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Identification and Categorization of Related Works in the Persian Bibliographic Universe: an FRBR Approach

by

Sholeh Arastoopoor and **Rahmatollah Fattahi**

Department of Library and Information Science,
Ferdowsi University of Mashhad, Iran

Abstract

Defining the relations between entities in the bibliographic universe aims at effective document description and access through collocating objects logically. Developing conceptual models such as FRBR, FRAD, etc., or revising previous ones and developing new codes such as AACRII or RDA have the same aim. Proliferation of works and their related entities in the Persian bibliographic universe is seen mostly in the fields of literature or religion. Studies show that relations among the different types of entities in these families have two patterns: derivative and descriptive relationships (usually in literature and theology respectively). Based on the FRBR model and taking two typical examples of these families in the Persian language ("Shahnama" [the Epic of Kings] and the "Koran") into account, it seems that the derivative pattern leads to work-expression and the descriptive pattern leads to work-to-work relationships. The point is that attributes describing a work in FRBR are fewer in number than other entities and although RDA defines a distinct relationship between works and expressions, it leaves the work-to-work relationship unclear. This paper attempts to identify the related bibliographic entities in the light of FRBR by analyzing their relationships in the Persian bibliographic universe. It also aims to categorize the types of entities in the hierarchy of the Persian bibliographic universe. According to the entities' attributes and their relations, some additional remarks will be made upon current codes (AACR and RDA). The categorization of entities will help develop better rules for description and access. Also identification and normalization of the names that apply to different types of related works will help restructuring uniform titles, which in turn will lead to a more effective collocation and display of related works.

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Introduction

In the card catalog era, cataloging procedures and filling outputs were very time-consuming. Due to limited access points, searching was restricted to strings of words in titles, inverted author names (i.e., name headings), and predetermined strings of words as subjects wh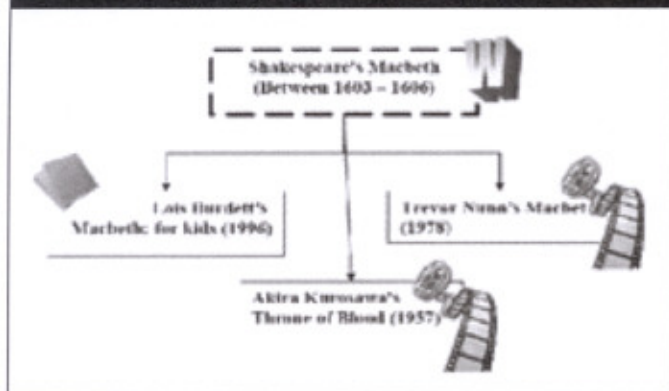ich sometimes made no sense to the user. Thanks to computers and library software (OPACs), tedious clerical jobs such as filing are now history and we have access to every possible piece of information in a record through free and/or keyword searching. Improved access and the wide range of other facilities were the bonus, while catalogs paid what was called "logical collocation" as the price. Scattered search results multiplied by bulky retrievals lead to long lists of retrieved records which need to be reorganized, if they are to be of any use.

Reorganizing OPAC displays in a rational and meaningful way, as has been discussed in the literature for a long time, depends on identifying work-sets as bibliographic families and analyzing types of relationships between members of these families in our bibliographic universe. Some works are progenitors which form work-sets with their unique relationship patterns[1]. However, some of them are some sort of dead ends in themselves. They will have no sequels, no modifications and/or no editions. Once they are published, they will find their way in the bibliographic universe as distinctive, independent works. The challenge lies with those which are so influential in their field and also in society that other bibliographic entities stem from them and their family grows larger[2]. Searching for members of these families results in voluminous retrievals that our current OPACs fail to see and fail to indicate their true relations. Regarding this, the Persian bibliographic universe is not an exception.

In order to make the machine learn these relationships, catalog developers should take a closer look at the typology of bibliographic associations. Different practical and/or conceptual models have been proposed to take such associations into consideration. Fattahi's super record approach, Carlyle's super work-set approach, FRBR, or more recent attempts in developing conceptual models such as Taniguchi's are among such new approaches[3,4,5,6]. Rather well accepted internationally, FRBR is now regarded as a possible solution. This paper aims at analyzing two Persian bibliographic families in order to identify the relationships between different but related entities and also to

Figure 1. Bibliographic relationships pointing to work -to-work association

identify terms applying to bibliographic relationships and their distribution throughout different fields in bibliographic records. In pursuit of this, the "Epic of Kings" (also known as "Book of Kings") and the "Koran"* were selected as two major works, each of which has a large bibliographic family.

Re-stating the FRBR's relationships
As mentioned in the FRBR report, there are different types of associations among which two patterns are distinguished — the high level and other relationships[7]. Taking a closer look at these relations and their subcategories, one can infer that in bibliographic families (work-sets) two leading groups of relationships are to be traced. These two groups have the ability to determine the spread and depth of a family.

Work-to-work relationships
Existing work-to-work relationships between two different entities suggest that 1) we have two different yet associated entities and 2) although distinctively separate, there is some sort of precedence between these two entities. The main work (main progenitor) existed till the second work was generated and now they both have their place in the family (figure 1).

Such a relationship may seem easy but it leads to some tricky complications:

● Each of these secondary works is an autonomous entity yet associated; projecting this relationship is rather hard, especially in cases such as "Throne of Blood" when the title is changed or in similar cases when the only clue for identifying the relationship is the plot.

● Each of these entities can act as a progenitor by itself. Then we would have a work which stems from a progenitor and yet has its own family (e.g. other texts associated with these entities such as critiques, etc).

● If subdued with only high-level relationships for reconsidering bibliographic records in OPACs, we would be far from the ultimate goal of collocation. Since each of these newly generated works refers to a whole new need in users (at least in our opinion) we as mediators have to address this need in relation to its roots through projecting relationships.
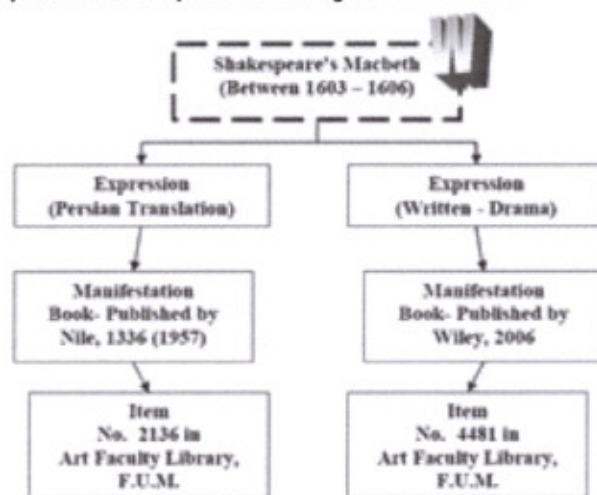
Work–expression relationship
This type of relationship, also known as the realization relation, indicates that each work needs to be realized in a way so that it would have a place in the real world. If the work-to-work
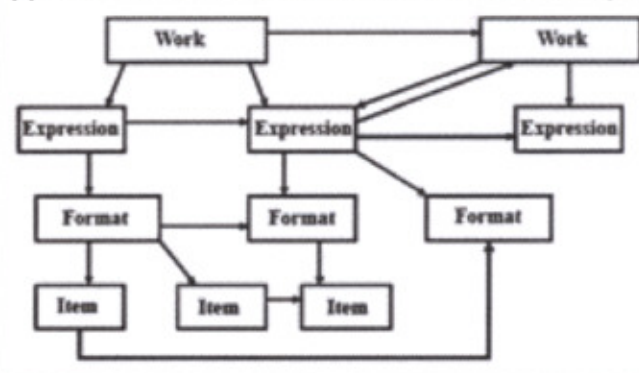
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* Although Arabic (not Persian), since the Koran is known as Muslim's holy book and due to its place among Iranians, it was selected as a work in Persian bibliographic families.

Figure 2

(a) Two different expressions leading to different items

(b) First level and other relations as abstracted in the FRBR Report

relationship results in distinct yet associated bibliographic families, the work-expression relationship shows a beginning in a series of relations forming a network of entities within one progenitor's family. In this network there exists only one seed or core node which other entities (expression, manifestation and item) stem from. But why among work-expression, expression-manifestation and manifestation-item relationships is the first one of more importance? The answer is again rather easy. Because there would be no item if there were no manifestation to be exemplified and there would be no manifestation if there were no expression. On the other hand, it is the expression that gives a work the chance to be realized (figure 2 a, b).

Then if there is a need for any restructuring of records based on FRBR, these relationships, their attributes and the resulting entity should be taken into consideration. The only problem would be that these relations are not clearly stated in bibliographic records. Thus for better mapping of records on these relationships and also for detailed analysis of records for identifying vocabularies that act as clues in attributing an entity to a group, other views on bibliographic relationships might be of help.

Other views on categorizing bibliographic relationships
There have been several approaches toward analyzing bibliographic relationships. Among them, UNIMARC definitions of bibliographic relationships, Goossens and Mazur studies on hierarchical bibliographic relationships[8], Tillett's Taxonomy of Bibliographic Relationships[9], Smiraglia's studies on derivative relationships[10] and Vellucci's specific focus on bibliographic relationships in music catalogs[11] are outstanding. Assuming

Table 1. Relationships distribution according to resulting entity (work or expression) in the "Epic of Kings" bibliographic family

	Work-to-Work	Work-Expression	Sum
Derivative Relationship	138 (69%)	62 (31%)	200 (100%)
Cumulative Percentage	39.4%	17.7%	57.1%
Descriptive Relationships	139 (92.7%)	11 (7.3%)	150 (100%)
Cumulative Percentage	39.7%	3.2%	42.9%
Sum	277 (79.1%)	62 (20.9%)	350 (100%)

Table 2. Distribution of different instantiations within the "Epic of Kings" bibliographic family

		Work	Expression
Derivative Relationship	Translations	1 (0.29%)	7 (2%)
	Selections	–	49 (14%)
	Lithography or Manuscripts	1 (0.29%)	6 (1.71%)
	Maps	1 (0.29%)	–
	Glossaries	7 (2%)	–
	Concordances	1 (0.29%)	–
	Adaptations	101 (28.86%)	–
	Addresses, Essays, Lectures	9 (2.57%)	–
	Humor, Caricatures, etc.	1 (0.29%)	–
	Adaptation into new literary form	16 (4.57%)	–
Descriptive Relationship	Critiques	98 (28%)	–
	Annotations	–	–
	Concepts, Characters	41 (11.7%)	11 (3.14%)
Sum		350 (100%)	

FRBR's relationships are functional, most of these categorizations focus on the essence and nature of the relationship regardless of specific instantiations in order to be comprehensive.

Needless to say, if we are to analyze bibliographic records, we must decompose these relations into different instantiations. Koohestani, who based her study on this assumption, identified 14 different instantiations (Different editions, Different copies, Different compilations, Translations, Extractions, Excerpts, Summaries or abstracts, Guides, Adaptations, Glossaries, Essays, Critiques and hermeneutics, Annotations, Parts)[12]. Each of these instantiations, which could be identified through vocabularies, act as a clue. These vocabularies are scattered all over the record, and it might be on some occasions that there is no distinguishable term in this regard.

Methodology

This study involves a closer look at the typology and terminology of relationships among members of two well-known Persian bibliographic families — the Epic of Kings and the Koran.

In order to include all family members in our study a free text search combining "Epic of Kings" (Shahnama) and "Ferdowsi" was performed in the National Library of Iran's database which yielded 3079 records. As for the other one, a similar search with "Koran" as keyword was performed which yielded 30,000 records. A sample of 350 records for the "Epic of Kings" family and a sample of 380 records for the "Koran" family were selected by means of a systematic sampling method. In our selecting process different editions of the same work (the Koran or the Epic of Kings) were not considered. They point to different expressions of the same work, without any change in the content. Thus although expressions, these types of records were regarded to be representatives of the work itself.

In order to analyze the relationships among the instances of both bibliographic families, a worksheet was prepared which decomposed work-to-work and work-expression relationships into essential relations (derivative, descriptive, accompanying and sequential). For this purpose Tillett's Taxonomy[13] was assumed to be a base, but due to excluding different editions of the same work from the sample, the equivalence relation was also excluded. Also whole-part relationship was merged with derivative relationship.

The selected records were analyzed for their relationships with the main progenitor to see whether these relations would lead to a new work or a new expression of the main work. The analyzing process performed in these steps included:
1) analyzing the record as if it represented a new work or a new expression;
2) identifying the vocabularies acting as clues in determining the associations;
3) documenting the terms and their fields in worksheets.

Findings

The Epic of Kings as the seed node of a major bibliographic family in Persian literature is among well-known literary works. Due to its influential role for bridging pre-Islamic and Islamic eras and its unique place in the Persian literature, lots of peripheral studies have been based upon it, and now with 3,079 records in the Iranian National Bibliography, its records could be FRBRized in pursuit of restructuring OPACs (table 1).

The analysis of a sample of 350 records in this regard reveals that:
1) Most bibliographic relationships between entities in this family are derivative or descriptive; there was no record in the sample pointing to accompanying or sequential relationships.
2) Focusing on FRBR's relations, it seems that work-to-work associations (about 79%) predominate on work-expression associations (about 21%).

A simple Chi square test performed on these results reveals that there is a significant difference between different types of relationships within the "Epic of Kings" family (Chi Sq. 1333.771, α less than 0.05). Focusing on frequencies and the distribution of records within this family, one can infer that, due to slight differences between those works stemming from the original work through a derivative or descriptive relationship, this significant difference points out that in the "Epic of Kings" bibliographic family, regardless of different editions of the work itself, the population of secondary works exceeds the expressions. In other

Table 3. Terminology of instantiations and associated fields in the Epic of Kings

		Term	Field
Derivative Relationship	**Translations**	Translations (16) Translator (6)	Added entries Subjects
	Selections	Selections (139) Tazmin (poetry) (1)	Added entries Uniform title
	Lithography or Manuscripts	[Lithography] (7) [Manuscript] (5)	Title
	Maps	Geographical names (1)	Subjects
	Glossaries	Glossaries (6)	Subjects
	Concordances	Concordance (1)	Subjects
	Adaptations	Adaptations (64)	Subjects
	Addresses, Essays, Lectures	Essays and lectures (6)	Subjects
	Humor, Caricatures, etc.	Lampoon (1)	Title
	Adaptation into new literary form	Card (2) Miniature (5) Photograph (2) Stamp (5)	Title Collation
Descriptive Relationship	**Critiques**	Critique and hermeneutics (92) History and criticism (59) Knowledge (1)	Subjects
	Annotations	Annotation (65)	Added Entries Uniform title
	Concepts, Characters	Characters (42) Misc. Terms (47)	Subjects

Table 4. Relationships distribution according to resulting entity (work or expression) in the "Koran" bibliographic family

	Work-to-Work	Work-Expression	Sum
Derivative Relationship	112 (61.2%)	71 (38.8%)	183 (100%)
Cumulative Percentage	29.5%	18.7%	47.1%
Descriptive Relationships	197 (100%)	–	197 (100%)
Cumulative Percentage	51.8%	–	52.9%
Sum	309 (81.3%)	71 (18.7%)	380 (100%)

words, a large sum of members of this family is among those distinctive separate entities which are yet associated with the main progenitor.

Another evident point in the distribution of entities within descriptive and derivative relationships is that descriptive relationship is more likely to produce new works. That those expressions stemmed from the main work through descriptive relationships with their residual (–76.5) compared to others supports this idea.

In a more detailed view, table 2 shows a decomposed version of table 1, focusing on the distribution of relevant instantiations in this regard.

Table 2 is rather more informative. It shows that:

1. "Adaptation" is the most populated group within this family and after that come "critiques", "selections" and concepts and characters.

2. Among instantiations stemming through descriptive relationship, characters are those which may also lead to a different expression (when the entity encompasses only the verses attributed to a specific character), which indicates some sort of extraction.

3. Analysis of the bibliographic records reveals that about 69% of those instantiations regarded as critiques were also assumed to be

annotations since the term "annotations" was used in added entries or in the uniform title field.

Table 3 provides a general view of the terminology used for different instantiations and their associated fields.

On the other hand, the "Koran" also as the seed node of a major bibliographic family in both Arabic and Persian languages, is among well-known religious works. It is the holy book for Muslims. This family is unique, since in any other country except those whose official language is Arabic, its members are bilingual or might at least have two different languages. Due to its influential role in people's religious and cultural lives, lots of peripheral studies have been based upon it; and now with 30000 records in the Iranian National Bibliography, its records could also be FRBRized in pursuit of the restructuring of OPACs (table 4).

Analysis of such a sample of 380 records in this bibliography reveals that:

1) Similar to the "Epic of Kings", most bibliographic relationships between entities of this family are also derivative or descriptive; and there is no record in the sample pointing to accompanying or sequential relationships.

2) Focusing on FRBR's relations, it seems that work-to-work associations (81.3%) predominate over work-expression associations (18.7%).

3) None of the instantiations stemmed through descriptive relationships is an expression. Taking both this issue and the distribution of instantiations in the "Epic of Kings" bibliographic family into account, one can infer that it is more probable to reach an expression through a derivative relationship than through a descriptive one. This might be attributed to the size of a derivative relationship group (number of its instantiations) or the very nature of its association. Answering this question requires analyzing more bibliographic families.

A simple Chi square test, performed on these results, also reveals that there is a significant difference between different types of relationships within the "Koran" family (Chi Sq. 65.216, α less than 0.05). Focusing on frequencies and the distribution of records within this family, one notices the difference between those works stemmed from the original work through a derivative and descriptive relation; but also this significant difference points out that disregarding different editions of the work itself, the population of secondary works exceeds expressions in the bibliographic family. In other words, a large sum of members of this family, similar to the "Epic of Kings", is among those

Table 5. Distribution of different instantiations within "Koran" bibliographic family

		Work	Expression
Derivative Relationship	Translations	3 (0.8%)	8 (2.1%)
	Selections	29 (7.6%)	42 (11.1%)
	Lithography or Manuscripts	–	6 (1.6%)
	Recitations	19 (5%)	–
	Glossaries	6 (1.6%)	–
	Concordances	3 (0.8%)	–
	Other guides	4 (1.1%)	–
	Stories (adaptations)	40 (10.5%)	–
	Addresses, Essays, Lectures	8 (2.1%)	–
	Adaptation into new form	–	15 (3.9%)
Descriptive Relationship	Study and teaching	41 (10.8%)	–
	Hermeneutics	38 (10%)	–
	Annotations	3 (0.8%)	–
	Concepts, Characters	102 (26.8%)	–
	Research	13 (3.4%)	–
Sum		380 (100%)	

Table 6. Terminology of instantiations and associated fields in the Koran

		Term	Field
Derivative Relationship	Translations	Translations (44) / Translator (4)	Subjects / Added entries
	Selections	Selections (59) / Prayers (22)	Subjects
	Lithography or Manuscripts	[Lithography] (14) / [Manuscript] (39)	Title
	Recitations	Recitation (3)	Subjects
	Glossaries	Glossaries (4)	Subjects
	Concordances	Concordance (3)	Subjects
	Other guides	Misc. Terms (4)	Subjects
	Stories (adaptations)	Koran stories (35)	Subjects
	Addresses, Essays, Lectures	Essays and lectures (6)	Subjects
	Humor, Caricatures, etc.	Lampoon (1)	Title
	Adaptation into new form	Card (1) / Cassette (8) / Photograph (2) / Stamp (1)	Title / Collation
Descriptive Relationship	Study and teaching	Study and teaching (28)	Subjects
	Hermeneutics	Hermeneutics (13)	Shiite Hermeneutics (12)
	Annotations	Annotation (2)	Title
	Concepts, Characters	Misc. Terms Koran -- ** (64) / ** -- Koranic aspects (17)	Subjects
	Research	Research (9)	Subjects

distinctive separate entities which are yet associated with the main progenitor. Due to its unique nature, it is almost impractical for somebody to gather different verses about a concept or a character in the "Koran" without sufficient interpretation or at least translation.

Another point which is again evident in the distribution of entities between descriptive and derivative relationships is that a descriptive relationship is more likely to produce works. The number of those works stemmed from the main work through descriptive relationship with their residual (70.3), compared to the fact that there is no expression resulting from the same relation, supports this claim.

In a more detailed view, table 5 shows a decomposed version of table 4, focusing on the distribution of relevant instantiations in this family.

Table 5 provides us more information. It points out that:
1. Concepts and characters are the most populated group within this family; and after that come selections, study and teaching, and stories (as some sort of adaptations).
2. Among stemmed instantiations through derivative relationships, a special group of selections is regarded as different works. Due to its sacred nature, changing the Koran's text is assumed to be impossible. But when it comes to selecting specific verses as verses for prayers, then the resulting entity could be regarded as a different work. These kinds of selections, although of an extracting nature, are not regarded as mere expressions.
3. As for sacred texts such as the Koran, one could not find instantiations such as critiques.
4. As for the adaptations into a new form, since no modifications are included, the new form could not be regarded as a new work.
5. Almost all of the Koran stories are about prophets; therefore they also could be regarded as instantiations on characters.

Table 6 provides a general view of the terminology used for different instantiations in the Koran family and their associated fields.

Lists of terms extracted from records in this study (tables 3 and 4) are not comprehensive. In order to prepare a more complete version of instantiations terminology in Persian language, works of Afshar Zanjani[14], Bokaii[15], Koohestani[16] and Mayel Heravi[17] were consulted. Needless to say, some of these terms are used in Arabic too, and although comprehensive it is certainly not complete. As for the transliteration of words, two Persian dictionaries were used (Moeen* and Dayhime**).

Discussion

If we aim at bringing any change to current OPAC displays or structure in the light of the FRBR model, for example like what Maxwell[18] describes, there exist only two ways: current MARC records must be reconsidered either manually or automatically.

* Moeen, M. A Persian Dictionary. Tehran: Amir Kabir. 6 vols. 1963.
** Deyhime, G. Persian Pronunciation Dictionary. Tehran: Fahrang Moaser.

The correct answer to this question is self-evident, but this option prompts some issues which need to be reconsidered and handled thoroughly. The answer to this question was the essence of Carlyle et al.'s study on bibliographic relationships[19]. Regarding the Epic of Kings and the Koran as two major representatives of Persian bibliographic families in this study, findings reveal a couple of challenges in FRBRizing records automatically.

● All records indexed in current databases are not nitty-gritty ones. There are records which at the same time seem both an expression and also a work. For example, selections which also could be regarded as adaptations (in this study about 37.5% of records had this ambiguity). The term "Adaptations" is a subdivision but "selections" comes in both uniform title and added entries. It is evident that terms pointing to a new work should be given priority, which requires machine learning. An example will explain the situation: The Epic of Kings' Arabic translation by Bondari has both terms of "prose" and "translations" in subjects. The term "prose" points to a new work, since it shows that the literary form of the work has been changed fundamentally (from poetry to prose); at the same time, a translation is regarded as a new expression for that work. Is a machine capable of setting such distinctions without previous learning?

● Cataloging errors are inevitable. This issue, if multiplied by a minimal level of cataloging, may cause deficiencies. Scattered and sometimes scarce use of uniform titles, prioritizing the variant title field upon uniform titles in some records and shifting code of action in other records were among present issues (having 101 adaptations but mentioning the term "adaptations" as a subdivision only 64 times (about 63%) for the Epic of Kings family is not justified.

● Current prescribed terminology may need reconsideration in course of codes of action. In Persian and also Arabic especially for religious works there is a kind of annotation called "Sharh". Currently the subdivision "Sharh" is given to all those texts which are regarded as critiques. Although it is not wrong, this and similar accepted courses of actions result in the elimination of semantics of these terms. They are always used within records pointing at criticism and when it comes to a distinct annotation it would leave no discriminating attribute within the term's semantics.

● Subjects and name-titles, especially in the form of added entries, could be regarded as main fields bearing normalized data which will be of use in determining the relationships and the resulted entity. Then the uniform title, the title proper, the main entry, the collation, the notes and sometimes the varying title could be of use (based on this study's results). The call-number was regarded to help identifying members of the family and also their relationship. In the PIR class (expanded LC class for the Persian Literature) a range of 4490 - 4498 numbers is allocated to Ferdowsi and the Epic of Kings but when it comes to different adaptations based on this work, new works are entered under their author. Thus the number would be totally different from what has been defined for the Epic of Kings. In the current situation, relying only upon unique work call-numbers results in losing some works such as adaptations.

● Allocating an entire chapter (25) to union titles in AACR2 seems to be one of the major steps towards grouping works that appear under various titles including translations (A 25.1 A, A25.2-35). The main entry and especially the added entries are among other tools aiming at collocation. In addition, allocating chapter 6 of RDA draft to this approach seems very promising. Another promising point is that chapter 6 aims at identifying works and expressions, thus implicitly stresses the importance of those relationships which delineate them (the basic motive of our study). But as Weihs & Howarth wrote, these rules must be of a mandatory nature in order to be effective[20]. Or, as our study suggests, they should be applied consistently in order to act as a real collocating device. In their absence the task of identifying entities is based upon the analysis of at least 4 different fields (Title proper, Main entry, Added entries, Subject Headings) at the same time. And some preliminary codes of action must be set.

● Although promising, chapter 6 in the RDA current draft has left literary works behind. Analyzing the Epic of Kings' family leads to a terminology available in table 3. Thus these types of works do need to be considered when identifying works and expression. Dismissing such important work-sets may result in incorrect collocation in the field of literature.

Concluding remarks

An analysis of two major bibliographic families in this study implicitly reveals that least three points should be considered simultaneously if any progress is to take place:

● Catalogers must become aware of what exactly their goal is. What is the main idea behind FRBR or other conceptual models and what would be the benefit of cataloging in this manner?

● Cataloging rules and local codes of action must be in agreement.

● There must be algorithms and relevant software which enabling to make some amendments for the two previous inconsistencies.

Dismissing any of these points may lead to inconsistent access especially when voluminous works are concerned. This study was based upon the assumption that there are terms in bibliographic records which might help identifying basic relationships among different entities in bibliographic families. These terms are now scattered all over the records: from the titles, the notes fields, to the collation or the subjects and from the main entry to the added entries or uniform titles. Thus what is needed is a means by which these terms are normalized: a field which is capable of collocation. Uniform titles, according to Vellucci, have long been discussed as linking tools[21]. This is also evident in AACR2 which defines uniform titles as tools for identifying works and manifestations. Future cataloging codes are more promising in this regard; since uniform titles have been regarded as tools for identifying works and expressions in RDA. But it seems that reconsideration is still required. Although there are traces of work-work relationships in 6.27.1-2, secondary works (new stemmed works from the main progenitor) and the progenitors are not separated in a way which could help the machine distinguish them. We may think of a new version of the uniform title designed in such a way that it represents bibliographical relationships in the light of the FRBR model. "Main progenitor, New stemmed work, Expression level attributes" could be regarded as a possible (or maybe rational) order for structuring this new FRBRized union title.

Studies such as ours help developing algorithms for determining different entities through record analysis, which provides raw materials for such FRBRized fields. Achieving this goal requires analysis of different bibliographic records (in

different subject areas e.g., literature, religion, philosophy, etc.) in order to have a comprehensive notion of different entities, their relationships, the terminology used, and possible differences in posting patterns among different bibliographic families.

The findings of the present research will help catalogers and software developers to create library software providing catalog users with better search/retrieval facilities, better collocation of related works (bibliographic families), and meaningful displays of the retrieval results. There is thus a need for revising some cataloging rules and restructuring some MARC fields (such as uniform titles).

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