

# Analysis of Work-to-Work Bibliographic Relationships through FRBR: A Canadian Perspective

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## Abstract

*The purpose of this study is to investigate the characteristics of Canadian publications by analyzing their bibliographic relationships based on the Functional Requirements for Bibliographic Records (FRBR) model. The study indicates frequencies of occurrence of work-to-work bibliographic relationships for manifestations published in 2009 and cataloged in the AMICUS online catalog. The results show that approximately 4.4% of the 2009 bibliographic records in the AMICUS catalog exhibit a work-to-work bibliographic relationship.*

**KEYWORDS:** *Functional Requirements for Bibliographic Records (FRBR), work-to-work relationships, bibliographic family, cataloging, Canada*

## INTRODUCTION

Bibliographic relationships have been at the heart of cataloging theory for more than a century. They can be defined as an association, connection, or interaction between different bibliographic entities, or components of entities. The Functional Requirements for Bibliographic Records (FRBR) conceptual model is built on relationships between and among bibliographic entities. Bibliographic “relationships serve as the vehicle for depicting the link between one entity and another, and thus as the means of assisting the user to ‘navigate’ the universe that is represented in a bibliography, catalogue, or bibliographic database.”<sup>1</sup> Chapter five of the *FRBR Final Report* deals specifically with bibliographic relationships.

These relationships are frequently expressed through the use of a note that indicates not only that a relationship exists among entities, but also clearly represents the nature of the relationship. In the FRBR model it is stated that a relationship is not valid unless the entities on each side of the relationship are explicitly identified.<sup>2</sup> For example, statements such as “based on a novel by *Moshe Gaash*,” “based on an animated short film,” “based on a story by Barry Wong,” do not explicitly establish a work-to-work relationship, while statements such as “based on the novel *Spying on Dracula* by Mary Labatt,” and “based on the film *Passione D’amore* directed by Ettore Scola” clearly indicate the target of the relationship.

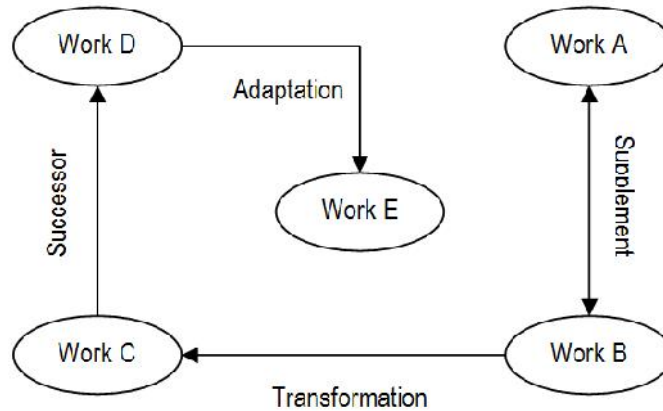
Identification of bibliographic relationships allows users to navigate between related works and can help information systems designers organize large result sets in a way that is more useful to end users. Collocation devices such as uniform titles (*Title of the Work* in *Resource Description and Access* [RDA] 6.2) may be used to that effect although the collocating functions of current library catalogs are generally felt to be unsatisfactory by library users.<sup>3</sup>

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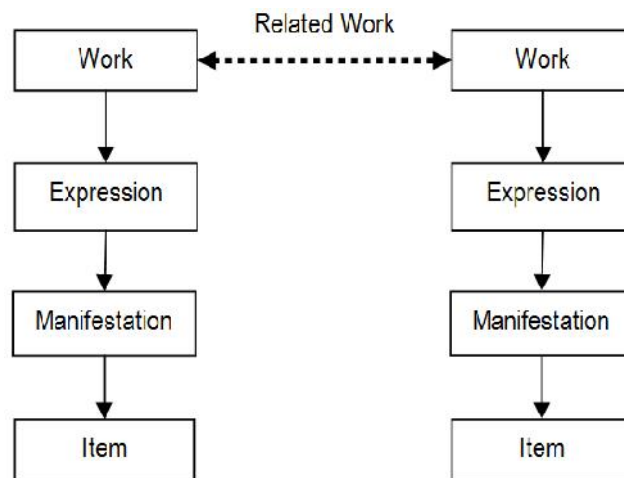
The FRBR model highlights the importance of bibliographic relationships and other aspects of bibliographic context for effectively retrieving information. The quality of bibliographic databases often depends on the ability to *link* entities through relationships.<sup>4</sup> The emphasis put on adding and maintaining relationships between intellectual works aims to improve the structure of bibliographic databases. As a result, the catalogs and databases serve users more effectively.

The network of bibliographic relationships is complex and thus not always easy to explain and display. Bibliographic relationships between works can be numerous and often more complicated than expected. Works may have supplements, which may be realized as a film, which may have a successor (in the form of a sequel), which could then be adapted into another work (Figure 1).



**FIGURE 1.** Bibliographic Relationships between Works

A lot of attention has been given to the *inherent relationships* between the entities in the FRBR Group 1 hierarchy. Additionally, there are many other rich content relationships that enable collocation of related items and navigation through the sometimes complex network of the bibliographic universe.<sup>5,6</sup> The present study focuses on work-to-work bibliographic relationships. The scarcity of literature dealing with the bibliographic relationships of Canadian publications demonstrates the necessity for a study designed to describe their features and characteristics. The current study will do that and also identify, describe and classify the bibliographic relationships on the basis of the FRBR taxonomy (Figure 2).



**FIGURE 2.** Work-to-Work Bibliographic Relationships

Even though many scholars have pointed out that the FRBR conceptual model could be successfully applied to bibliographic records<sup>7,8</sup> the usefulness of the model has not been adequately considered and analyzed in the Canadian context. Some researchers have analyzed work types based on the FRBR model,<sup>9</sup> but little research has been done specifically on work-to-work bibliographic relationships from the FRBR point of view.

The effectiveness and efficiency of bibliographic databases depend on identifying and categorizing work-sets as bibliographic families and determining and displaying the type of relationship between bibliographic entities in the bibliographic universe. Finding and collocating related members of these families is a major issue for bibliographic databases, especially online public access catalogs (OPACs).

As mentioned in the *FRBR Final Report*,<sup>10</sup> there are two types of bibliographic relationships in bibliographic families (work-sets): work-to-work and work-to-expression. The present study attempts to test the FRBR model for identification and categorization of work-to-work bibliographic relationships among Canadian publications and is a novel contribution to the literature on the FRBR bibliographic relationships.

The purpose of this study is to identify and explore the characteristics of Canadian publications. It attempts to answer the following research questions:

- What is the frequency of work-to-work relationships between Canadian publications?
- How are bibliographic relationships in the 10 classes of Dewey Decimal Classification (DDC) different from each other? What proportion of these publications are scattered per each DDC class?
- What proportion of Canadian publications are members of each category of the FRBR taxonomy of work-to-work relationships?

This study also indirectly opens up the following questions: Are the current linking devices in the bibliographic relationships cataloging rules adequate for Canadian publications? If not, how should they be improved?

## LITERATURE REVIEW

As pointed out by Žumer, “. . . after over one decade of study and research on FRBR, we still refer to FRBR as ‘the new library model’. This can be explained by the fact that there are not many real-life implementations of FRBR.”<sup>11</sup> Research into the FRBR bibliographic relationships in general and into the work-to-work bibliographic relationships in particular is still in an exploratory phase.

Among the forerunner and most prominent researchers in the field of bibliographic relationships are Tillett, Smiraglia, and Vellucci. In 1987 Tillett,<sup>12</sup> inspired by the thesaurus relationship taxonomies and through a careful analysis of the *Anglo-American Cataloguing Rules*, proposed a taxonomy of seven bibliographic relationships: equivalence, derivative, descriptive, whole-part, accompanying, sequential, and shared characteristic. Based on that analytical study, she further examined the occurrence of bibliographic relationships in bibliographic records of different subjects, languages, publication dates, and formats. The Tillett study was a cornerstone piece of research that has inspired many studies to examine the relationship between bibliographic records. As Riva<sup>13</sup> stated, some of these types of relationships are very broad and also very frequent in bibliographic records, while others occur infrequently. Of the seven classes, derivative is particularly broad ranging. This led Smiraglia<sup>14, 15</sup> to focus only on the derivative relationships and to propose a subdivision into seven subclasses as an

extension to the taxonomy. He proposed a taxonomy of derivative relationships: *simultaneous derivations, successive derivations, translations, amplifications, extractions, adaptations, and performances*.

In 1997 Vellucci<sup>16</sup> focused on musical materials where a high intensity of bibliographic relationships exists. She studied the phenomenon of bibliographic families in a music catalog, validating the applicability of six of Tillett's seven classes to music materials (*the shared characteristic* class is applicable to all materials by default and so was not investigated further), although the subgroups within the categories varied somewhat. She found that nearly 94% of musical materials bear at least one of the relationships defined by Tillett. Her research indicates that the categories of bibliographic relationships identified by Tillett<sup>17, 18</sup> and Smiraglia<sup>19</sup> are present in the music catalog in large numbers. One should note that these are pre-FRBR studies that include both work-to-work (equivalent to FRBR Table 5.1) relationships and work-set (expression-to-expression, manifestation-to-manifestation, item-to-item) relationships among bibliographic records (covered in FRBR later tables).

Recently, Arastoopoor and Fattahi<sup>20</sup> studied the typology and terminology of relationships among members of two well-known Persian bibliographic families: the *Epic of Kings* and the *Koran*. A sample of 350 records for the *Epic of Kings* family and a sample of 380 records for the *Koran* family were selected through a systematic sampling method. This study found that most of bibliographic relationships between entities in these two families are derivative or descriptive. Unsurprisingly, there was no record in the sample pointing to accompanying or sequential relationships, as one really does not expect to find successors of the *Koran* or other sacred texts. This case study of the two biggest bibliographic families from Iranian publications was based on Tillett's Taxonomy,<sup>21</sup> not on the taxonomy of relationships in the *FRBR Final Report*.

Research conducted at OCLC<sup>22</sup> on sizes of bibliographic families (about work-set relationships, not work-to-work relationships) showed that a majority of works have only one expression and manifestation, and that only a relatively small number of works have more than one expression. Only about 20% of all works in WorldCat have more than one manifestation, and about 1% has more than seven. To some catalogers this means that only a relatively small percentage of a catalog would profit from FRBR, which could bring the viability of FRBR implementation as a whole into question. However, what is usually overlooked is the fact that the latter works have been published in many versions and editions, showing that there is demand for them, and they are central to the users.<sup>23</sup>

## MATERIALS AND METHODS

In the present study, two experiments were conducted: one for detecting bibliographic records with at least one type of relationship and a second to find the DDC class number of given bibliographic records.

One of the first steps in this study was to create a list of keywords (in English and in French) representing work-to-work bibliographic relationships. Keyword searching was used based on a simple assumption that there are key terms representing bibliographic relationships in bibliographic records that may be helpful in identifying and understanding relationships between different bibliographic entities. These terms are generally scattered all over the bibliographic records, especially in titles, statements of responsibility, and notes.

Data was collected in AMICUS (the Canadian national catalog<sup>24</sup>). The decision to use this source was primarily based upon the fact that AMICUS is the national catalog of Canada

maintained by Library and Archives Canada/Bibliothèque et Archives Canada (LAC/BAC), containing over 30 million records,<sup>25</sup> which is large enough to obtain representative data for Canadian publications in all classes of DDC. Collecting data through an online tool meant, however, that the researchers did not have physical access to the material that was retrieved.

As mentioned, an exhaustive list of English and French keywords<sup>26</sup> was constructed to represent every bibliographic relationship listed in Table 5.1 (Work-to-Work Relationships) of the *FRBR Final Report*. In an attempt to find as many records exhibiting a work-to-work relationship as possible we used the “advanced search” function with the “any keywords” key (i.e., all keywords in the record) with a publication date filter set to “2009” and place of publication set to “Canada.” Only LAC/BAC contributed monographic records were considered. Searches were carried out during a four-month period between September 1, 2010 and December 22, 2010.

The retrieved bibliographic records were used as the data for the analysis of bibliographic relationships. Each bibliographic record was manually analyzed to determine the type of relationship expressed and to detect false hits. To determine whether the bibliographic records provided sufficient data on the bibliographic relationships, we carefully read bibliographic information in each record, especially the notes. The type of relationship was often clearly indicated in the record: “Suite de: *Hush! Hush!*” (sequel); “Supplement to: *Doelle, Meinhard, 1964- Environmental law*” (supplement); “Illustrations taken from the Max & Ruby animated television series and adapted by Muse Publishing and Communications” (adaptation); “Motion picture based on the novel by Herman Brusselmans” (transformation). In some cases, searching in other bibliographic tools (WorldCat, Amazon, Google Books) was required to determine whether two or more works were related or not. If there were two or more records for the same work (in print, electronic, sound recording, video recording, etc.), only one of them was counted. Records that turned up in more than one search were of course also only counted once.

The frequency of each type of bibliographic relationship was empirically assessed. Analysis was carried out by constructing frequency and cross tables in a spreadsheet. The types of bibliographic relationships were classified and compiled and calculated for analysis. The data collected also included the DDC classes<sup>27</sup> to allow analysis by discipline.

## RESULTS

The bibliographic relationships found in the Canadian publications that have been selected from the AMICUS catalog were analyzed and classified according to type and DDC classes. According to data obtained from Library and Archives Canada, the total number of monographic records representing manifestations published in Canada in 2009 and cataloged in AMICUS is 28,633. Our analysis revealed that the total 1,261 records exhibit a work-to-work bibliographic relationship that represents approximately 4.4% of the population. One should note that this proportion is probably slightly underestimated since according to LAC’s bilingual records policy, some manifestations in AMICUS are sometimes linked to two records (e.g., creating two bibliographic records for one book that contains parallel expressions of the same work formatted with two title pages).

Table 1 shows the frequency and percentage of work-to-work bibliographic relationships in each category. The most frequently observed relationship is supplement (59%), followed by successor (24%), transformation (10%), and adaptation (6%). Together, these four types of relationships account for 98% of the relationships observed. A close examination of

supplementary materials reveals that 80% (595 records) of them are teacher’s guides and student manuals. One should remember that the collection used for this study is that of a national library and is undoubtedly somewhat uncharacteristic of most collections. For instance, LAC/BAC receives on legal deposit some types of materials, school texts for instance, that are not collected in all libraries. Considering the strong contribution these materials show to the prevalence of relationships (particularly the supplement type) the collection profile of the database under study is important. Also, LAC/BAC does not receive DVDs and so on on legal deposit and the lack of films might result in an under detection of cases of adaptations, transformations, and imitations.

Finally, the decision to omit serials very likely results in under-reporting for sequential relationships outside of literature.

**TABLE 1.** Frequency and Percentage of Bibliographic Relationships

<b>Relationship Type</b>	<b>Occurrences</b>	<b>Percentage</b>
Supplement	742	59
Successor	302	24
Transformation	124	10
Adaptation	79	6
Complement	8	<1
Summarization	6	<1
Imitation	0	0
Total	1261	100

Table 2 shows the frequency of each type of bibliographic relationship in each of the 10 DDC main classes. The data reveals that the majority of successor works (sequel) are in Literature, while the majority of supplements are in Social Sciences, Language, Science, and in Technology. It is also shown that the majority of complements are in the Arts. Also, it is worth noting that adaptations are mainly found in Technology, Arts, and in Literature while the majority of transformations occurred in Arts.

Table 3 presents the frequency and percentage of occurrence of the bibliographic relationships for each DDC class. It shows that Literature (26%) exhibits the highest number of bibliographic relationships among the ten DDC main classes while Philosophy and Psychology (2%), and Religion (2%) had the fewest.

Tables 2 and 3 present frequency data broken up by DDC classes. It should be noted that these are observed frequency without the context of the actual distribution of DDC classes within the whole 2009 population, which probably contains relatively fewer records in the 000, 100, and 200 classes, compared to 300, 800, or 900 to start with.

When comparing the total number of bibliographic relationships in each class of DDC, it was found that approximately 26% of the bibliographic relationships observed occurred in Literature. This is in accordance with previous studies,<sup>28</sup> where the predominant bibliographic relationships were also in Literature.

Previous studies<sup>29</sup> also revealed that the frequencies of each type of bibliographic relationship differ for the classes or disciplines, (e.g., Literature, Arts, Science, and Social Sciences). Tillett<sup>30</sup> and Smiraglia<sup>31</sup> found that the derivative relationship appeared most frequently in the humanities category.

**TABLE 2.** Distribution of Work-to-Work Relationships in Each Class of DDC

	000	100	200	300	400	500	600	700	800	900	Total
Successor	5	1	2	4	0	0	4	6	266	14	302
Supplement	33	15	20	156	115	174	167	6	20	36	742
Complement	0	0	0	2	0	0	0	6	0	0	8
Summarization	0	0	0	3	0	0	3	0	0	0	6
Adaptation	3	3	1	5	1	7	10	19	26	4	79
Transformation	0	1	2	5	0	0	1	104	10	1	124
Imitation	0	0	0	0	0	0	0	0	0	0	0
Total	41	20	25	175	116	181	185	141	322	55	1261

**TABLE 3.** Occurrence of Bibliographic Relationships in Each DDC Class

DDC Class	Number of bibliographic relationships	Percent
000 Generalities	41	3
100 Philosophy & psychology	20	2
200 Religion	25	2
300 Social sciences	175	14
400 Language	116	9
500 Science	181	14
600 Technology	185	15
700 Arts & recreation	141	11
800 Literature	322	26
900 History & geography	55	4
Total	1261	100

### OBSERVATIONS

The FRBR model can be applied to establish relationships in bibliographic databases to support resource discovery. We have tested the AMICUS catalog to estimate the existence of work-to-work relationships in Canadian publications. Our data collection process was hindered by the lack of a systematic method to record relationships. Here is summary of the difficulties we encountered.

- Catalogers use a variety of different terms in the note fields to record bibliographic relationships as they are often transcribed from what the authors or publishers have used on the title page. There are many variant words in book titles to indicate a relationship, especially for educational resources (e.g., answer book, answer key, educator guide, educator's companion, instructor guide, parent guide, solutions manual, student book, student guide, student manual, student workbook, students book, students book, students guide, students workbook, teacher book, teacher edition, teacher guide, teacher kit, teacher manual, teacher resource, teacher toolkit, teacher workbook, teachers book, teachers guide, teachers kit, teacher's resource, teachers toolkit, teachers workbook, teaching book, teaching guide, workbook). Therefore it is not easy to design an algorithm to systematically retrieve these records. Relationship should be controlled based on the clear bibliographic relationship designators.
- In some cases we have observed that supplement relationships between two works (e.g., A and B: A has supplement B; B is supplement to A) are not always clearly defined. Sometimes the title of the primary work is not available in the catalog, which leads to blind references. Bibliographic relationships between works are not always mentioned in

the MARC (Machine Readable Cataloging) relationship fields (770, 772, etc.). We often simply found notes containing expressions such as “Supplement to:” and “Has supplement:” for linking the supplemental works. But specific types of relationships (e.g., novelization) are not clearly defined.

## DISCUSSION

This case study is only one example of work-to-work bibliographic relationships and while issues may vary from country to country, we believe it offers a somewhat unique and different perspective. It seems that the distribution of bibliographic relationships is country and culture dependent. The results of previous studies<sup>32</sup> show that factors such as country of publication, subject matter, language, publication format, and publication date of the publication, have direct relations to each category of the bibliographic relationships. Smiraglia and Leazer<sup>33</sup> concluded that “discipline, form, and genre all fail to demonstrate any influence on derivation of works”<sup>34</sup>; but in the same paper they claimed that “discipline appeared to approach statistical significance.”<sup>35</sup> In previous studies<sup>36</sup> the country of publication was considered a very important variable that could have a significant influence on the overall orientation, patterns, and types of publications. Also, and more importantly, the level of completeness of records for different categories of materials can affect which types of relationships are deemed sufficiently important to warrant the research needed to record them accurately.

Overall, this study confirms that bibliographic relationships are prevalent and an important feature of Canadian publications. There are both similarities and differences between our findings and previous research. The results show that approximately 4.4% of the Canadian 2009 publications recorded in the AMICUS catalog contain a work-to-work bibliographic relationship.

The application of the FRBR model is expected to be more beneficial to certain classes of DDC than others. Since a great proportion of work-to-work relationships were observed in DDC class 800, resource discovery through explicitly defined relationships in bibliographic records will be especially useful to users who are looking for works of fiction. Findings from this study may provide directions for improvements and new system implementations.

Naturally, a single case study is not enough, although we do not expect any bias, in any direction toward our queries. We presented the results to make our point and to formulate the problem of recognizing work-to-work bibliographic relationships. It would be very interesting to replicate this study using different national bibliographies to obtain comparable data. Further study of specific segments of work-to-work bibliographic relationships is required for developing a more comprehensive taxonomy of bibliographic relationships between related works.

The picture we get from our study is still predominantly Canadian. Additionally, more research should be done on related works and the taxonomy of bibliographic relationships in FRBR and RDA as the cataloging rules applied can affect which types of relationships are deemed important. Are referencing related works devices provided by RDA sufficient? If not, what alternative approaches and techniques could be used to connect related works?



## NOTES

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fichier de l'élève; guide d'enseignement; guide d'apprentissage; guide de l'étudiant; guide des étudiants; guide pédagogique; kit d'enseignement; livre d'activités; livre d'exercices; manuel d'enseignement; manuel d'apprentissage; manuel de lecture; manuel de l'élève; manuel de l'étudiant; ...

27. DDC class numbers were collected from the 082 field of the LAC records when available. If no 082 field was present, data found in the 055 field (LC class number) was used and converted to a DDC number using the conversion table available on OCLC's Question Point reference service (<http://www.questionpoint.org/>).
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