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**A Comparison of Descriptive Tagging Practices by
Library, Archive, and Museum Professionals using an
Inter-Indexing Consistency Approach**

Abstract

This study is a comparison of the descriptive tagging practices among library, archive, and museum professionals using an inter-indexing consistency approach. The first purpose of this study was to determine the extent of the similarities and differences among professional groups when assigning descriptive tags to different object types typically found within the library, archive and museum environments. The second purpose of this study was to compare the descriptive practices of these three professional groups to different object types typically found within the library, archive and museum environments. Findings from this study indicate while there were few differences in depth of indexing per object type among professional groups, various levels of description were applied to the different object types. Levels of description were derived from: (1) the three dimensional or physical media pictured; (2) the digital surrogate; (3) the objects *aboutness*; (4) the technique and materials used to make the physical object, and; (5) written text. Data analysis also indicates there was a significant difference between means in the total number of exact matched primary tags applied per object type. As such, information retrieval within the online environment could be improved if there was better quality control in the application of the different levels of description among information professionals.

Introduction

Collaboration among library, archive, and museum professionals is uncommon especially in the online environment. One reason for this is because information professionals have “...often emphasized their distinctions from one another, largely on the basis of the physical format of the information they held” (O’Toole and Cox 2006, xi-xii). Librarians concentrated on single, non-unique items, such as books, periodicals, and similar print materials (Lubetzkey 1953; Svenonius 2000; Taylor and Joudrey 2009). Archivists deal with massive amounts of unique documents that are best understood and described in relation to each other and to their creators and seldom can afford to identify each individual document (Hensen 2007; O’Toole and Cox 2006; Schellenberg 1965). Museum professionals have a vast array of different physical and print artifacts to describe utilizing an extensive system of description (Elings and Garcelon 1998; Marty 2008).

According to Rayward (1998), these differences no longer exist when objects are in digital form and “...there has been a growing awareness that what has been accepted as separating these professions may no longer be relevant and...have become dysfunctional” (Rayward 1994, 163). This is because as principles of descriptive cataloging evolved from organizing lists of individual books to more granular approaches of subject access (Blake 2009; Lancaster 1998; Pettee 1936; Svenonius 2000) it became possible, with the adoption of new cataloging technologies, (Baca 2008; Chen 1976; Svenonius 2000) for information users to find and retrieve objects across collections (Baca 2008; Chen 1976).

However, when the catalog changed from the traditional card catalog to online cataloging, new descriptive standards, while proposed, were never adopted within the library environment. The traditional standards used in descriptive card cataloging within the library environment were simply translated to the online cataloging environment. The majority of information objects within the museum environment are

not digitized because they have only recently begun making their collections available beyond the traditional brick-and-mortar walls. Furthermore, museum professionals continue to resist the adoption of controlled vocabularies due to their inability to adequately describe objects held within their institutions (Beaudoin 2007).

The archival environment “leapfrogged” (Roe 2005) into the online cataloging environment with the development of Encoded Archival Description (EAD). The problem, according to Eastwood (2000) is that archival arrangement is not practiced (that is, conceptually) as the organization of internal and external relationships among collections of documents. While internal relationships within collections of documents are established, the external relationships between collections of archival documents are not connected with other related information objects within the library and museum environments.

As information professionals adhere to inter-institutional cataloging practices instead of participating with each other through the establishment of related data elements among information objects, networked information will continue to mirror physical libraries, archives, and museums (Trant 2009). Part of the problem as to why networked information continues to mirror the physical information environments is because the quality of “...information representation has not been adequately done” (Chu 2010, 19) via the linking of related data elements across the information environments.

To improve the quality of information representation for information retrieval “better quality control over the subject access points in cataloging records is essential if we are to improve retrieval effectiveness or to facilitate cooperative cataloging” (Chan 1989, 349). Increased quality in the application of descriptive access points would result in more consistent descriptions when information professionals characterize what an object *is*, what an object is *of*, and what an object is *about*. Consistency in the application of descriptions would increase the potential of related information objects among the library, archive, and museum environments to be linked to each other via their shared data elements within the online cataloging environment.

Few studies have explored differences in tagging practices among library, archive, and museum information professionals and its potential impact when assigning descriptive metadata to various types of information objects. It is recognized that in today’s online environment, the information user can “...create, organize, index, and search for images and other information sources through social tagging and other collaborative activities” (Rorissa 2010, 2230). However, while the information user has taken advantage of the online collaborative tagging environment to describe their images, information professionals have not. Collaborative tagging among the library, archive, and museum environments could help streamline information access within the shared online cataloging environment and increase retrieval effectiveness.

Collaborative tagging may also offer an additional avenue to traditional indexing practices because “...there is continuity between conventional indexing and user tagging: a continuity that could form the basis for a complementary system of subject access that could enrich conventional indexing rather than crowding it out” (Kipp and Campbell 2006, 11). This is because collaborative tagging has the potential to influence indexing by offering access to alternative points of view in how different information professionals describe their objects. Thus, the main research question posed in this study was: “What are the similarities and differences in the descriptive

practices of library, archive and museum professionals when describing the same sample of digital objects?"

Methodology

To answer the main research question posed in this study data was collected from library, archive, and museum professionals via the creation of a website (www.christineangel.org). A power analysis was conducted to determine the number of research participants needed to obtain significant data. It was determined that a total of 90 information professionals divided into three groups – library, archive, and museum professional – were needed in order to achieve 90% power at the 0.05 level of significance.

The website was composed of twenty digital images which were divided into four different object types: (1) scanned images of photographs; (2) objects (consisting of scanned images of pottery); (3) scanned archival documents, and; (4) scanned images of book covers. The objectives were: (1) to determine the extent of the similarities and differences among LAM professionals when assigning descriptive metadata to a wide variety of objects that may be found in any one or all three types of institutions, and; (2) to compare the indexing practices of different groups of information professionals to different object types.

Instructions were provided to the information professional simply asking “What descriptive metadata would you apply to this item?” Primary and secondary tags were applied to each object. One primary tag was required for each object; secondary tags were optional with depth of indexing limited to ten.

Figure 1. Data collection instrument

The screenshot shows a web form for data collection. On the left, a dropdown menu is labeled 'Image Category' with an arrow pointing to it. The form itself has a header 'IMAGE CATEGORY: PHOTOGRAPH'. Below this is a central image of a photograph showing two people sitting on the ground in front of a small structure. To the right of the image are several input fields: one labeled 'PRIMARY TAG' with an arrow pointing to it, and ten stacked fields labeled 'SECONDARY TAGS' with an arrow pointing to them. At the bottom right of the form is a button labeled 'Next Image >' and a counter labeled 'IMAGE 10 OF 20' with an arrow pointing to it.

For all 20 objects, the screen looked like the example shown in Figure 3. There was one text box available for the primary tag and ten text boxes available for any secondary tags. The image category was provided denoting the four types of objects. An image counter was also placed at the bottom of each screen showing the research participants progress during the study.

Results

The first research question involved calculating a simple analysis of variance (ANOVA) to determine if there was a significant difference among library, archive,

and museum professionals in the total number of tags assigned to the sample of 20 objects. The independent variable for this calculation was professional group and the dependent variable was number of tags.

The obtained value was 0.250 with an associated level of significance of 0.780. The critical value for rejections of the null hypothesis at a 0.05 level of significance was 3.10. Since the critical value was greater than the obtained value there were no significant differences among library, archive, and museum professionals in the number of tags to describe each object.

For the second research question, the *t*-test for independent samples was used to calculate the number of tags applied between professional groups. The objective of this part of the study was to determine if there was a significant difference in the average number of tags assigned between librarians and archivists (LA), librarians and museum staff (LM), and archivists and museum staff (AM) professionals. The null hypothesis was defined as there is no significant difference between professional groupings in the number of tags applied to describe the sample of objects. The dependent variable was number of tags. The level of significance was set at 0.05. All three test statistics indicated that there were no statistically significant differences in the average number of tags assigned between professional groupings.

The third question in this study was to determine if there were any significant differences in the number of tags assigned per object type by library, archive, or museum (LAM) professional group. The objectives of this question were to: (1) determine if object type had an effect on the number of tags assigned per professional group and; (2) determine if the type of information professional (library, archive, or museum) had an effect on the number of tags assigned per object type.

To analyze the number of tags per object type, the data was organized by the two factors being measured: (1) object type, and; (2) professional group. Then each factor was organized into different levels. There were four different levels of measurement pertaining to object type: (1) photographs; (2) objects; (3) archival documents, and; (4) book covers. There were three different levels of measurement pertaining to professional group: (1) librarians; (2) archivists, and; (3) museum staff professionals. This resulted in a 3 x 4 factorial design which was then used to determine via a two-way ANOVA if: (1) object type had an effect on the number of tags assigned per professional group; (2) if professional group had an effect on the number of tags assigned per object type, and; (3) if there was an interaction between object type and professional group.

The dependent variable for this statistical analysis was number of tags. The sample size was 20 because the comparison was conducted among professional groups, but across the four different object types. As such, the profession factor was collapsed, so the 30 subjects within each professional group behave like one. The critical value was set at $p \leq 0.05$.

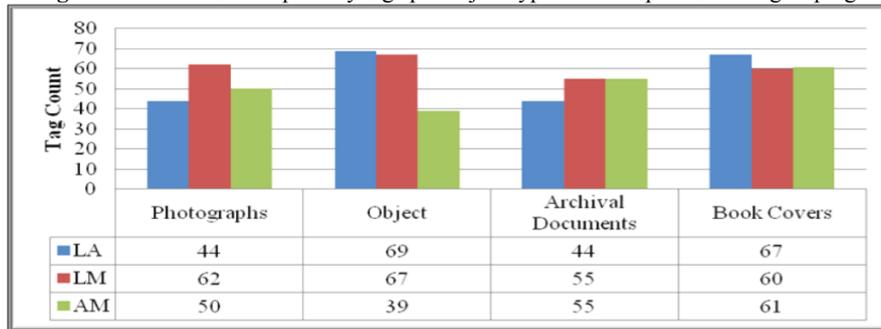
For the main factor “profession” the two-way ANOVA indicated $p = 0.533$ indicating there were no significant difference among professional groups (LAM) in the total number of primary and secondary tags assigned per object type.

For the main factor “object type” the two-way ANOVA found $p = 0.024$ indicating there was a significant difference in the total number of primary and secondary tags applied per object type. A post hoc test was calculated to determine at which levels this

difference occurred. Results indicated there was a significant difference in the number of tags applied between objects and photographs.

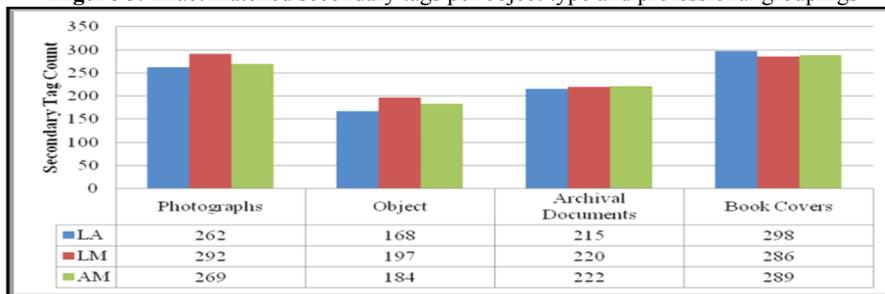
The objective of the fourth question was to determine if there was a significant difference in the number of exact matched primary and secondary tags assigned per object type (photographs, objects, archival documents, and book covers) and between professional groupings (LA, LM, AM). A simple word count was conducted for this measure. A summary of all research findings concerning exact matched primary tags between professional groups and object types are summarized below in Figure 2.

Figure 2. Exact matched primary tags per object type between professional groupings



There were a total of 3,616 exact matched secondary tags applied between professional groupings when describing all 20 objects. The least agreement was found between library and archive (LA) professionals with a total of 943 exact matched secondary tags. The most agreement was found between library and museum (LM) professionals with a total of 995 exact matched secondary tags. The total number of exact matched secondary tags between professional groupings (LA, LM, AM) and object type are summarized in Figure 3.

Figure 3. Exact matched secondary tags per object type and professional groupings

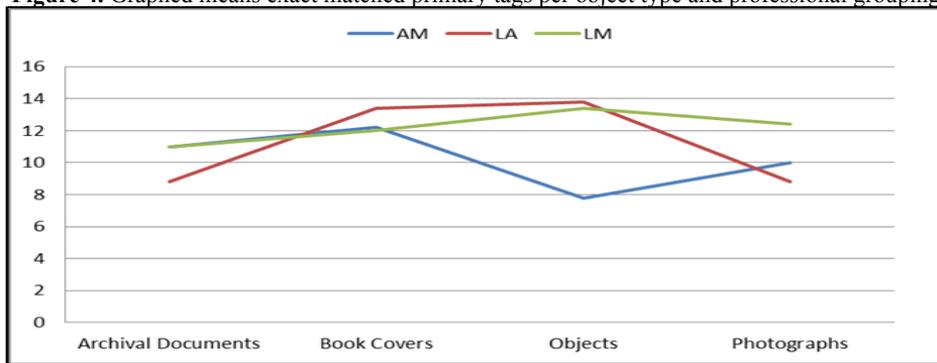


A two-way ANOVA was then calculated. The objectives were to determine if: (1) object type had an effect on the number of exact matched primary tags assigned per professional grouping, and; (2) to determine if the type of professional grouping had an effect on the number of exact matched primary tags assigned per object type. Results of the two-way ANOVA concerning the total number of exact matched primary tags

indicated there was an interaction between the main factor object type and the main factor professional grouping.

A post hoc test between professional groupings and object type revealed there were two significant differences between archival documents and book covers with $p = 0.008$. The second difference occurred between photographs and book covers with $p = 0.014$. The conclusion was that there is an interaction between main factor professional grouping and main factor object type. This interaction occurred between AM and LM professionals when tagging exact matched primary descriptors to archival documents, photographs, and book covers. When the means are graphed, a significant difference in means is especially evident between LA and AM professionals when tagging objects with a mean number of 13.8 exact matched primary tags for LA professionals and a mean number of 7.8 exact matched primary tags for AM professionals.

Figure 4. Graphed means exact matched primary tags per object type and professional grouping



A two-way ANOVA concerning exact matched secondary tags was also conducted. For the main factor “profession” the result of the two-way ANOVA was $p = 0.874$ indicating there was not a significant difference in the number of exact matched secondary tags among professional groupings (LA, LM, AM). For the main factor “object type” the two-way ANOVA found $p = 0.002$ indicating there was a significant difference in the total number of exact matched secondary tags applied per object type.

Results of the post hoc for the main factor object type indicate the means between object and photograph were significantly different with $p = 0.015$. There was also a significant difference between objects and book covers with $p = 0.003$.

The exact matched data obtained from question four was used to answer the fifth question in this study, which was to determine the percentage of exact matched primary and secondary tags used by library, archive, and museum professionals to describe the four object types. The percentage of exact matched tags among library, archive, and museum professionals was measured utilizing Jacoby and Slamecka’s consistency formula which was used in their 1962 study titled *Indexer Consistency under Minimal Conditions*. The formula was adapted for use within this present study to calculate the percentage of exact matched tags:

Figure 5. Formula used to calculate percentage of exact matched tags among LAM professionals

$$\text{PERCENT OF TAGS MATCHED} = \frac{N(LAM)}{N(L) + N(A) + N(M) - N(LA) - N(LM) - N(AM) + N(LAM)} \times 100$$

Where: L = Library; A = Archive, and; M = Museum; N(L) = Number of terms assigned by Library Professionals; N(A) = Number of terms assigned by Archive Professionals; N(M) = Number of terms assigned by Museum Professionals; N(L), N(A), N(M) = Number of terms assigned by each information professional; N(LA), N(LM), and N(AM) = Number of terms matched among the three pairs of indexers per document; N(LAM) = Number of terms matched among all three indexers

Calculations concerning exact matched tags among LAM professionals were made by analyzing: (1) the percentage of exact matched primary tags per object type; (2) the percentage of exact matched secondary tags per object type, and; (3) the percentage of exact matched primary and secondary tags per object type. The results are summarized in the Table below.

Table 1. Percent exact matched tags among LAM professionals

Object	Primary Tags	Secondary Tags	All Tags
Photographs	9.26 percent	18.01 percent	16.53 percent
Objects	9.84 percent	14.50 percent	13.37 percent
Archival Documents	12.70 percent	14.58 percent	13.98 percent
Book Covers	17.87 percent	20.44 percent	19.84 percent
All Tags	12.22%	17.02%	16.04%

Source: www.christineangel.org

Conclusion

The purpose of this study was to assess the similarities and differences among library, archive, and museum professionals when assigning tags to represent the subject matter of an object and the relationships between those assigned tags. There were four different object types used in this study: (1) photographs; (2) objects, consisting of scanned images of pottery; (3) archival documents, and; (4) book covers. There were three different types of information professionals measured for indexing consistency in this study: (1) library professionals; (2) archive professionals, and; (3) museum information professionals.

When comparing this study to other indexing consistency studies the 13.98% consistency in the total number of exact matched descriptive tags applied to archival documents in this study was slightly lower when compared to Jacoby and Slamecka's finding of 16.3% consistency reported for experienced indexers and higher than the 12.6% consistency reported for inexperienced indexers. There was a significant difference in descriptions pertaining to photographs among LAM professionals compared to Markey's 1981 indexing consistency study. Differences in tagging practices could be attributed to differences in the number of research participants used between the two studies. Jacoby and Slamecka used a total of six research participants in their 1962 study and Markey's study consisted of three research participants.

Findings from this study indicate there was a significant difference found in the total number of primary and secondary tags applied between scanned images of pottery

and photographs. One reason for this variation in the number of tags per object type was due to differences in the types of information conveyed per object type. That is, the images of pottery did not have any text included with them aside from the description of the “object type” which was included with the research tool. Qualitative analysis of descriptive tags used to represent scanned images of pottery indicate information professionals assigned descriptive terms to the images of pottery based upon: (1) the introductory paragraph provided by the researcher; (2) prior knowledge pertaining to Catawba pottery by the information professional, or; (3) from the information professional performing a cursory search of Catawba pottery in order to obtain more information about the objects so that they could be described. More granularity was applied to images of pottery if there were distinguishing attributes such as the handles that were shaped into faces on object six or the ceramic candlestick represented in object eight.

Another reason for differences in indexing depth between the scanned images of pottery and photographs was due to research participants classifying broad descriptive concepts into more narrow ones. The descriptive term “clothing” for example was classified as “uniform,” “costume,” “ceremonial” and “traditional.” This same type of classification schema was done when representing the images of pottery but because the pottery offered less descriptive characteristics than the photographs, the descriptions were not as rich resulting in a decrease in the depth of indexing when compared to photographs, archival documents, and book covers. Even though a decreased level of indexing was displayed among scanned images of pottery across professional groups there was still a high amount of consistency displayed that could allow for the linking of related data elements across objects and professional groups within the online environment.

There were also significant differences in the number of exact matched primary tags applied to archival documents, book covers, and photographs. When comparing the number of exact matched primary descriptive tags applied to archival documents and book covers, the archival documents in this study contained more text per document than book covers which contained a few words in the title. Because there were more words on the archival documents information professionals could choose from than book covers, there was less consistency in the application of primary descriptive terms used when describing archival documents and more consistency between professional groupings when describing book covers.

Comparative analysis between book covers and photographs indicate book covers exhibited a high depth of indexing among all professional groups because this object type contained text that could be derived from the object for description and images that could be used to assign descriptors to the object. The one exception to this was object five (photograph). This information object had words in the actual photograph which accounted for an increase in the number of terms and the number of exact matched descriptive tags when applied among LAM professionals. The fact that this image had more than one term included with the image that information professionals could use for its description and the fact that the image pictured could be described utilizing additional levels of granularity are the most plausible reasons as to why a greater amount of consistency occurred with this object (Object 5) when compared to all the other information objects in this study.

Differences in indexing depth were also found among professional groups. Depth of indexing among archivists was significantly higher when applying descriptive terms to archival documents. This is because qualitative analysis indicated that archivists used more multi-word terms when describing the same sample of archival documents than library and museum professionals.

Tagging practices exhibited among archivists indicate depth of indexing is lower when describing scanned images of pottery when compared to library and museum professionals. The reason for this may be due to the fact that archivists organize and describe their information objects utilizing the principles of provenance and original order. The research tool used for data collection in this study offers no context to the information objects used as tagging tools. The lack of context provided with the images in this study could have had an effect upon the archivist's ability in providing more descriptive terms. If this is indeed what happened, this could have implications as to how objects are described for information retrieval via the World Wide Web. Further research is needed.

Findings also indicate that information professionals utilize various levels of description when representing the information objects. Levels of description were derived from: (1) the three dimensional or physical media pictured, ("document," "letter," "postcard," and "photograph") (2) the digital surrogate "image;" (3) what the object is *about* ("Catawba," "Treaty"), and; (4) descriptions pertaining to the technique(s) used to make the physical object ("handwritten") and the materials used to make it ("ink" and "paper"). There were also two different types of descriptive terms applied by information professionals to objects: (1) terms derived from the text contained on an object, and; (2) assigned terms, or descriptions applied to the objects such as "survival." While multiple approaches are necessary when determining the subject matter of an information object, key concepts were sometimes missed which decreased the ability to link related data elements together across the information environments.

Findings from this current study indicate information professionals may need instruction pertaining to the conceptual arrangement of the various levels of subject analysis as they apply to different object types. This is because multiple approaches are necessary when determining the subject matter of an information object and key concepts were sometimes missed which decreased the ability to link related data elements together across the library, archive, and museum environments. As such, instruction in the process of determining the subject matter of an object is needed for better quality control in subject access points. Better quality control in determining what an object *is*, what an object is *of*, and what an object is *about* could increase the ability of information professionals across the information environments to map related data elements between objects via their descriptive attributes and thereby increase the number of connections between the information user and the information object.

References

- Baca, M. (Ed.). 2008. *Introduction to metadata* (2nd ed.). Los Angeles, CA: Getty Research Institute.
- Beaudoin, J. E. 2007. Visual material and online access: Issues concerning content representation. *Art Documentation* 26(2): 24-28.
- Blake, V.L.P. 2009. Forging the Anglo-American cataloging alliance: Descriptive cataloging, 1830-1908. *Cataloging & Classification Quarterly* 35(1-2): 3-22.

- Chan, L.M. 1989. Inter-indexer consistency in subject cataloging. *Information Technology and Libraries* 8: 349-358.
- Chen, P. 1976. The entity-relationship model – toward a unified view of data. *ACM Transactions on Database Systems* 1: 9-36.
- Chu, H. 2010. *Information representation and retrieval in the digital age*. Medford, N.J.: Information Today, Inc.
- Eastwood, T. 20002. Putting the parts of the whole together: Systematic arrangement of archives. *Archivaria* 50: 93-116.
- Elings, M.W. and E. Garcelon. 1998. The Robert Honeyman Jr. Collection Digital Archive: EAD and the use of library and museum descriptive standards. *Archives and Museum Informatics* 12: 205-219.
- Hensen, S.L. (Ed). 2007. *Describing archives: A content standard*. Chicago: Society of American Archivists.
- Jacoby, J. and Slamecka, V. 1962. *Indexer consistency under minimal conditions*. Report No. RADC-TDR-62-426. Bethesda, MD.
- Kipp, M.E.I. and D.G. Campbell. 2006. Patterns and inconsistencies in collaborative tagging systems: An examination of tagging practices. *Proceedings of the American Society for Information Science and Technology* 43(1): 1-18.
- Lancaster, F.W. 1998. *Indexing and abstracting in theory and practice* (2nd ed.). Champaign, ILL.: University of Illinois, Graduate School of Library and Information Science.
- Lubetzky, S. 1953. *Development of cataloging rules*. Champaign, ILL.: University of Illinois, Graduate School of Library and Information Science.
- Markey, K. 1981. *Computer-assisted construction of a guide to themes and concepts in medieval art and their essential attributes* (Unpublished doctoral dissertation). Graduate School of Syracuse University, Illinois.
- Marty, P.F. 2008. Metadata and museum information. In *Museum informatics: People, information, and technology in museums*, ed. P.F. Marty and K.B. Jones, New York NY: Taylor & Frances Group, LLC.
- O'Tool, J.M. and R.J. Cox. 2006. *Understanding archives and manuscripts*. Chicago, IL: Society of American Archivists.
- Pettee, J. 1936. The development of authorship entry and the formulation of authorship rules as found in the Anglo-American code. *Library Quarterly* 48(4): 289-300.
- Rayward, W.B. 1994. Some schemes for restructuring and mobilizing information in documents: a historical perspective. *Information Processing and Management* 20(2): 163-175.
- Rayward, W.B. 1998. Electronic information and the functional integration of libraries, museums, and archives. In *History and electronic artefacts*, ed. E. Higgs, Oxford: Oxford University Press, pp. 207-224.
- Roe, K. 2005. *Arranging and describing archives and manuscripts*. Chicago, IL: Society of American Archivists.
- Rorissa, A. 2010. A comparative study of flickr tags and index terms in a general image collection. *Journal of the American Society for Information Science and Technology* 61(11): 2230-2242.
- Schellenberg, T.R. 1965. A nationwide system of controlling historical manuscripts in the United States. *The American Archivist* 28(3): 409-412.
- Svenonius, E. 2000. *The intellectual foundations of information organization*. Cambridge, MA: The MIT Press.
- Taylor, A.G. and D. Joudrey. *The organization of information*, (3rd ed.). Westport, Conn.: Libraries Unlimited.
- Trant, J. 2009. Tagging, folksonomy and art museums: Results of steve.museum's research. *Archives & Museum Informatics*.