4. *Illustration statement in the physical description*, as when one edition (expression) of a work is illustrated and another is not

Expression 1

The expedition of Humphry Clinker / Tobias Smollett. — Ware : Wordsworth Classics, 1995. **333 p. ; 20 cm.**

Expression 2

The expedition of Humphry Clinker / Tobias Smollett ; introduction and notes by Thomas R. Preston ; the text edited by O.M. Brack, Jr. — Athens, Ga. : University of Georgia Press, c1990. **ix, 500 p. : ill., map ; 24 cm.**

5. *Paging, playing time or other statement of extent*, which is often the only indicator of a change of edition in the classic sense of a resetting of the type; in this example, these two items probably represent the same edition of the work (i.e., two manifestations of the same expression):

Expression 1

The expedition of Humphry Clinker / by Tobias George Smollett. — New York, Century, 1902. **372 p.**

Same Expression?

The expedition of Humphry Clinker / by Tobias George Smollett. — New York, Century, 1904. **372 p.** (Same edition of the same work (same setting of type), despite the different publication dates.)

6. *Series*, as when one edition of a work is in a series and others are not:

Expression 1

The expedition of Humphry Clinker / Tobias Smollett ; edited by Peter Miles. — London : Everyman, 1993. xxxiii, 444 p.

Expression 2

Humphry Clinker : an authoritative text, contemporary responses, criticism / Tobias Smollett ; edited by James L. Thorson. — 1st ed. — New York : Norton, c1983. xxi, 436 p. : ill. ; 22 cm. — **(A Norton critical edition)**

By the way, these examples point to a major flaw in FRBR itself. The tables in FRBR do not agree with the definitions in FRBR. The definition of expression makes it clear that some of the previous items are examples of expressions. However, the tables imply that the elements of the description that identify expressions above actually identify manifestations. The truth is that FRBR's approach of labelling an element of the description as identifying one and only one type of FRBR entity is misguided and is not based on a good understanding of how bibliographic description actually works. In fact, any given element of the description may at times identify a work, sometimes an expression, and sometimes a manifestation. For example, when the title on all expressions does not vary, the title on the item identifies the work. When the title varies from expression to expression, as in the case of translations, the title identifies a particular expression or group of expressions. There are sometimes cases where the title on the title page changes without any change in the text underneath; these used to be called *title-editions*; in such cases, the changed title identifies a different manifestation. The definitions and examples in FRBR are excellent, but the tables should be used with caution and sometimes ignored!

Expression Identifiers in Authority Records

There are some exceptions to the rule that we do not normalize expression identifiers. These exceptions occur in the case of unusually prolific works, such as the *Bible*. In these cases, cataloging rules call for adding some expression identification to the work identifiers for these works, effectively turning the work identifiers into expression identifiers. These are the only expression identifiers that appear in authority records. For example, AACR2R's rule 25.18 contains elaborate rules for adding expression identifiers to the uniform title for the *Bible*; note that work identifiers all begin by identifying the work (*Bible*) and then subarrange expressions first by language, then by version; in the bibliographic record,

the date can be appended at the end for further subarrangement.

Bibliographic record:

130_0 \$a Bible. \$l English. \$s Authorized. \$f 1990.
245 04 \$a The Holy Bible : \$b containing the Old and New Testaments, King James version, translated out of the original tongues and with the former translations diligently compared and revised.
250 __ \$a Giant print reference ed.
260 __ \$a [Nashville] : \$b Nelson, \$c c1990.
300 __ \$a 1578, 48 p., [16] p. of plates : \$b col. maps ; \$c 24 cm.

Authority record:

130_0 \$a Bible. \$l English. \$s Authorized.
430_0 \$a Bible. \$l English. \$s King James Version

The Joint Steering Committee, which is working on a new FRBRized edition of AACR, is considering adding rules that would result in the creation of many more expression-based uniform titles for other works besides the *Bible*.⁷ One caveat: If this approach is followed in a rigid fashion, with one citation order only, it may prevent users from having options that they might find most useful, as I try to explain below.

OPAC and Staff Client Indexing Requirements for FRBRization

The yawning gap between authority records and bibliographic records maintained by most OPACs ensures that users' searches for works using variants of author name or title will be highly likely to fail in most systems, or to succeed only partially (as when only editions carrying the variant forms are retrieved).

When the title variant sought by the user exists as a name-title cross reference in an authority record, users searching for a work by title (rather than author and title) may find the work only if a keyword-within-heading search of authority record headings is included as part of the title search (not done in any existing OPACs) and then only if the search results are small.

If a user does a keyword in title search on *Nutcracker*, it will succeed comprehensively only if the following see reference from the work authority record is included in the search:

400 1_ \$a Tchaikovsky, Peter Ilich, \$d 1840-1893. \$t Nutcracker

Otherwise, it will retrieve only some expressions but not all of this work (only those that were published with *Nutcracker* on the chief source of information.) For example, sound recordings made in non-English-speaking

countries will not be retrieved, even though they might be useful to an English-speaking user.

Other problems for users stem from the fact that our OPAC software lacks hierarchical sensitivity. For example, the cross-reference from FBI to United States. Federal Bureau of Investigation needs to be applied not just to that heading, but to those hierarchically beneath it, including, for example, "United States. Federal Bureau of Investigation. Counterterrorism Section."

First authority record:

010 __ \$a n 78095617
110 1_ \$a United States. \$b Federal Bureau of Investigation
...
410 2_ \$a FBI

Second authority record:

010 __ \$a n no 89021691
110 1_ \$a United States. \$b Federal Bureau of Investigation. \$b Counterterrorism Section
410 1_ \$a United States. \$b Federal Bureau of Investigation. \$b Criminal Investigative Division. \$b Counterterrorism Section
410 1_ \$a United States. \$b Federal Bureau of Investigation. \$b Intelligence Division. \$b Counterterrorism Section

The second authority record lacks the cross reference from FBI. A search for FBI Counterterrorism Section should not be allowed to fail, as it would in all current OPACs. A cross reference to a heading should also be made available to users who access any subset of that heading. For example, a cross reference to an author should be available to any user seeking one of his works identified by means of his name and the title of the work. In other words, the entities sought by users exist in catalogs as clumps of authority records related hierarchically by the use of alphabetic-numeric entry strings. All headings that begin with "United States. Federal Bureau of Investigation" belong to a clump of corporate entities that form part of the FBI, and catalog indexing and display software needs to recognize that fact.

To solve these problems, the following must be done:

1. Link work authority records with bibliographic work identifiers, including works that are identified by title alone, rather than by an author name and a title.
2. Link authority records for all headings that are hierarchically related and allow keyword searches to match across all hierarchically related authority records; for example, allow a single search that includes a variant of Tchaikovsky's name and a variant of the title *Nutcracker* to be successful by matching on the name authority record for Tchaikovsky as well as the name-title authority record for *Shchellkunchik*.

3. Allow users to search on multifield work identifiers, and do not require that the search match exactly left to right.
4. Allow users to succeed even when they search on name and title variants found in authority records, both individual records and hierarchically linked clumps of authority records
5. Enable an author-title keyword search, using both author terms and title terms, that searches both authority records and bibliographic records, such that users need not know the order of terms in the headings matched *with author terms searched only in:*

Authority records:

100
110
111
400
410
411
500
510
511

Bibliographic records:

100
110
111
600
610
611
700
710
711
800
810
811

and with title terms searched only in:

Authority records:

\$t, \$p, and \$n subfields in 100, 110 and 111 fields
\$t, \$p, and \$n subfields in 400, 410 and 411 fields

Bibliographic records:

240
245 1 _
505
\$t, \$p, and \$n subfields in 600, 610 and 611 fields
\$t, \$p, and \$n subfields in 700, 710 and 711 fields
246
740

For a name and title search, display only bibliographic records:

- that contain *both* a matched author and a matched title (in other words, AND, do not OR, the author and title terms); and
- are linked to name-title authority clumps that contain *both* a matched author and a matched title (in other words, AND, do not OR, the author and title terms).

Since an author-title work identifier is usually unique, such searches should usually retrieve only one work, but there are probably exceptions when users seek an author with a very common surname, such as Smith, and a title containing terms that match the titles of many different works, such as "report."

OPAC and Staff Client Display Requirements for FRBRization

Default multiple bibliographic record display for most searches should be by work identifier.

This is true for subject, author, or plain keyword searches. If tables must be used in multiple bibliographic displays, enable a table cell to contain a work identifier that sometimes consists of two fields and sometimes of one field, including in it any of the following that apply:

- 1XX if present
- 240 if present
- if 240 not present, 245 \$a, \$n and \$p [and possibly \$h, \$k and \$s] only
- Arrange by element from beginning to end across two fields, if necessary
- Subarrange editions of the same work by date, earliest to latest as default

Note how much easier it is to scan the first display (table 1), compared to the second (figure 2) and third (figure 3) displays. The reasons are: (a) that work identifiers are used to arrange the works (unlike the second display); and (b) that the work identifiers are put into a compressed display such that the "author" part of an author-title work identifier displays only once, and each work title appears only once, even when it occurs on multiple bibliographic records (unlike the third display). Such compression cannot be done with table displays, which are therefore much harder to scan. Figure 4 illustrates a table display that does not use work identifiers correctly.

Even if users are able to re-sort each column, they will be unable to get a work identifier sort with this type of table display, because the title portion of the work identifier is sometimes in the 245 field (third column) and sometimes in the 240 field (second column). This type of display is also overly rigid, since some works

have work identifiers that consist of title alone; consider the result of a search on "Marlene Dietrich" (figure 5).

Again, even if the user is able to re-sort a given column, it is impossible to obtain a work identifier sort, because the work identifier is sometimes in the 130 field (column 2) and sometimes in the 245 field (column 3). Even worse are those displays in which the system supplies the first 700 field in the "Author/creator" column! Such an approach shows a complete lack of understanding of the value of a work identifier in constructing displays.

Separately display the work itself from works about and related works:

Shakespeare, William, 1564-1616. ⁸	
1. All's well that ends well.	95
2. Antony and Cleopatra.	158
3. As you like it.	172
4. Comedy of errors.	97
5. Coriolanus.	151
6. Cymbeline.	132
7. Hamlet.	800
8. Henry V.	162
9. Henry VI.	133
10. Macbeth. ⁹	431
...	
25. Tragedie of Macbeth	
SEARCH UNDER:	
Macbeth	431

When the user chooses line 10, for Macbeth, the following display could result:

Shakespeare, William, 1564-1616. Macbeth.	
1. Editions of Macbeth. ¹⁰	299
2. Other works related to Macbeth. ¹¹	87
3. Works about Macbeth. ¹²	45

For users who consider a work intended for performance and a performance of that work (even one adapted into a cinematic work) to be the same work, despite the fact that the AACR2R cataloging rules treat these as two related works, it is possible that we could use leader byte 6 codes in existing records to identify sound recording and moving image, as distinct from text, and create displays of performances (whether expressions or related works) on that basis.¹³ Consider for example, the following potential display of the work *Macbeth* in response to the user's choice of line 10 above.

Shakespeare, William, 1564-1616. Macbeth.	
1. Editions of Macbeth. ¹⁴	299
2. Performance(s) of Macbeth on sound recording. ¹⁵	2

3. Performance(s) of Macbeth on film or video. ¹⁶	7
4. Other works related to Macbeth. ¹⁷	78
5. Works about Macbeth. ¹⁸	45

When the user chooses line 3, for performance(s) of Macbeth on film or video, the following display could result:

1. Classic theatre. Macbeth. 1977.
2. Hallmark hall of fame. Macbeth (1954)
3. Hallmark hall of fame. Macbeth (1960)
4. Macbeth (Motion picture : 1948)
5. Macbeth (Motion picture : 1971)
6. Studio one. Macbeth. 1951.
7. Throne of blood. Akira Kurosawa's throne of blood. 1957.

A music example:

Mozart, Wolfgang Amadeus, 1756-1791. ¹⁹	
...	
32. Così fan tutte	55
33. Country dances	2
34. Dalla sua pace	
SEARCH UNDER	
Don Giovanni. Dalla sua pace	1
35. Dans un bois	
SEARCH UNDER	
Dans un bois solitaire	2
36. Dans un bois solitaire	2
37. Davidde penitente	7
38. Davide penitente	
SEARCH UNDER	
Davidde penitente	7
39. Deh, per questo istante solo	
SEARCH UNDER	
Clemenza di Tito. Deh, per questo istante solo	3
40. Deh vieni all'afinestra	
SEARCH UNDER	
Don Giovanni. Deh vieni all'afinestra	1
41. Deh vieni, non tardar	
SEARCH UNDER	
Nozze di Figaro. Deh vieni, non tardar	13
42. Dick Sanderman speelt Mozart ²⁰	
SEARCH UNDER	
Instrumental music. Selections	19
43. Dick Sanderman speelt Mozart op het Scheuer orgel in de Hervormde kerk te Den Ham	
SEARCH UNDER	
Instrumental music. Selections	19
44. Dir, Seele des Weltalls	2

45. Dissonantné	
SEARCH UNDER	
Quartet, strings, K. 465, C major	13
46. Dissonance	
SEARCH UNDER	
Quartet, strings, K. 465, C major	13
47. Dissonance quartet	
SEARCH UNDER	
Quartet, strings, K. 465, C major	13
48. Dissonanssi	
SEARCH UNDER	
Quartet, strings, K. 465, C major	13
49. Dissonant	
SEARCH UNDER	
Quartet, strings, K. 465, C major	13
50. Dissonanzen-Quartett	
SEARCH UNDER	
Quartet, strings, K. 465, C major	13
51. Divertimenti	168
52. Dixit und magnificat	3
53. Do not fear, O best-beloved	6
SEARCH UNDER	
Non temer, amato bene, K. 505	6
54. Don Giovanni ²¹	146
...	

When the work *Don Giovanni* is chosen (line 54), this would be the next display:

Mozart, Wolfgang Amadeus, 1756-1791. Don Giovanni.	
1. Textual music ²²	79
2. Performance(s) on sound recording ²³	23
3. Performance(s) on film or video ²⁴	5
4. Film(s) and video(s) based on this work ²⁵	1
5. Other related works ²⁶	3
6. Works about this work ²⁷	35

Note that here we have chosen to distinguish between film/video expressions (line 3) and film/video related works/adaptations (line 4). When any of the above are chosen, (either Textual music or Performance(s) on sound recording or any of the others), the next display could appear:

Mozart, Wolfgang Amadeus, 1756-1791. Don Giovanni.	
1. The complete work	26
2. Selections ²⁸	14
3. Portions of the work: ²⁹	23
4. Arrangements ³⁰	7
5. [Under textual music and works about only] Chorus scores ³¹	2
6. [Under textual music and works about only] Librettos ³²	4
7. [Under textual music and works about only] Vocal scores ³³	3

If line 3, for “portions of the work” is chosen, the next display could be:

Mozart, Wolfgang Amadeus, 1756-1791. Don Giovanni.	
Portions of the work:	
1. Ah! chi mi dice mai	2
2. Batti batti o bel masetto	1
3. Dalla sua pace	1
4. Deh vieni all'finestra	1
5. Don Giovanni a cenar tecco	1
6. Finch' han dal vino	1
7. Ho capito	1
8. La ci darem la mano	2
9. Madamina il catalogo e questo	1
10. Menuetto	2
11. Mi tradi quell'alma ingrata	1
12. Mio tesoro	1
13. Non mi dir bellidol mio	1
14. Notte e giorno faticar	1
15. O statua gentilissima	1
16. Or sai chi l'onore	1
17. Ouverture	2
18. Sola sola in vuido loco	1
19. Vedrai carino se sei buonino	1

NOTE: If any given part is chosen, the same sort of display should be possible under it, namely:

Mozart, Wolfgang Amadeus, 1756-1791. Don Giovanni.	
Ah! chi mi dice mai.	
1. The complete work	
2. Selections	
3. Arrangements	

Ideally, the display software would not display any of the lines in the above displays unless at least one bibliographic record appeared under it when selected.

Another example; when line 51 (*Divertimenti*) is chosen from the initial display (instead of Don Giovanni as in the example above), the next display would be:

Mozart, Wolfgang Amadeus, 1756-1791. Divertimenti	
1. Divertimenti, K. Anh. 226, E [flat] major	1
2. Divertimenti, K. 131, D major	4
3. Divertimenti, K. 136, D major	4
4. Divertimenti, K. 137, B [flat] major	2
5. Divertimenti, K. 138, F major	1
6. Divertimenti, K. 186, B [flat] major	3
7. Divertimenti, K. 188, C major	1
8. Divertimenti, K. 205, D major	1
9. Divertimenti, K. 213, F major	5
10. Divertimenti, K. 240, B [flat] major	6
11. Divertimenti, K. 247, F major	5
12. Divertimenti, K. 251, D major	10
13. Divertimenti, K. 252, E [flat] major	6

14. Divertimenti, K. 253, F major	5
15. Divertimenti, K. 254, B [flat] major	2
16. Divertimenti, K. 270, B [flat] major	4
17. Divertimenti, K. 287, B [flat] major	7
18. Divertimenti, K. 289, E [flat] major	4
19. Divertimenti, K. 334, D major	10
20. Divertimenti, K. 439B	36
21. Divertimenti, K. 563, E [flat] major	11

When line 20 is chosen, the following display could result:

Mozart, Wolfgang Amadeus, 1756-1791. Divertimenti, K. 439B	
1. Textual music ³⁴	24
2. Performance(s) on sound recording ³⁵	10
3. Other related works ³⁶	1
4. Works about this work ³⁷	1

When line 1 is chosen, the following display might result:

Mozart, Wolfgang Amadeus, 1756-1791. Divertimenti, K. 439B	
1. The complete work	2
2. Selections ³⁸	2
3. Portions of the work ³⁹	19
4. Arrangements ⁴⁰	1

When line 3, Portions of the work, is chosen, the following display might result:

Mozart, Wolfgang Amadeus, 1756-1791. Divertimenti, K. 439B	
Portions of the work:	
Divertimenti, K. 439B. No. 1	4
Divertimenti, K. 439B. No. 1. Rondo; arr.	1
Divertimenti, K. 439B. No. 1. Selections	2
Divertimenti, K. 439B. No. 2	2
Divertimenti, K. 439B. No. 3	1
Divertimenti, K. 439B. No. 3. Rondo; arr.	1
Divertimenti, K. 439B. No. 4	2
Divertimenti, K. 439B. No. 4. Allegro (1st movement); arr.	1
Divertimenti, K. 439B. No. 4. Selections	1
Divertimenti, K. 439B. No. 5	4

Allow users the option of rearranging the expressions/manifestations of a particular work in a number of different ways.

These ways include:

1. By language
2. By translator
3. By editor or annotator
4. By illustrator

5. By edition statement
6. By publisher
7. By date
8. By performer
9. By format (e.g. manuscript vs. printed text)
10. By extent (e.g., paging or playing time)

The example using Mark Twain in figure 6 is arranged by date, but ideally a user should be given the option of rearranging by any of the columns; for example, listing all the expressions above in order by edition statement, publisher, editor or illustrator, or format. Users also should be able to construct this matrix themselves, depending on the expression identifiers of interest in any given situation. For example, if they are looking at the expressions of a musical work, including sound recording expressions, they might want the above table to include a "performer" column.

It should be borne in mind, of course, that none of this discriminatory data concerning expressions/manifestations has ever been normalized in our cataloging records, with the exception of the subsidiary author names; even so, it would seem that the recommended approach to organizing expressions/manifestations might have a rough utility for scholars in the humanities.

Subsidiary author names may still be problematic; as can be seen in figure 6, it is not at all uncommon for there to be more than one. Sometimes there are two functions being carried out, as when there is an illustrator and an editor. In that case, it might be useful to allow the user to put the different functions into different columns in the matrix, so that it would be possible to sort by editor or illustrator. Other times, two people carry out the same function, as when there are two editors. In the latter case, it may be necessary to list a particular expression/manifestation twice, although it may not be worth doing so, given the confusion it can cause users by identifying one particular expression/manifestation in two different ways, thus giving the appearance that there are two different expressions/manifestations rather than one.

Another problem with subsidiary author names is that they must be identified by means of what are called *relator terms* in MARC 21. These relator term functions are not necessarily associated with the expression level; sometimes they are associated with the work level. For example, "editor" may refer to the expression-related function of editing a classic text such as *The Adventures of Tom Sawyer* to create a definitive version of the text based on the author's (Mark Twain's) intentions. However, in the case of a film work, the film editing function produces the film work; any substantial re-editing of the same footage would produce a new work. Thus, such relator term relationships must be handled with care and subtlety in OPAC displays.

Expression-Based Records, or, the Multiple Versions Problem

Users frequently experience difficulties with the proliferation of separate bibliographic records for items that contain exactly the same content but have format variation (manifestations of the same expression of the same work, to use FRBR terminology). Such problems could be mitigated if catalogers in preserving institutions were allowed to use the MARC 21 holdings format to attach more than one manifestation to a single bibliographic record, whenever the intellectual content is known to be exactly the same and only the physical format varies. In order for this to work optimally, users would need to be given well-designed holdings displays that let them re-sort holdings by format, by location, by reproduction date, and so on.

For example, consider the following expression-based record for a film preserved at the UCLA Film and Television Archive with manifestations described as holdings appended to the expression record (first line of each holdings statement is rendered in boldface):

One hour with you / Paramount Publix Corp. ; an Ernst Lubitsch production ; produced and directed by Ernst Lubitsch ; assisted by George Cukor ; screenplay by Samson Raphaelson. — United States : Paramount Publix Corp., 1932.

Romantic comedy with songs; feature.

Based on the play *Nur ein Traum, Lustspiel im 3 Akten* (Only a dream) by Lothar Schmidt, which opened in Munich in 1909. Remake of *The marriage circle*.

CAST: Maurice Chevalier (Dr. Andre Bertier); Jeanette MacDonald (Colette Bertier); Genevieve Tobin (Mitzi Olivier); Charlie Ruggles (Adolph); Roland Young (Professor Olivier); Josephine Dunn (Mlle. Martel); Richard Carle (Detective Henri Pornier); Barbara Leonard (Mitzi's maid).

CREDITS: Photography, Victor Milner; camera operators, William Mellor and William Rand; assistant cameramen, Guy Roe and Lucien Ballard; gowns, Travis Banton; interpolated music, Richard A. Whiting; sound, M.M. Paggi.

Playing time on release was 75 or 80 min., according to: AFI catalog, 1931-1940.

Copyright notice on videodisc sleeve: ©1932, Paramount Publix Corporation, renewed 1959 by EMKA, Ltd.

HOLDINGS:

1. Inventory number: VA11168 M

1 videocassette of 1 (VHS) (80 min.) : sd., b&w and col. ; 1/2 in.

Los Angeles, California : UCLA Film and Television Archive, March 1994. Reproduced from 3/4 in. videocassettes (M56801). Reproduction for preservation purposes permitted by Universal. Tinted sequences transferred as color on videotape.

2. Inventory number: M56801

2 videocassettes of 2 (80 min.) : sd., b&w and col. ; 3/4 in.

Los Angeles, California : UCLA Film and Television Archive, March 1994. Reproduced at Video Craftsmen from 35 mm. prsv safety print (M32578). Reproduction for preservation purposes permitted by Universal.

Tinted sequences transferred as color on videotape.

3. Inventory number: M32578

5 reels of 5 (80 min.) (ca. 9000 ft.) : opt sd., b&w with b&w (tinted) sequences ; 35 mm. safety print.

Los Angeles, California : UCLA Film and Television Archive, 1986. Reproduced from 35 mm. safety prsv dupe pic neg (XFE2240 -2248 M) and dupe track neg (XFE2250 -2258 M). Reproduction for preservation purposes permitted by Universal.

4. Inventory number: XFE2240 -2248 M

9 reels of 9 (80 min.) (ca. 9000 ft.) ; 35 mm. safety prsv dupe pic neg.

Los Angeles, California : UCLA Film and Television Archive, March 1994. Reproduced from 35 mm. nitrate print (M2993). Reproduction for preservation purposes permitted by Universal.

5. Inventory number: XFE2250 -2258 M

9 reels of 9 (80 min.) (ca. 9000 ft.) : opt sd. ; 35 mm. safety prsv dupe track neg.

Los Angeles, California : UCLA Film and Television Archive, March 1994. Reproduced from 35 mm. nitrate print (M2993). Reproduction for preservation purposes permitted by Universal.

6. Inventory number: M2993

5 reels of 5 (80 min.) (ca. 9000 ft.) : opt sd., b&w with b&w (tinted) sequences ; 35 mm. nitrate print.

CONDITION: Fragile; shrunken.

Summary

Most writers on catalogs have agreed that in order for a catalog to be a catalog, it must be capable of assembling all of the expressions/manifestations of a work held in a given collection so that the user can make his or

her own selection: For example, is there an illustrated expression? If so, by whom? Are there edited expressions? If so, by whom? Are there translated expressions? If so, into what language and by whom? Do any expressions have manifestations available electronically via the Internet? If so, which expressions are so available? So far, OPACs have stumbled badly in this respect, even though the underlying records have numerous mechanisms built-in to support well-designed displays of works, related works, and works about the work. If the assembly of such complex displays is beyond the capacity of current database management and client-server software implementations that deliver records on demand over the Internet to catalog searchers, then perhaps the conclusion to be reached is that this is not the correct technology to be used in the construction of catalogs. Perhaps we are letting the tail wag the dog. Lest we become inveterate dog-waggers, perhaps we should seek new technology that is capable of producing online public access *catalogs*, as opposed to our current online public access *finding lists*.

Acknowledgments

Karen Coyle was kind enough to read a draft of this paper and make a number of very cogent and useful comments on it that improved it immensely. I am most grateful for her help in coming to a better understanding of why current systems cannot yet follow some of my recommendations. I suspect she would not agree with all of the recommendations I make, however, so I take full responsibility for those (as well as for any errors I may have made).

References and Notes

1. While *Functional Requirements for Bibliographic Records* (Munich: K. G. Saur, 1998) defines many different entities, including person, corporate body, and concept, the focus in FRBRization has been on FRBR entities work, expression, and manifestation. Thus, FRBRization could be defined as the attempt to get OPAC software to better support the indexing and display of works and their expressions/manifestations. VTLIS, Inc. Accessed Apr. 7, 2005, www.vtls.com/website.shtml. Vinod Chachra and John Espley, "Differentiating Libraries through Enriched User Searching: FRBR As the Next Dimension." Accessed Apr. 7, 2005, www.ala.org/ala/alcts/alctscoted/presentations/presentations.htm. "OCLC Research Activities and IFLA's Functional Requirements for Bibliographic Records." Accessed Apr. 7, 2005, www.oclc.org/research/projects/frbr/default.htm. Rick Bennett, Brian F. Lavoie, and Edward T. O'Neill, "The Concept of a Work in WorldCat: An Application of FRBR." Accessed Apr. 7, 2005, www.oclc.org/research/publications/archive/2003/lavoie_frbr.pdf. Thomas Hickey and Diane Vizine-Goetz, "Implementing FRBR on Large Databases." Accessed Apr. 7, 2005, http://staff.oclc.org/~vizine/CNI/OCLCFRBR_files/slide0009.htm. Thomas Hickey, Edward T. O'Neill, and Jenny Toves, "Experiments with the IFLA Functional Requirements for Bibliographic Records (FRBR)," *D-Lib Magazine* 8, no. 9 (Sept. 2002). Accessed Apr. 7, 2005, www.dlib.org/dlib/september02/hickey/09hickey.html. Diane Vizine-Goetz, "FictionFinder: A FRBR Works-based Prototype." Accessed Apr. 7, 2005, www.ala.org/ala/alcts/alctscoted/presentations/presentations.htm. Merrilee Proffitt, "RedLightGreen: FRBR Between a Rock and a Hard Place." Accessed Apr. 7, 2005, www.ala.org/ala/alcts/alctscoted/presentations/presentations.htm. Library of Congress, Network Development and MARC Standards Office, "Displays for Multiple Versions from MARC 21 and FRBR." Accessed Apr. 7, 2005, www.loc.gov/marc/marc-functional-analysis/multiple-versions.html. Library of Congress, Network Development and MARC Standards Office, "FRBR Display Tool." Accessed Apr. 7, 2005, www.loc.gov/marc/marc-functional-analysis/tool.html.
2. Seymour Lubetzky, *Writings on the Classical Art of Cataloging* (Englewood, Colo.: Libraries Unlimited, 2001).
3. Unfortunately, the archives and manuscripts people have managed to get an authority record into the national file for Clemens, Samuel Langhorne, 1835-1910 (n93099439 \$z n88274847), apparently on the grounds that he signed his letters that way; in my opinion, this goes against the intent of the concept of separate bibliographic identities in AACR2R. In fact, I'll go beyond that to argue that one of Seymour Lubetzky's few mistakes may have been to argue for the concept of separate bibliographic identities, given the fact that most OPACs encourage users to do keyword searches that do not search authority records. It has the effect of fragmenting one of the most important entities users have available for identifying the works they seek—the author entity.
4. "FRBR Work-Set Algorithm." Accessed Apr. 7, 2005, <http://oclc.org/research/projects/frbr/algorithm.htm>.
5. Karen Coyle, "Future Considerations: the Functional Library Systems Record," *Library Hi Tech* 22, no. 2 (2004): 169.
6. "FRBR Work-Set Algorithm." Accessed Apr. 7, 2005, <http://oclc.org/research/projects/frbr/algorithm.htm>.
7. Jennifer Bowen, "FRBR: Coming Soon to Your Library?" Accessed Apr. 7, 2005, www.ala.org/ala/alcts/alctscoted/presentations/presentations.htm. JSC, Format Variation Working Group. Accessed Apr. 7, 2005, www.collectionscanada.ca/jsc/current.html#ForVarWG.
8. (a) MARC 21 100 field in both authority and bibliographic records; (b) 700 field in bibliographic records; (c) 600 field in bibliographic records, all containing *Shakespeare, William, 1564-1616*. Note that in this author search, prior to the selection of this author heading, all 400 and 500 fields from the authority record for the author (here, *Shakespeare, William, 1564-1616*) should also display as search under and search also under references.
9. (a) MARC 21 \$t subfield in authority record that begins with *Shakespeare, William, 1564-1616*; (b) 240 field in bibliographic record with a 100 for *Shakespeare, William, 1564-1616*; (c) 245 field \$a in bibliographic record with a 100 for *Shakespeare, William, 1564-1616*; (d) 600 \$t subfield that begins with *Shakespeare, William, 1564-1616*; (e) 700 \$t subfield that begins with *Shakespeare, William, 1564-1616*; all containing *Macbeth*. Note that 400 and 500 fields from the work authority record for *Macbeth*

should also appear in the display under Shakespeare as search also or search also under references.

10. Include here all bibliographic records with the work identifier for Macbeth (100 plus 240 or 100 plus 245), as well as added entries for the work with second indicator 2 (MARC 21 format), indicating that they are contained in the work cataloged.

11. In the MARC 21 format, added entries for the work (700 subfield t) with second indicator blank.

12. In the MARC 21 format, 600/610/611 fields with subfield t, or 630, contain subject added entries for the work.

13. It is also possible that a change in the MARC 21 format to specifically identify related work added entries as performance added entries could lead to online catalog displays that might prevent undue confusion for users. Currently, the second indicator of an added entry for a work can be set to 2 when the work is actually contained within the work cataloged, and an added entry for a work is contained in a 7XX field. If the same second indicator were given another value for performance, it would potentially allow for the following types of display of Macbeth, as well.

14. Include here all bibliographic records with the work identifier for Macbeth (100 plus 240 or 100 plus 245), as well as added entries for the work (700 with subfield t) with second indicator 2 (MARC 21 format), indicating that they are contained in the work cataloged.

15. Bibliographic records with 100 plus 240, or 100 plus 245, or 700 12 of *Shakespeare, William, 1564-1616. Macbeth* (including any subsequent subfields) and with leader byte 6 code j.

16. Bibliographic records with 100 plus 240, or 100 plus 245, or 700 (any indicators) of *Shakespeare, William, 1564-1616. Macbeth*, and with leader byte 6 code g for moving image performances.

17. In the MARC 21 format, added entries for the work (700 with subfield t) with second indicator blank.

18. In the MARC 21 format, 600/610/611 fields with subfield t, or 630 fields, contain subject added entries for the work.

19. (a) MARC 21 100 field in both authority and bibliographic records; b) 700 field in bibliographic records; c) 600 field in bibliographic records, all containing *Mozart, Wolfgang Amadeus, 1756-1791*. Note that in this author search, prior to the selection of this author heading, all 400 and 500 fields from the authority record for the author (here, *Mozart, Wolfgang Amadeus, 1756-1791*) should also display as search under and search also under references.

20. This rather curious reference and the following one are the result of referring from the title of a particular performance (a title associated with a particular expression rather than with the work as a whole) to the title of the work as a whole. Perhaps this practice could stand some critical examination?

21. (a) MARC 21 \$t subfield in authority record that begins with *Mozart, Wolfgang Amadeus, 1756-1791*; (b) 240 field in bibliographic record with a 100 for *Mozart, Wolfgang Amadeus, 1756-1791*; (c) 245 field \$a, \$p and \$n in bibliographic record with a 100 for *Mozart, Wolfgang Amadeus, 1756-1791*; (d) 600 \$t subfield that begins with

Mozart, Wolfgang Amadeus, 1756-1791; e) 700 \$t subfield that begins with *Mozart, Wolfgang Amadeus, 1756-1791*; all containing *Don Giovanni*. Note that 400 and 500 fields from the work authority record for *Don Giovanni* should also appear in the display under *Mozart* as search also or search also under references.

22. Bibliographic records with 100 plus 240 or 100 plus 245 or 700 12 of *Mozart, Wolfgang Amadeus, 1756-1791. Don Giovanni* (including any subsequent subfields) and with leader/06 code c or d.

23. Bibliographic records with 100 plus 240 or 100 plus 245 or 700 12 of *Mozart, Wolfgang Amadeus, 1756-1791. Don Giovanni* (including any subsequent subfields) and with leader/06 code j.

24. Bibliographic records with 100 plus 240 or 100 plus 245 or 700 12 of *Mozart, Wolfgang Amadeus, 1756-1791. Don Giovanni* (including any subsequent subfields) and with leader/06 code g.

25. Bibliographic records with 700 1, second indicator blank, of *Mozart, Wolfgang Amadeus, 1756-1791. Don Giovanni* (including any subsequent subfields) and with leader/06 code g.

26. Bibliographic records with 700 1, second indicator blank, of *Mozart, Wolfgang Amadeus, 1756-1791. Don Giovanni* (including any subsequent subfields) and without leader/06 code g.

27. Bibliographic records with 600 10, of *Mozart, Wolfgang Amadeus, 1756-1791. Don Giovanni* (including any subsequent subfields).

28. Presence of subfield k and text "Selections."

29. Presence of subfield p or subfield n preceded by a period; exclude subfield p or n preceded by a comma.

30. Presence of subfield o and text "arr."

31. Presence of subfield s and text "Chorus score(s)."

32. Presence of subfield s and text "Libretto(s)."

33. Presence of subfield s and text "Vocal score(s)."

34. Bibliographic records with 100 plus 240 or 100 plus 245 or 700 12 of *Mozart, Wolfgang Amadeus, 1756-1791. Divertimenti, K. 439B* (including any subsequent subfields) and with leader/06 code c or d.

35. Bibliographic records with 100 plus 240 or 100 plus 245 or 700 12 of *Mozart, Wolfgang Amadeus, 1756-1791. Divertimenti, K. 439B* (including any subsequent subfields) and with leader/06 code j.

36. Bibliographic records with 700 1, second indicator blank, of *Mozart, Wolfgang Amadeus, 1756-1791. Divertimenti, K. 439B* (including any subsequent subfields) and without 008/33 code m or v.

37. Bibliographic records with 600 10, of *Mozart, Wolfgang Amadeus, 1756-1791. Divertimenti, K. 439B* (including any subsequent subfields)

38. Presence of subfield k and text *Selections*.

39. Presence of subfield p or subfield n preceded by a period; exclude subfield p or n preceded by a comma.

40. Presence of subfield o and text "arr."

Appendix A. Review and Critique of Existing FRBRization Projects

Network Development and MARC Standards Office, Library of Congress FRBR Display Tool

Display examples available at: Library of Congress. Network Development and MARC Standards Office, "FRBR Display Tool," www.loc.gov/marc/marc-functional-analysis/tool.html.

Critique: The Library of Congress is constrained by its OPAC software (as described above) to force a user to search either on author or on title, but not on both.

The FRBR Display Tool assumes that only bibliographic records will be searched and displayed; thus authority records cannot be used to assure that users succeed even if they search on name or title variants (the default author search in their catalog does search author authority records, but they list only bibliographic fields as fields searched in their description of the displays).

Work displays are not compressed as recommended in this article, so are bulky and difficult to scan, although there is some compression used (author and title of a work appear only once and this helps considerably).

Related works and works about are not identified as such and can appear before editions of the work sought (depending on the main entry), which makes for a more confusing display.

Not all works seem to cluster together; for example, what appear to be two editions of Dibdin's play *The Heart of Midlothian* are listed as if they were two different works.

The FRBR display tool sensibly does not attempt to discriminate between manifestations and expressions in recommended displays, but calls both "editions." As noted above, current cataloging practice assumes that humans are making this discrimination, not machines. The text describing the FRBR display tool is somewhat confusing in this regard, however, implying that only language change discriminates expressions and that all other changes (such as edition statement changes, changes in subsidiary authorship) are manifestation changes; this follows the tables in FRBR, but contradicts the definitions of these entities in FRBR, as discussed above.

OCLC FictionFinder

Screen prints available in: Diane Vazine-Goetz. "FictionFinder: a FRBR Works-based Prototype," www.ala.org/ala/alcts/alctscoted/presentations/presentations.htm

Critique: Does allow user to search using both author and title, but it is unclear whether the search is matched against authority records.

The display of "26 works" found under *author: carroll* and *title: Alice's adventures in wonderland* is rather confusing; does this include related works (adaptations, films,

and so on) and works about? If so, it would be helpful to create a more structured display that differentiates among these categories.

The grouping of expressions by language is very helpful; it is not clear whether this grouping uses bibliographic records or also draws on authority records.

The display of expressions does not include much useful information about expressions to be found in bibliographic records such as editors, translators, illustrators, edition statements ("abridged ed."), publication dates and the like.

RLG RedLightGreen

Screen prints available in: Merrilee Proffitt. "RedLightGreen: FRBR Between a Rock and a Hard Place," www.ala.org/ala/alcts/alctscoted/presentations/presentations.htm. [NOTE: In all fairness, Merrilee Proffitt says explicitly in the above paper that RedLightGreen is "not a FRBR implementation," but does go on to say that it is an attempt to "use FRBR concepts such as work, expression/manifestation to discuss how records should cluster," in order to "reduce the number of editions on the results screen."]

Critique: A known work search is not demonstrated; instead, a subject search is shown in which the user identifies a work of interest and then asks to see all available editions. The display of all available editions includes more valuable information than do such displays in other FRBRization projects, but leaves out important discriminatory information such as editor, translator, illustrator, and so on.

The display of works under the subject heading of interest (Buddhist art) does not employ work identifiers at all; all works are listed by title on item. Because of that, the editions of each work do not cluster together based on work identifier, and the user sees them only if he or she selects a hot link in the single record display called "not the right edition?" One wonders how many users understand that link and what it can do for them . . .

VTLS Virtua

Screen prints available in: Vinod Chachra and John Espley, "Differentiating Libraries Through Enriched User Searching: FRBR as the Next Dimension," www.ala.org/ala/alcts/alctscoted/presentations/presentations.htm.

Critique: Users must still choose either an author or a title search.

Unclear whether the author search is matched against authority records or bibliographic records.

The work display under Beethoven does not include cross references from authority records; for example,

there is no cross reference from "Pastoral" to "Symphonies, no. 6 . . ."

Displays of expressions are created by requiring catalogers to create nonstandard work and expression records, instead of recognizing that the MARC 21 authority record is already designed to be a work record, and that every field in a standard AACR2R/MARC 21 bibliographic record

potentially contains information to identify and describe a particular expression, as demonstrated in this paper.

The nonstandard expression record does not seem to include much useful information about expressions to be found in standard bibliographic records, such as editors, translators, illustrators, edition statements ("abridged ed."), publication dates, and the like.

Appendix B. Figures and Tables

MARC 21 work identifiers on bibliographic records for expressions of the work	100, 110 or 111 plus 240 100, 110 or 111 plus 245 \$a, \$n, and \$p only 130 700, 710 or 711, second indicator 2, plus \$t subfield 730, second indicator 2
MARC 21 work identifiers on bibliographic records for works about the work	600, 610, or 611 plus \$t subfield 630
MARC 21 work identifiers on bibliographic records for works related to the work	700, 710 or 711, second indicator blank, plus \$t subfield 730, second indicator blank

Figure 1. How to Read Work Identifiers in MARC 21 Records

Table 1. Compressed Display of Musical Works under the Subject Heading "Symphonies," Arranged by Work Identifier

Symphonies	No. of Records	Symphonies	No. of Records
1 Beethoven, Ludwig van, 1770-1827* Symphonies, no. 1, op. 21, C major**	89	10 Haydn, Joseph, 1732-1809 Symphonies, H. I, 6, D major	75
2 Symphonies, no. 2, op. 36, D major	50	11 Ives, Charles, 1874-1954 Symphonies, no. 1	1
3 Symphonies, no. 3, op. 55, E flat major	45	12 Mahler, Gustav, 1860-1911 Symphonies, no. 5, C# minor	25
4 Symphonies, no. 4, op. 60, B flat major	32	13 Mozart, Wolfgang Amadeus, 1756-1791 Symphonies, K. 22, B flat major	77
5 Symphonies, no. 5, op. 67, C minor	120	14 Prokofiev, Sergey, 1891-1953 Symphonies, no. 1, op. 25, D major	5
6 Bizet, Georges, 1838-1875 Symphonies, C major	5	15 Schubert, Franz, 1797-1828 Symphonies, D. 417, C minor	16
7 Borodin, Aleksandr Porfir'evich, 1833-1887 Symphonies, no. 2, B minor	12	16 Tchaikovsky, Peter Ilich, 1840-1893 Symphonies no. 1, op. 13, G minor	12
8 Dvorak, Antonin, 1841-1904 Symphonies, no. 1, C minor	55		
9 Symphonies, no. 2, op. 4, B flat major	10		

*(a) MARC 21 100 field in both authority and bibliographic records; (b) 700 field in bibliographic records; (c) 600 field in bibliographic records, all containing *Beethoven, Ludwig van, 1770-1827*. Note that if this were an author search, as opposed to a subject search for symphonies, all 400 and 500 fields from the authority record for the author (here, *Beethoven, Ludwig van, 1770-1827*) should also display as search under and search also under references.

** (a) MARC 21 \$t subfield in authority record that begins with *Beethoven, Ludwig van, 1770-1827*; (b) 240 field in bibliographic record with a 100 for *Beethoven, Ludwig van, 1770-1827*; (c) 245 field \$a, \$n, and \$p [rarely occurs with music] in bibliographic record with a 100 for *Beethoven, Ludwig van, 1770-1827*; (d) 600 \$t subfield that begins with *Beethoven, Ludwig van, 1770-1827*; (e) 700 \$t subfield that begins with *Beethoven, Ludwig van, 1770-1827*; all containing *Symphonies, no. 1, op. 21, C major*. Note that if this were an author or work search instead of a subject search for symphonies, 400 and 500 fields from the work authority record or records (for parts and so on) should also appear in the display.

- | | |
|---|---|
| <p>1 Symphonie no. 1 op. 21 ; Symphonie no. 7 op. 92 [sound recording] / Ludwig van Beethoven</p> <p>2 Symphony no. 1 / Charles Ives ; Three essays for orchestra / Samuel Barber [sound recording]</p> <p>3 Symphony no. 1, in C major [sound recording] / Georges Bizet</p> <p>4 Symphony no. 1 in C minor : The bells of Zlonice ; The hero's song : op. 111 [sound recording] / Dvorak</p> <p>5 Symphony no. 2, in B flat major, op. 4 [sound recording] / Dvorak</p> <p>6 Symphony no. 1 in D, op. 25 : Classical ; Symphony no. 4, op. 47/112 : revised 1947 version [sound recording] / Serguey Prokofiev</p> <p>7 Symphony no. 1, in G minor, op. 13 (Winter dreams) [sound recording] / Tchaikovsky</p> <p>8 Symphony no. 2 in B minor [sound recording] / Borodin</p> | <p>9 Symphony no. 2 in D major, op. 36 ; Overture Coriolan, op. 62 ; Overture Prometheus, op. 43 [sound recording] / Ludwig van Beethoven</p> <p>10 Symphony no. 3, in E flat major, op. 55 (Eroica) [sound recording] / Ludwig van Beethoven</p> <p>11 Symphony no. 4, in B-flat, op. 60 ; Symphony no. 8 in F major, op. 93 [sound recording] / Ludwig van Beethoven</p> <p>12 Symphony no. 4, in C minor, D. 417 (Tragic) ; Symphony no. 5, in B flat major, D. 485 [sound recording] / Franz Schubert</p> <p>13 Symphony no. 5 in B flat major, K. 22 / Mozart</p> <p>14 Symphony, no. 5, in C minor, op. 67 [sound recording] / Ludwig van Beethoven.</p> <p>15 Symphony no. 5 in C sharp minor ; Symphony no. 10 in F sharp major [i.e. minor] [sound recording] / Gustav Mahler</p> <p>16 Symphony no. 6 in D (1761) "Le matin" [sound recording] / Joseph Haydn</p> |
|---|---|

Figure 2. Display of Musical Works under the Subject Heading "Symphonies," Arranged by Title instead of by Work Identifier

Work identifier*	Title and statement of responsibility	Publication information
Beethoven, Ludwig van, 1770-1827. Symphonies, no. 1, op. 21, C major	Sinfonie Nr. 1, C-Dur, opus 21 / Beethoven ; nach den quellen herausgegeben von Peter Hauschild.	Leipzig : Edition Peters, c1987.
Beethoven, Ludwig van, 1770-1827. Symphonies, no. 1, op. 21, C major	Fidelio ; Symphony no. 1, in C, op. 21 [sound recording] / Beethoven.	Camden, N.J. : His Master's Voice, [1955]
Beethoven, Ludwig van, 1770-1827. Symphonies, no. 2, op. 36, D major	Symphony no. 1 & 2 [sound recording] / Ludwig van Beethoven.	Holzgerlingen, Germany : Hänssler Classic, p2003.
Beethoven, Ludwig van, 1770-1827. Symphonies, no. 2, op. 36, D major	Symphonie Nr. 2 : D-dur = D major = ré majeur : Opus 36 / Beethoven ; nach den quellen herausgegeben von Armin Raab.	München : G. Henie, c1995.
Beethoven, Ludwig van, 1770-1827. Symphonies, no. 3, op. 55, E flat major	Symphonie Nr. 3, Es-Dur : Eroica = Symphony No. 3 in E flat major, op. 55 : Eroica / Ludwig van Beethoven ; herausgegeben von Peter Hauschild.	Wiesbaden : Breitkopf & Härtel, c1999.
Beethoven, Ludwig van, 1770-1827. Symphonies, no. 3, op. 55, E flat major	Symphony, no. 3, in E-flat major, op. 55 (Eroica) [sound recording] / Beethoven.	New York : Columbia, 1949.
Beethoven, Ludwig van, 1770-1827. Symphonies, no. 4, op. 60, B flat major	Symphony no. 4 in B flat, op. 60 ; Symphony no. 5 in C minor, op. 67 [sound recording] / Ludwig van Beethoven.	Holland : Phillips, 1986, p1940.
Beethoven, Ludwig van, 1770-1827. Symphonies, no. 4, op. 60, B flat major	Symphony no. 4, B flat major, op. 60 / Beethoven.	Scarsdale, N.Y. : E.F. Kalmus Orchestra Scores, 1941.
Beethoven, Ludwig van, 1770-1827. Symphonies, no. 5, op. 67, C minor	Symphony no. 4 in B flat, op. 60 ; Symphony no. 5 in C minor, op. 67 [sound recording] / Ludwig van Beethoven.	Holland : Phillips, 1986, p1940.
Beethoven, Ludwig van, 1770-1827. Symphonies, no. 5, op. 67, C minor	Fünfte Symphonie : op. 67 / L. van Beethoven.	Leipzig : C.F. Peters, [189-?]

*Depending on the record, the work identifier may consist of any one of the following combinations of MARC 21 bibliographic fields:

130 [more common with films than with other works]

100, 110 or 111 plus 240

100, 110 or 111 plus 245, \$a, \$n, \$p, \$r [rare with musical or legal works but common with works of belles lettres]

Figure 3. Table Display of Beethoven Works Using Work Identifiers but No Compression

Author/creator	Uniform title	Title, statement of responsibility, and publication date
Schnitzler, Arthur, 1862-1931		Aphorismen und Betrachtungen / Hrsg. von Robert O. Weiss. [1967]
Schnitzler, Arthur, 1862-1931	Plays. English. Selections	Arthur Schnitzler : four major plays / translated by Carl R. Mueller. 1999.
Schnitzler, Arthur, 1862-1931	Selections. 1981	Arthur Schnitzler, sein Leben, sein Werk, seine Zeit / herausgegeben von Heinrich Schnitzler, Christian Brandstatter und Reinhard Urbach. 1981.
Schnitzler, Arthur, 1862-1931		Ausgewahlte Erzahlungen. 1950.
Schnitzler, Arthur, 1862-1931	Selections. 1999.	Ausgewahlte Werke in acht Banden / Arthur Schnitzler ; herausgegeben von Heinz Ludwig Arnold. 1999-2002.
Schnitzler, Arthur, 1862-1931		Beatrice : a novel, and other stories / Arthur Schnitzler ; translated from the German by Agnes Jacques and Elsie M. Lang. 1926.
Schnitzler, Arthur, 1862-1931	Frau Beate und ihr Sohn. English	Beatrice and her son / Arthur Schnitzler ; translated by Shaun Whiteside ; introduction by Martin Swales. 1999.
Schnitzler, Arthur, 1862-1931	Frau Bertha Garlan. English	Berta Garlan / Arthur Schnitzler ; translated by G.J. Weinberger. c1987.

Figure 4. Table Display That Does Not Use Work Identifiers Correctly

Author/creator	Uniform title	Title, statement of responsibility and date
	Stage fright	Alfred Hitchcock's stage fright / Warner Brothers ; director, Alfred Hitchcock ; screenplay, Whitfield Cook. 1950.
	Angel (Motion picture : 1937)	Angel / Paramount Pictures, Inc. ; an Ernst Lubitsch production ; presented by Adolph Zukor ... 1937.
	Blue Angel	Der Blaue Engel / ein Ufaton-Film der Erich Pommer produktion ; unter Mitwirkung des Authors fur den Tonfilm geschrieben von Carl Zuckmayer und Karl Vollmoller ; Drehbuch, Robert Liebmann ; Regie, Josef von Sternberg. 1930.
		Blazing saddles / Michael Hertzberg production ; director, Mel Brooks ; screenplay, Mel Brooks, Norman Steinberg, Andrew Bergman, Richard Pryor, Alan Uger ; from an original story by Andrew Bergman. 1974.
		Blonde Venus / Paramount Publix Corp. ; producer-director, Josef von Sternberg ; screenplay, S.K. Lauren and Jules Furthman ; original story, Jules Furthman. 1932.

Figure 5. Result of a Search on "Marlene Dietrich"

Edition	Publisher	Date	Editor, annotator	Illustrator	Format
		1876			manuscript
	Chatto and Windus	1876			text
	Chatto and Windus	1877			text
new ed.	Chatto and Windus	1885		Williams, True, illustrator	text
	American Publishing Co.	1891			text
new ed.	Chatto and Windus	1897		Williams, True, illustrator	text
ed. de luxe	American Pub. Co.	1899			text
Hillcrest ed.	American Pub. Co.	1903			text
author's national ed.	Harper and Bros.	1903			text
	Harper and Bros.	1910			text
	Harper	1917		Brehm, Worth, illustrator	text
	Ginn and Company	1931	Ward, Bertha Evans, editor		text
	Harper and Bros.	1932	Barry, Emily Fanning, editor Bruner, Herbert Bascom, 1892–1974, editor		text
	Heritage Club	1937		Rockwell, Norman, illustrator	text
	Rand, McNally	1938			text
	Children's Pr.	1970, c1969		Davidson, Al, illustrator	text
	Univ. Publ. of America; Georgetown Univ. Library	1982			manuscript facsimile
	Univ. of California Pr.	1982, c1980	Gerber, John C. annotator; Baender, Paul, editor		text
	Oxford Univ. Pr.	1993	Mitchell, Lee Clark, editor		text
	EMC/Paradigm Pub.	1998	Shepherd, Robert D., annotator		text
	toExcel	1999	Michael, John, editor		text
	Gramercy Books	2002		Howell, Troy, illustrator Williams, True W., illustrator	text
	Kingfisher	2002		Fletcher, Claire, illustrator	text
	Sterilin Publ.	2004		McKowen, Scott, illustrator	text
	Townsend Pr.	2004			text
	Barnes & Noble Classics	2005	Stade, Geoarge, editor		text

Figure 6. Twain, Mark, 1835–1910. *The adventures of Tom Sawyer*