

5-1-2014

# A Child-Driven Metadata Schema: A Holistic Analysis of Children's Cognitive Processes During Book Selection

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A CHILD-DRIVEN METADATA SCHEMA: A HOLISTIC ANALYSIS OF  
CHILDREN'S COGNITIVE PROCESSES DURING BOOK SELECTION

by

Jihee Beak

A Dissertation Submitted in

Partial Fulfillment of the

Requirement for the Degree of

Doctor of Philosophy

in Information Studies

at

The University of Wisconsin-Milwaukee

May 2014

## ABSTRACT

### A CHILD-DRIVEN METADATA SCHEMA: A HOLISTIC ANALYSIS OF CHILDREN'S COGNITIVE PROCESSES DURING BOOK SELECTION

by

Jihee Beak

The University of Wisconsin-Milwaukee, 2014

Under the Supervision of Professor Hope A. Olson, and Professor Richard P. Smiraglia

The purpose of this study was to construct a child-driven metadata schema by understanding children's cognitive processes and behaviors during book selection. Existing knowledge organization systems including metadata schemas and previous literature in the metadata domain have shown that there is a no specialized metadata schema that describes children's resources that also is developed by children. It is clear that children require a new or alternative child-driven metadata schema. Child-driven metadata elements reflected the children's cognitive perceptions that could allow children to intuitively and easily find books in an online cataloging system. The literature of development of literacy skills claims that the positive experiences of selecting books empower children's motivation for developing literacy skills. Therefore, creating a child-driven metadata schema not only contributes to the improvement of knowledge organization systems reflecting children's information behavior and cognitive process, but also improves children's literacy and reading skills.

Broader research questions included what metadata elements do children like to use? What elements should a child-driven metadata schema include? In order to answer these research questions, a triangulated qualitative research design consisting of questionnaires, paired think-aloud, interview, and diaries were used with 22 child participants between the ages of 6 and 9. A holistic understanding of the children's cognitive processes during book selection as a foundation of a child-driven metadata schema displays an early stage of an ontological contour for a children's knowledge organization system. A child-driven metadata schema constructed in this study is apt to include different metadata elements from those metadata elements existing in current cataloging standards. A child-driven metadata schema includes five classes such as story/subject, character, illustration, physical characteristics, and understandability, and thirty three metadata elements such as character's names and images, book cover's color, shape, textured materials, engagement element, and tone. In addition, the analysis of the relationship between emergent emotional vocabularies and cognitive factors and facets illustrated the important role of emotion and attention in children's information processing and seeking behaviors.

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## ACKNOWLEDGMENTS

I am heartily thankful to my supervisors, Professor Hope A. Olson and Professor Richard P. Smiraglia, whose encouragement, guidance and support from the initial to the final level enabled me to complete this dissertation. I would like also to thank the other three committee members, Professor Margaret E.I. Kipp, Professor Terrance Newell, and Professor Kyongboon Kwon for their valuable suggestions and feedback.

I am indebted to the 22 children and their parents in my study, and the four libraries: Wauwatosa Public Library, Greendale Public Library, Zablocki Public Library, and Brown Deer Public Library. I also want to extend thanks to library directors, Ms. Paula Kiely, Mr. David Sikora, Mr. Brian Williams-Van Klooster, and Ms. Mary Murphy for accommodating my research, and special thanks to a children's librarian, Ms. Anne Kissinger, at the Wauwatosa Public Library for welcoming and her support.

Many of my colleagues have provided incredible support and encouragement over the years. In addition, I am grateful to the School of Information Studies, University of Wisconsin-Milwaukee for a research fund and technical support.

Lastly, my family is the greatest supporter in my life. This dissertation is dedicated to my grandfather. Thank you for all your prayers and deepest thoughts.

Jihee Beak

## Chapter 1: Introduction

### 1.1. An anecdotal motivation for the study

I remembered the first time when I visited a children's room in a public library at my hometown in South Korea. The children's room consisted of two-tier bookshelves along the walls and there were many children's books scattered around the room. Children's books were arranged by authors' last names. However, children did not seem to care about the author's name. Therefore, they had to pull books out to look for other information in the books. This classification system did not seem to work for a children's library in a chaotic situation. Ten years after my first experience of a children's library, I am still going to children's libraries. The difference is that now I visit children's libraries in the United States. However, when it comes to a classification system for a children's library, it seems little has changed. Children's libraries, regardless of whether they are in South Korea or in the United States, still use the same knowledge organization systems such as the *Dewey Decimal Classification (DDC)*.

Nowadays children are living in the internet world. They try to find information through a library catalog system or a web portal. How do children find information in an online environment? Is it as difficult as finding books in a physical library? Is there any child-appropriate knowledge organization system such as a metadata schema for children in the online environment? While observing children's information seeking and searching behavior in physical and digital libraries, I have been able to find some research gaps and research problems in metadata schemas for children's resources. Children's information



needs call for a new metadata schema that describes children's resources from children's perspectives and that provides child-appropriate access points.

## **1.2. Background: The current situation with metadata schemas for children**

Children have become a significant user group in both physical and digital library environment. To keep pace with the growing information needs from a children's user group, Library and Information Science (LIS) has developed child-friendly search interfaces, web portals, or digital libraries. Behind these products, a great number of studies on children's information behavior have been conducted. A body of literature in children's information behaviors shows that children have different information seeking and searching behaviors from those of adults. Due to lack of cognitive abilities including limited vocabularies and concepts, or lack of capacity to understand Boolean logic, etc. children have difficulties searching for information with keywords (Borgman et al., 1995; Busey & Doerr, 1993; Hirsh, 1997; Hutchinson et al., 2005; Pejtersen, 1986; 1989; Sandlian, 1994; Solomon, 1993; Walter, Borgman & Hirsh, 1996). Instead, children prefer finding information through a browse search (Beheshti et al., 2010; Bilal, 2000; 2001; 2002b; Borgman et al., 1995; Borgman, Chignell, & Valdez, 1989; Large, Beheshti, & Rahman, 2002; Pejtersen, 1986; Sandlian, 1994; Walter, Borgman, & Hirsh, 1996). Moreover, in order to motivate children's interest or attention to find information, digital libraries or web portals for children are concerned about aesthetic aspects (Reuter, 2007a). Interfaces become more colorful and use graphical icons and images. These changes encourage children to engage in information seeking and searching activities.

Despite a huge amount of effort and research regarding improving information retrieval systems for children, children still complain about using library cataloging systems and finding information in an online environment. It is because of the disconnection between information retrieval and information organization. Information retrieval and information organization are often considered as two sides of the same coin. Without having well-constructed information organization systems, it is hard to develop effective information retrieval systems. Even well-designed interfaces, if they fail to consider an information organizational perspective, cannot fully function to meet children's information seeking behaviors and needs. Given this relationship between information retrieval and information organization, there has been lack of consideration in information organization systems for children's libraries or children's resources.

Current knowledge organization systems (KOS) used in school or public libraries for children are not specialized for children. For instance, many school and public libraries in the United States still use the *Anglo-American Cataloguing Rules, 2<sup>nd</sup> ed, (AACR2)*, *MARC21*, *DDC*, *Library of Congress Subject Headings (LCSH)*, etc. These KOS were not originally developed for representing children's resources, but rather designed for representing general resources for adult audiences. There are two components in information organization: users and resources. Information organization tends to emphasize more how to represent the characteristics or the nature of resources than how to reflect users' perspectives in KOS (Beak & Olson, 2011a; 2011b). It is very important to understand who the end users are when new information retrieval systems or knowledge organization systems are developed. However, in the case of developing an

information retrieval systems or interfaces, they are developed for children, but not developed by children. Adult developers or experts often believe that they can represent children's information seeking behaviors and cognitive processes. This belief might be partially true and might work. By considering children's information behaviors on behalf of children's user groups, these adult experts might develop a "user-centered" metadata schema. However, it is not as effective as a "user-driven" metadata schema, based on studies about children's information seeking behaviors and cognitive processes from actual children. Two terms, user-centered and user-driven, may be interchangeable. However, strictly speaking, a user-driven approach requires empirical data from targeted end users, whereas a user-centered approach simply considers users' perspectives more than technical issues. Therefore, it is necessary to develop a user-driven metadata schema to describe and provide information in a user-friendly or user-appropriate way.

Existing KOS including metadata schemas and previous literature from the metadata domain, have shown a research gap leading to this study's research problem. There is a no specialized metadata schema that describes children's resources that also developed by children. It is clear that children require a new or alternative child-driven metadata schema. LIS has employed grounded theory (e.g., Seldén, 2005) often to study information seeking behaviors. This study uses a grounded theory to reveal children's information seeking behaviors. Mansourian (2006, p. 390) describes the value of grounded theory:

The most important issue in using GT [Grounded Theory] is to remember the value of the GT's essence in developing a theory, which is essentially grounded in the real data without any effects of bias towards a specific direction or considering any pre-convinced assumption in data analysis. Therefore, the essence of GT is remaining open and unbiased towards what data suggest to build up the theory based only on the data and nothing else.

The value of using grounded theory in this study is that I am able to understand what and how children's cognitive processes occur during book selection without pre-conceived assumptions. In other words, I do not predict participants' information seeking behaviors, but rather I observe phenomena with an open mind. In this sense, a grounded theory approach is useful to discover the holistic ontological contour of children's cognitive processes and information seeking behaviors as a foundation for developing a child-driven metadata schema.

A child-driven metadata schema enables children to readily find and select information by themselves with child-appropriate access points. The literature of development of literacy skills claims that the positive experiences of selecting books empower children's motivations for developing literacy skills. Therefore, creating a child-driven metadata schema not only contributes to the improvement of KOS reflecting children's information behavior and cognitive process, but also improves children's literacy and reading skills.

## Chapter 2: Literature review and conceptual framework

The aim of this study is to develop a child-driven metadata schema describing children's resources and targeting children's user groups through a study of children's information seeking behavior and cognitive processes during book selection. In this aspect, this chapter reviews the literature in children's information behavior and metadata schemas for children's resources. The body of LIS literature regarding children's information behavior has grown. The literature influences other research such as interface or OPAC design, digital libraries for children, or information organization for children. There are few studies emphasizing information organization related to children. However, there are many studies that deal with the aspect of children's information retrieval. Given that information retrieval and information organization are two sides of the same coin, the scope of the literature reviewed includes both information retrieval and information organization.

The first part of this chapter is focused on several topics such as children's information seeking behavior, interface design, categorization, terminology, and metadata. The second part of this chapter develops working definitions for the key concepts by reviewing literature. The key concepts include children, metadata, information, and context. Last, this chapter identifies dominant interpretations embedded in the literature along with some other interpretations that have been ignored or less considered. The research gaps emergent in the literature are also addressed throughout the literature review.

## **2.1. Children's information behavior**

Information behavior refers to human interactions with information including creating, organizing, searching, and utilizing activities. "Early on, studies on information behavior were called 'use studies'[,] studies of 'information seeking and gathering,' or studies of 'information needs and uses'" (Bates, 2010, p. 2383). Children's information behavior has been studied in three main research streams: 1) children's information seeking/searching behavior, 2) interface design for children's web portals or digital libraries, and 3) some aspects of information organization such as categorization, naming, and metadata for children.

### **2.1.1. Children's information seeking/searching behavior**

Information seeking and information searching are sometimes distinguished. Bates (2010) briefly describes the differences between information seeking behavior and searching behavior (p. 2384). Studies on information searching behavior specifically deal with "the act of searching itself" (Bates, 2010, p. 2384). However, this study considers information searching as a type of information seeking behavior. Therefore, information seeking and searching behavior are interchangeable in this literature review.

#### **2.1.1.1. Main projects of retrieval systems for children**

Studies about children's information seeking behavior tend to focus on children's different behavior or cognitive abilities in contrast to adults' information seeking

behavior. Several projects such as Book House, the Science Library Catalog (SLC) project, and the Kid's Cataloging project conducted early studies of children's information searching behavior with the purpose of developing child-friendly information retrieval systems. A recent project is the International Children's Digital Library (ICDL). These projects are developed based on children's information seeking behavior. Therefore, their interfaces or information retrieval systems reflect children's perspectives.

Book House is a Danish system for information retrieval in fiction, developed by Annelise Mark Pejtersen (Pejtersen, 1986; 1989). Book House reflects a user's cognitive perspective, noting that "the retrieval process then involves a mapping between these multi-level descriptions – i.e. between collection characteristics and user needs values, abilities" (Pejtersen, 1989, p. 41). Book House offers a browsing interface based on icons. Icons are generated by a multi-faceted or multi-dimensional classification schema. Main facets of the classification include author's intention, frame/setting, subject matter, and accessibility (Pejtersen, 1986; 1989, p. 41). These facets reflect different aspects from traditional bibliographical information. They are associated with user's reading needs by cognitive work analysis.

The Science Library Catalog (SLC) project was conducted by a team of researchers (mainly Christine L. Borgman) at UCLA's Department of Library and Information Science from 1988-1995. The SLC's interface displays graphic bookshelves, representing subjects by Dewey Decimal Classification (DDC). "The Science Library Catalog [...]"

provided access to bibliographic records on science topics through a graphical interface and utilized a bookshelf metaphor to correspond to children's mental models of a library catalog" (Hirsh, 1997, p. 726).

The Kid's Catalog was developed by a research team from the Denver Public Library and CARL (Colorado Alliance of Research Libraries) Systems, Inc., which is the vendor of the Denver Public Library's OPAC system. It creates a colorful and visual point-and-click browsing search interface (Busey & Doerr, 1993; Sandlian, 1994). The Kid's Catalog focuses on a browsing search. Its browse search consists of three sections: Explore, Find it!, and Best Stories. Compared to SLC's DDC-based subject hierarchy structure, the Kid's Catalog Explore section has fifteen major classes. "The divisions and subdivisions of the fifteen major classes were constructed using curriculum guides and by literally browsing the entire children's library collection at the Denver Public Library" (Busey & Doerr, 1993, p. 81). Now the Kid's Catalog has been changed to Secret WonderWeb (<http://kids.denverlibrary.org/catalogs/index.html>), which is used at Denver Public Libraries.

The ICDL was developed by an interdisciplinary team of researchers from fields including library and information science, computer science, education, along with classroom teachers, graphic designers, etc. at the University of Maryland. The ICDL consists of intergenerational research group teams as well. ICDL project teams create a kids' team, consisting of six children from 7 years old to 11 years old. A cooperative



inquiry approach encourages the kids' team to be involved in the project and to “minimize the existing power structures (e.g., adults in charge, children follow directions)” (Druin, 2005, p. 25). ICDL considers children's perspectives more than other previous projects regarding children's searching and browsing behaviors and child-friendly interface design (Hutchinson, Bederson, & Druin, 2007).

### **2.1.1.2. Common findings: Keyword search vs. Browsing search**

The common findings from these projects show that children have difficulties in keyword searching such as spelling, typing skills, and formulating a search query (Borgman et al., 1995; Busey & Doerr, 1993; Hirsh, 1997; Hutchinson et al., 2005; Pejtersen, 1986; 1989; Sandlian, 1994; Solomon, 1993; Walter, Borgman & Hirsh, 1996). Children's language acquisition or intellectual ability to spell and type keywords is related to children's information seeking behavior. Keyword searches demand that users type exact words, although recent search engines have a spelling correction function. Children's intellectual levels are not developed enough to compose and spell their own search queries (Borgman et al., 1995). Sandlian (1994, p. 139) points out several of children's weaknesses in a keyword search:

These mechanical functions [keyword search functions] hinder the access of information to a large pre-literate population. While many children have large verbal vocabularies, their writing, spelling, and typing skills lag behind their oral skills . . . . Another problem, linked to children's

cognitive abilities, is their difficulty in shifting search strategies once their initial option fails.

As Sandlian (1994) mentions, children might prefer typing verb-based search terms rather than noun-based terms. Additionally, children are less able to switch the form of words or to find similar terms when they have zero hits.

Keyword search requires users to generate their own search queries. Sometimes, users have difficulty finding proper keyword terms, or even though they have proper terms, the terms might not coincide with the terms assigned by indexers (Solomon, 1993). These problems are challenging even for adults. Therefore, formulating a search query is the most difficult information searching activity for children.

The other problem caused by a keyword search is associated with understanding Boolean logic (Borgman et al., 1995; Hirsh, 1997; Sandlian, 1994; Walter, Borgman, & Hirsh, 1996). Because children do not know how to use the connectives AND, OR, and NOT, children input many keywords within a query, so that the number of results retrieved is usually null or too small. It makes children frustrated while searching for information.

The problems in performing a keyword search by children demand alternative search systems. Previous projects and literature assert that a browse search brings better effectiveness than a keyword search (Borgman et al., 1995; Busey & Doerr, 1993; Hirsh,

1997; Pejtersen, 1986; 1989; Sandlian, 1994; Walter, Borgman, & Hirsh, 1996). The SLC search is based on browsing “to minimize the known difficulties children have with existing online catalog (e.g., spelling, typing/keyboarding, alphabetizing, Boolean logic) and to build on their skills and abilities (e.g., browsing, recognizing relevant topics, navigating hierarchical displays, using a mouse)” (Hirsh, 1997, p. 726).

Given that cognitive ability plays a crucial role in searching, a browse search requires less cognitive effort (Beheshti et al., 2010; Bilal, 2000; 2001; 2002b; Borgman et al., 1995; Borgman, Chignell, & Valdez, 1989; Large, Beheshit, & Rahman, 2002; Pejtersen, 1986; Sandlian, 1994; Walter, Borgman, & Hirsh, 1996). The other cognitive advantage of a browse search is related to children’s limited knowledge (Walter, Borgman, & Hirsh, 1996). Not only for children, but also even for adults, when people do not have enough knowledge about certain domains, they want and need to navigate the domain rather than perform keyword searches. Martens (2012) asserts that “Models such as Erdelez’s (1999)<sup>[1]</sup> ‘information encountering’ in which users find information serendipitously, or Bates’ (2005)<sup>[2]</sup> ‘berrypicking’, which describes an evolving search, might best describe children’s searching behaviors” (p. 164). Serendipity might be a good description for children’s information seeking behavior. Often, their information needs are vague. It is because of children’s lack of knowledge or lack of experiences in a certain domain. In this case, recalling memory to formulate possible keywords for searching is not effective.

<sup>[1]</sup> Erdelez, S. (1999). Information encountering: It's more than just bumping into information. *Bulletin of the American Society for Information Science*, 25(3), 25–29.

<sup>[2]</sup> Bates, M. J. (2005). *Berrypicking*. In K. E. Fisher, S. Erdelez, & L. McKechnie (Eds.), *Theories of information behaviors* (pp. 58–62). Medford, NJ: Information Today.

Rather recognizing given concepts helps children seek information. In this sense, a browse search supports children's cognitive processes better.

### **2.1.1.3. Children's information seeking behavior related to book selection**

Another research stream in children's information behavior research is related to book selection. Interest in children's book selection is usually studied under the umbrella of literacy or in school library services (Reuter, 2007b). Their foci are different from what the studies on information retrieval pay attention to. However, the reason why this literature review includes the studies related to children's book selection behavior is that this literature provides important understandings of children's perceptions of books. Factors that make children choose a book can be applied for creating metadata elements or organizing information (Beak, 2012; Beak & Olson, 2011a; 2011b). There are a couple of studies regarding children's book selection.

Beak and Olson (2011a; 2011b) analyze five pieces of literature (Kragler & Nolley, 1996; Moore, 1988; Pejtersen, 1986; Robinson et al., 1997; Wendelin & Zinck, 1983) in children's book selection. Through meta-analysis of the five pieces of literature, Beak and Olson (2011a) identify nine unique characteristics of children's book selection (see Table 2-1).

Table 2-1. Unique characteristics of children's information seeking behaviors and book

(Beak &amp; Olson, 2011a, p. 6)

Unique characteristics of children's book choices		Origins
Physical Characteristics	Book cover's illustration or character including its objects and colors Size of the print Hardback / Paperback	Kragler & Nolley (1996) Wendelin & Zinck (1983) Moore (1988) Pejtersen (1986)
Intellectual difficulty	Difficulty of words The number of pages or words Age appropriateness	Moore (1988) Robinson, Larsen, and Haupt (1997) Pejtersen (1986)
Prior knowledge (particular character, series, titles, etc.)		Kragler & Nolley (1996) Robinson, Larsen, and Haupt (1997)
Recommendation (by peers, teachers, or family)		Kragler & Nolley (1996)
Awards		Wendelin & Zinck (1983)
Topics (learning, social activities, or interests)		Kragler & Nolley (1996) Pejtersen(1986)
Media connection (such as TV shows, movies)		Kragler & Nolley (1996) Wendelin & Zinck (1983)
Emotions (happy, sad, funny, adventurous, etc.)		Pejtersen (1986)
Frame (The setting in time and place of the subject)		Pejtersen (1986)
Genre		Robinson, Larsen, and Haupt (1997)

Reuter's study (2007b) and Beak's study (2012) are the most recent research studies in children's book selection behavior. The findings of these two studies show similar facets and factors related to children's book selecting behavior. Children tend to select books by contents, reading experience or emotional interest, or familiarity. Since Reuter's study (2007b) focuses more on the aspect of children's literacy rather than the aspects of information retrieval or information organization, her study might be beyond the scope of

this dissertation. However, this type of study provides an important foundation for developing metadata schemas for children. In other words, understanding children's book selection behavior suggests which metadata elements should be created to provide more effective access points for children. Later, I discuss the relation between children's book selection behavior and the creation of metadata elements.

### **2.1.2. Interface design**

Studies about children's information seeking behavior have many implications for designing interfaces or information retrieval systems. As the previous section shows, a browse search is more effective for children. Consequently, the studies of interface design for children's libraries or web portals are concerned with how to improve browse search interfaces. This section addresses several foci of interface design studies.

Graphical aspects regarding interface design related to aesthetic displays of information can motivate child users to use a search interface. Colors or images are used to improve aesthetic aspects of interfaces. For example, many school libraries' OPAC systems provide subject-based browsing categories such as Animals, Science, People, etc. These subjects are represented in text format with associated images or icons, so that children can recognize the subjects readily. Cooper (2005, p. 296) notes physical considerations relating to interface design response:

The use of larger font and readable font style as well as inclusion of less text and/or images on a page makes it easier for children to address the information on the screen . ... Use of color to help young children distinguish objects from each other on a screen, and uncomplicated shapes that are recognizable, also support the child viewer.

The ICDL also concerns itself with graphical and visual aspects of the interface. Its interface is not only colorful and visual, but also includes dynamic factors. For instance, the ICDL provides two dynamic book viewer interfaces: comic and spiral. These options motivate children to read books.

Graphical displays are not only helpful to increase children's interest and motivation, but also are effective in understanding classification systems or structures of subject domains. For instance, the SLC tries to take advantages of the browsing function and visual interface design. Browse search functions are likely to consist of hierarchical structures. To help understand the classification/structure of the science domain, SLC displays subjects using graphical metaphor of bookshelves (Borgman et al., 1995). The ICDL is also dedicated to improve the search interface, not only for the visual design, but also for the search function. The ICDL's a simple browse search does not require a top-down and hierarchical approach. One of shortcomings in browse search is that children are less likely to understand hierarchical structures. In addition, if hierarchical structures require children to navigate more than three levels, children might give up searching or feel frustrated searching. The ICDL allows children to search/browse books without limiting

navigation and without understanding Boolean logic by making the browse search interface flat (Druin, 2005; Hutchinson et al., 2005).

The other focus of interface design for children's libraries is related to children's physical ability. Inkpen (2001) and Hourcade et al. (2004) examine children's motor skills that could impact the design of children's information system interfaces. Inkpen (2001) compares two interaction styles, drag-and-drop versus point-and-click, of children using a mouse. His findings show that children solve a problem faster and make fewer errors when they interact with the interface by using a point-and-click style rather than when they use a drag-and-drop style. Hourcade et al. (2004) show that children have more difficulties using a mouse than adults do in point-and-click tasks. Compared to adults' performance, preschool children use a mouse with less accuracy. It illustrates that age affects information searching behavior regarding accuracy, target reentry, and efficiency (p. 1). These motor abilities of children should be considered in order to design child-friendly interfaces.

Relatively recent studies focus on the visualization of vocabularies like taxonomies for children. The studies about visualization for children's subject headings or taxonomy have been done by Andrew Large and Jamshid Beheshti from the School of Library and Information Studies at McGill University (Beheshti et al., 2010; Large et al., 2009a; 2009b). Their interest is in how to display a taxonomy in a three dimensional (3D) interface rather than to examine the taxonomy structure itself. Beheshti and his



colleagues (2010) perform a comparison of a conventional taxonomy interface with a Cone interface representing the taxonomy in 3D. They use a T-test to compare list-based conventional interface and a cone-based visual 3D interface. Although the T-test shows that there is no significant difference between the two interfaces, they also find out the differences regarding the preferences of the interfaces by using a post-questionnaire. Children are intrigued by a visual 3D interface, but they find information faster in a conventional interface. To explain these different results, Beheshti et al. (2010, p. 7) assume two possibilities:

One interesting finding is that those students who played video games frequently seem to dislike the 3D visualization interface more than those who are infrequent or non-users. We found a similar negative correlation in our previous study on the 2D visualization, and speculated that two possible rationalizations could explain this finding. First, the gamers tend to move and click at faster speeds than less frequent players, which may result in failure to spot relevant terms that flash on and off the screen as the cursor travels on its way. A second possible explanation is that gamers had higher expectations of visual and navigational features that were not met in the non-gaming environment of the Cone.

As Beheshti et al. (2010) interpret children's information behavior considering children's gaming culture, studies on children's information seeking behavior are required to understand a broader context of children's social and cultural interaction with information.

Not only studies of visualization, but also studies of interface design are apt not to consider the contents or the structures of information. Beheshti et al. (2010) point out that students were not sure about the taxonomy structure or the terminology (p. 6). However, their explanation does not associate those factors to the efficiency of visualized interfaces. So far, the literature illuminates the advantages of a browsing search interface by discussing the visual and functional aspects. These aspects are more likely to be associated with information retrieval. Given that information organization supports information retrieval systems, studies linked to information organization such as categorization, terminology, or metadata are necessary to holistically view children's information seeking behavior and to find fundamental improvements in interfaces and information retrieval systems.

### **2.1.3. Information organization for children**

Compared to the number of studies about children's information behavior regarding information retrieval, including searching systems and interface designs, there are relatively few studies focusing on information organization. Abbas (2005b) asserts that "the effect of using an inappropriate representation scheme, such as a metadata scheme or a controlled vocabulary that is not age appropriate for children or young adults, is an area that has been largely neglected in the research" (p. 1513). In other words, studies about interface designs based on children's information seeking or searching behavior overlook the representation issues including the contents of the information displayed in a search interface.

A browse search interface tends to provide subject-based information access points in hierarchical structures. Users narrow down search results by going through hierarchical subject structures. Indeed, a browse search interface tends to have a limited space to display information. For example, a school library OPAC system, Destiny by Follett, provides a visual search interface. The visual search interface provides only 9 main subject-based categories. Why do most browse search interfaces provide subject-based information access points? Why are certain subjects displayed in a browse search interface as access points, while other subjects are limited or ignored? How do children categorize concepts in a certain domain? How do children construct relationships among concepts? Information organization is concerned with these questions related to the relationship or representation of information. Abbas (2005b) claims that it is necessary to understand the contents or representation of users' expression and information needs rather than being concerned with the interface or systemic improvement in children's digital libraries. In this sense, studies about children's information organization deal with information representation including categorization, classification, naming, subject headings or vocabularies, and metadata. However, since information organization and information retrieval are two sides of the same coin, the following literature review covers both information organization and information retrieval literatures.

#### **2.1.3.1. Categorization / subject hierarchies**

The studies about children's categorization examine how children structure subject hierarchies (Bar-Ilan & Belous, 2007; Bilal & Wang, 2005; Cooper, 2002a; 2002b; 2002c;

2004; Large et al., 2007). The studies addressing categorization are helpful to design classifications, taxonomies, thesauri, or browsing search interfaces. Bar-Ilan and Belous (2007) examine how children create structures of subject categories for web directories by using a card-sorting method and an enveloping system. Elementary school children (4th- and 5th-grade graduates) are asked to categorize 61 subject terms extracted from two popular web directories, Walla ([www.walla.co.il](http://www.walla.co.il)) and Yahoooligans. Terms are written on cards and given to children without any structure. Children restructure these terms by using different sizes of envelopes as they perceive the structure to be. Different sizes of envelopes equate to hierarchical levels. The findings of this study show how children construct different subject hierarchies from two existing web directories' structures. For instance, some terms such as MP3, artists & bands, and Mozart are not even considered by children (p. 903). In terms of structures, two web directories provide "leisure & entertainment" as the top-level category covering music, cinema, and TV, whereas children are not able to perceive the concept of "leisure & entertainment." Instead, children put the concepts of music, cinema, and TV each into the top-level categories (p. 905).

Bilal and Wang (2005) also study middle school children's conceptual structures of subject hierarchies in the science domain employed by two web directories: Yahoooligans! and KidsClick! Children are required to sort deconstructed concepts from the web directories and to create new concept maps. Concept mapping reflects mental representation of the concepts, and it is an effective method for examining children's conceptual classification (p. 1305). The findings show that children create less depth of

categorization, meaning “the number of levels from the top level to the lowest end of the trees” (p. 1308), and more breadth of categorization, meaning “the number of parallel subordinate categories that are derived from a superordinate category at each level of the hierarchy” (p. 1308). In addition, constructing relationships among concepts for children is challenging because they categorize concepts based on “situational, perceptual, and experiential rather than conceptual” factors (p. 1311).

Cooper (2002c) asks children to suggest what information a library should include, without providing any given concepts. This approach is different from the studies of Bar-Ilan and Belous (2007), and Bilal and Wang (2005), in which children are given specific concepts selected by researchers and the children are allowed to construct the subject hierarchies. Cooper’s approach helps understand “what the children typified as important in their concept of a library” (Cooper, 2002c, p. 1225). Children in Cooper’s study (2002c) include just words such as cat, Harry the Dirty Dog, dictionary, etc. As the suggested words show, children at this level do not consider the classification of concepts. In addition, Cooper’s study (2002c) might contribute to the design of access points or contents for a browse search interface. The importance and effectiveness of a browse search for children is also associated with issues of metadata elements or access points. The information provided in a main browse search interface influences children’s information seeking behavior, because it is hard for children to think of other possible subjects that are not displayed in the browse search interface. When it comes to developing a browse search interface, it should be considered what contents and aspects of information children prefer to access. Therefore, Cooper’s study (2002c) suggests

what subjects or topics should be represented in the limited space of a browse search interface.

Most studies of children's categorization suggest a similar implication for designing web search interfaces for children. Children should be included in "the design process of the content side of the development of Web search tools for children" (Bar-Ilan & Belous, 2007, p. 906). "Children's browsing on the Web, especially their traversal behavior of hierarchies, can be much improved. The organization of concepts in a Web directory is important because successful traversal to a specific concept depends on a match between a child's conceptual structure of the hierarchy and the structure employed in the directory" (Bilal & Wang, 2005, p. 1311). When it comes to the implementation of these studies for a browse search interface, the studies of Bilal and Wang (2005) and Bar-Ilan and Belous (2007) suggest how to construct hierarchical relationships among concepts and how deeply or how broadly information should be provided in a browse search.

Lastly, school libraries nowadays call for a child-friendly classification system. Metis (<http://www.metisinnovations.com/>) is a categorization system newly developed for school library practice. Because Metis is a new classification system, there are only a couple of articles in support of Metis (Kaplan et al., 2013; Kaplan et al., 2012). Its website and an online blog (<http://eye-fours.blogspot.com/search/label/metis>) provide venues for discussion about Metis's advantages. Metis basically criticizes *DDC*'s ineffectiveness for children. According to Kaplan et al. (2012), using *DDC* in school

libraries has three problems: 1) division by discipline, 2) bias by Western perspectives and cultures, and 3) numerical code. In order to overcome these problems, the Metis uses visually compelling signs and different classification including 26 broad main categories (see Table 2-2).

Table 2-2. Metis's Main Categories

A. Facts (Upper grades); Concepts (Lower grades)	I. Sports	R. Humor
B. Machines	J. Ourselves	S. Mystery
C. Science	K. Community	T. Adventure
D. Nature	L. USA (Then and Now)	U. Scary
E. Animals	M. Countries (Then and Now)	V. Graphic
F. Pets	N. Languages	W. Memoirs
G. Making Stuff	O. Traditions	X. Fiction (Upper grades); Picture Stories (Lower grades)
H. Arts [For Lower grades, GH is a single category, Arts and Crafts]	P. Tales [including all mythology, religious stories, folk tales]	Y. Beginning Fiction
	Q. Verse	Z. Middle Fiction

Metis classification is developed based on children's information seeking behaviors that have been observed by school librarians. Kaplan et al. (2012) "asked our fourth and fifth graders to brainstorm the contents of their ideal library in terms of categories or topics." They adopted Cooper's methodology (2002c). Given that *DDC* was not originally developed for children whereas Metis reflects real voices from children, the movement toward using the Metis classification seems natural.

### 2.1.3.2. Naming

Children not only perceive concepts at different levels of hierarchical classification, but also use different terms to express information needs. Studies of naming or labeling concepts by children have not been paid sufficient attention. Although there are many studies about the extent of match between users' terms and subject headings by using transaction log analysis (Carlyle, 1989; Greenberg, 2001; Taylor, 1984) or recently through tagging studies (Kipp, 2005; Lu, Park, & Hu, 2010; Rolla, 2009; Yi, 2010), there are very few studies addressing children's naming behavior (Abbas, 2005b; Brown, 1994, 1995). The studies about naming examine how children label or name certain concepts by analyzing terms from keyword search terms from a linguistic viewpoint.

Brown (1995) conducts a cross-sectional study consisting of 3rd grade, 7<sup>th</sup> grade, 11<sup>th</sup> grade, and college students to examine how well subject search terms generated by participants match with subject headings. This study does not concentrate on children's naming behavior, but rather on finding out the reasons of match-failure of subject search terms. However, Brown (1995, p. 375) exhibits a good understanding of the characteristics of children's terms:

For example, a child may have concept of astronomy as a field of study but lack in his or her vocabulary the word "astronomy" and, therefore, may name the category, "stars and planets." Likewise, the child may encounter a collection of previously unrelated things and, in trying to group them, sue the description of a common attribute or use for the



category name, such as “things to take on a boat trip.” It might be expected that younger children would have a more limited vocabulary and fewer or more limited conceptual categories than older students and, as a consequence, would name labels that are more descriptive (i.e., “things you take on a camping trip”) than analytic (“camping equipment”).

Children tend to use concrete, simple, and descriptive terms, which is similar to the findings from Bilal and Wang’s study (2005).

The findings show that simple, concrete, and associative subject search terms are more likely to bring a higher match with a subject heading. Brown (1995, p. 377) suggests training metacognitive labeling skills in children in order to obtain better match search results:

Training and experience might improve the match-success rate of subject searches by deterring development trends that work against match-success.

We suggest two interventions:

- Incremental training in metacognitive labeling skills, that is, training the student to think about the label-naming process; and
- Incremental situated learning experiences with subject descriptions and terms used to name them.

Metacognitive labeling skills refer to the ability to think about how subject headings are created (named or labeled). The conclusion from the study of training metacognitive

labeling skills is that it requires cognitive work in children to switch their thought processes to indexing processes for subject headings. It does not seem to be a fundamental solution to increase matches between children's search terms and subject headings. Rather, changing subject headings to child-friendly terms is more effective, so that children do not need to go through unnecessary cognitive processes like a metacognitive labeling process.

Abbas' study (2005b) focuses on terms generated by children. She analyzes to what extent children's expression of information needs are matched with the representations of resources. Children's expression of information needs can be found at two levels: driving questions and search terms. Before creating search terms, children have questions or information needs. She calls them driving questions (DQ)s. She claims that examining "children's DQs enables us [the researchers] to see a little about how they think and the process they undertake to solve their information need" (p. 1515). After comparing these two expressions, Abbas (2005b) lastly compares them to the representation of resources using controlled vocabulary (system terms). Findings from the comparison between search terms and system terms illustrate that the controlled vocabulary is inadequate to represent children's information needs. Terms generated by children tend to be representative in a more age-appropriate way. The findings are not surprising. However, Abbas' study (2005b) cannot explain why terms from three levels do not match each other or what patterns are among terms from each level. For instance, a student in her study has a question, "What would happen if you put a Furby in space?" and the student's search term is Space travel, while controlled vocabularies such as Astronomy, Space

exploration, or Orbits are suggested for the question. Abbas' study (2005b) especially cannot explain why children having DQs select/use search terms. Why does the student use the search term, Space travel? It might be because of lack of knowledge of a domain, lack of languages/vocabularies, or a different cognitive view, etc. Therefore, it suggests that it is necessary to understand in depth how children think about concepts and express them.

### **2.1.3.3. Metadata schemas**

The UK Office for Library and Information Networking (UKOLN)'s formal definition of metadata is "data associated with objects which relieves their potential users of having to have full advance knowledge of their existence or characteristics" (Dempsey & Heery, 1997, p. 5). Caplan (2003) also explains that metadata plays a mediate role in resource discovery, access, and in sharing resources between users and information. In addition, the development of metadata schemas is one of the most important tasks in initiating digital libraries. Some libraries create a new metadata schema for their own purposes, and others create metadata application profiles by combining several metadata standards. The main criteria in selecting a metadata schema, as answered by cataloging and metadata professionals, are types of resources and target users/audiences (Park & Tosaka, 2010). As many definitions of metadata and metadata creations practices show, metadata schemas need to reflect both users' information behavior and characteristics of resources per se.

User studies in various context and subject domains have been conducted and have influenced the domain of metadata. There are two dimensions in user studies and metadata: 1) metadata evaluation, and 2) metadata development. The first dimension tends to evaluate how effective or useful existing metadata elements are. Metadata quality evaluation by users' reviews covers usefulness, understandability, effectiveness, or users' satisfaction (Zhang & Li, 2008; Liddy et al., 2002; Liddy, Allen, & Finneran, 2003). In addition, metadata evaluation is apt to be conducted after a metadata schema is implemented in practice rather than during the process of developing metadata standards. On the other hand, the second dimension, metadata development, means that studies of user's needs and information seeking behaviors have been used as a foundation of creating metadata elements (Lee et al, 2013a; Lee et al., 2013b; Lee & Downie, 2004;). There are relatively fewer user studies for metadata development than there are user studies for metadata evaluation. Moreover, there is no children's information seeking behavior study in order to develop a child-driven metadata schema.

The development of metadata schemas for children has not considered children as a user group apart or different from adults, with children having specific information behavior and information needs. Abbas (2005b) points out that the "development of indexing languages and controlled vocabularies or subject headings lists has focused on the users as either a homogeneous group with no age specified or on a specific discipline or domain" (p. 1513). This situation also applies to the development of metadata schemas. When it comes to metadata studies, the Dublin Core Metadata Initiative (DCMI) has played a pivotal role in developing and nurturing a metadata domain. Beak and Smiraglia

(2013) analyze the DCMI conference proceedings from 2001 to 2012 in order to discover the patterns of emergent research themes. However, the findings show that user groups are missing from the domain's definition as it emerges in the domain analysis. For instance, there is no single study addressing metadata for children's resources (which is not the same as K-12 educational resources or Learning Object Metadata).

There are very few studies about children's metadata schemas (Abbas, 2005a; Beak, 2012; Beak & Olson, 2011a; 2011b; Druin, 2005; Druin et al., 2001). Abbas (2005a) addresses examples of metadata schemas for children's resources, issues related to creating metadata for children's resources, and age-appropriate controlled vocabularies. Abbas (2005a, p. 310) is concerned about the values of metadata like subject headings, and its consistence and interoperability:

While there is a wide variety of metadata scheme available, content creation guidelines / rules are not as prevalent in the Web environment (Sutton, 2004)<sup>[3]</sup>, which can make representation inconsistent and present many problems to metadata creators who wish to share metadata or who are concerned with interoperability between their system and other online systems.

Because these concerns about the values of metadata related to naming were discussed in the previous section, here I emphasize a different scope of metadata schemas. The

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<sup>3</sup> Sutton, S. (2004). *Building an education digital library: GEM and the early metadata standards adoption*. In D. I. Hillman & E. L. Westbrook (Eds.), *Metadata in practice* (pp. 1–16). Chicago: American Library Association.

meaning of metadata schemas in this study is limited to metadata properties or elements, and not the values of metadata like controlled vocabularies. In this aspect, there are fewer studies focusing on the creation of metadata elements.

To create child-appropriate and child-friendly metadata elements, it is necessary to understand children's information seeking behavior. The reason why the ICDL has been used as a good example of a children's digital library is not only because of its colorful interface, but also because of the different metadata elements or access points associated with children's perspectives. Hutchinson et al. (2005) apply different book selection criteria to the ICDL's browsing interface. Considering that book selection criteria is related to metadata elements, the ICDL creates their own metadata schema including non-traditional metadata elements such as book cover's colors, characters, and feeling. Although there is no specific research article about the ICDL's metadata schema, Druin (2005) briefly presents how the ICDL's metadata schema was created. Druin and ICDL's research team interacted with children, and the use of observations and interviews helped to get a better picture of new metadata elements that reflect children's thinking and behavior in the metadata schema (Druin, 2005, p. 30; Hutchinson et al., 2005, Reuter & Druin, 2004). Beak and Olson (2011a; 2011b) compare two metadata schemas between AACR2+ (mainly AACR2 and other complementary cataloging and encoding standards) and the ICDL's metadata schema in light of children's information seeking behavior. The findings show that the ICDL's metadata schema has more child-appropriate metadata elements such as book cover's colors, characters, and feelings. Therefore, the ICDL's

metadata schema seems to more effectively represent children's unique information seeking behavior than AACR2+ (see Table 2-3).

Table 2-3. Representation of unique characteristics of children's book choices in two metadata schemas (Beak & Olson, 2011a, p. 8)

Unique characteristics of children's book choice		Metadata elements from crosswalk			
		AACR2+		ICDL's metadata schema	
		Main Elements	Sub Elements	Sub Elements	Main Elements
Physical characteristics	Size of the print	X	X	X	X
	Hard / Paper cover	X	X	X	X
		X	X	Format*/ Shape*	Others*
	Book cover's color	Note	Physical description	Cover colors*	
Physical characteristics / Prior knowledge	Book cover's characters or objects/ Particular characters	X	X	Characters*	
Prior knowledge	Series	Series	Title proper of series	Series title	
Intellectual difficulty		X	X	Length*	Others*
	# of pages or words	Physical description	Pagination	Page count	Physical characteristics
	Difficulty of words	Note	Summary	Abstract	Abstract, keywords, etc.
	Age appropriateness	Note	Audience	Age range	
Topics		[MARC21: 6XX]		Subject & Keywords	
		[MARC21: LitF]		Type	
Genres		[MARC21: 655]		Genre	
Frame		[MARC21: 648, 650  y  z, 651]		Setting: When & Where	
Recommendation / Awards		[MARC21: 586]		Award	
		X	X	Rating*	Others*
Emotions		X	X	Feeling*	
Media Connection		Uniform title [MARC21: X30, 6XX, 700  t]		X	X

Beak (2012) analyzes children's cognitive processes during book selection through interviews and observations with six children. Reuter (2007b) also studies children's book selection behavior, and identifies many factors and facets related to children's book selection. Reuter (2007b) does not associate children's behavioral factors in relation to book selection with metadata elements. However, Beak (2012) asserts that the findings from Reuter's study (2007b) can play an important role in conveying evidence or reasons why certain metadata elements should be created for users. Therefore, Beak (2012) re-examines Reuter's study (2007b) within a context of knowledge organization, specifically the creation of metadata elements. The findings of Beak's study (2012) show results similar to Reuter's study (2007b) in general. The facets and factors reinforcing Reuter's findings are content, genres, familiarity, difficulty, and emotional interest or arousal. Given that there are two components in knowledge organization: resources and users, Beak (2012) categorizes the perceptual cognitive factors into three parts: resource-centered, user-centered, and a combination of resource and user (see Table 2-4).

Table 2-4. Categorization of perceptual aspect by two components in KO

(Beak, 2012, p. 7)

	Resource-centered	User-centered
Resource-centered	<ul style="list-style-type: none"> <li>• Basic bibliographical information</li> <li>• Contents/story</li> <li>• Series</li> <li>• Characters</li> <li>• Genres</li> <li>• Illustrations</li> <li>• Physical characteristics</li> </ul>	<ul style="list-style-type: none"> <li>• Difficulty</li> <li>• Familiarity</li> <li>• Emotional interest: external factors of books</li> </ul>
User-centered		<ul style="list-style-type: none"> <li>• Emotional interest: internal</li> </ul>



		factors of person <ul style="list-style-type: none"> <li>• Personal connection</li> <li>• Activities</li> </ul>
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The categorization shows which factors are more related to resources or users. By distinguishing these categories, current metadata schemas can be evaluated by how well the metadata schemas represent both resources and users.

## **2.2. Key concepts to this research from the literature**

Several key concepts such as children, metadata, information, and context need to be defined for this research. The following section discusses these key concepts within this research scope by deriving the concepts from the literature.

### **2.2.1. Children**

Children are considered as a different user group from adult users (or even from adolescent users) in a library setting. The age makes a difference between children and adults due to different cognitive abilities. Cooper (2005) emphasizes that children are going through the processes of cognitive, physical, social, and emotional development that affects interaction with digital technology. Due to children's developmental characteristics or abilities, choosing children's ages for research is an important procedure for studying children's information behaviors. The age group of children in the literature varies. By referring to the Association for Library Services to Children's 2004

fact sheet, Gross (2006) identified children as individuals of fourteen and under (p. 3). When the age groups of children in the literature of children's information behavior are briefly considered, although few studies include children over 11 years old or preschool children, generally speaking children the term "children" refers to the age between 5 and 11 or between grades first and sixth. Children's cognitive development has been considered to select the age of child participants or to interpret children's information seeking behaviors (Bilal, 2007; Borgman et al., 1995; Cooper, 2002a; 2002c; Kuhlthau, 1988; Walter, 1994; Yu, 2012).

Table 2-5. Piaget's stage of cognitive development (Piaget, 1960)

Stages	Ages	Characteristics
Sensorimotor	Birth to 2 years	Show reflective behaviors
Preoperations	2 to 7 years	Symbolic thinking (Language skill is important) Egocentric thinking Irreversible thinking Centered thinking Confusion between physical and psychological events
Concrete operations	7 to 11 years	Ability to understand others' perspectives Ability to understand multiple classification (Decentered thinking) Reversible thinking Logical and deductive thinking in conservation Ability to understand concrete reality, not abstract ones
Formal operations	11 to adults	Ability to understand abstract and hypothetical concepts Scientific thinking Proportional thinking

The most commonly used cognitive development theory in the literature is Piaget's developmental stage model. Piaget divides children's cognitive development into four stages (see Table 2-5). Children in each stage show different cognitive behaviors. Children in the first two stages are not able to think logically. After the concrete operational stage, children begin to think logically. In addition, there is a significant difference between concrete operations and formal operations. Children at the concrete operational stage can think logically, but their cognitive ability is limited by concrete and observable objects and events. However, children at the formal operational stage start to apply their thinking to abstract concepts. In other words, children at the formal operational stage may be able to use OPAC systems designed for adults through library literacy skill education. However, children at the concrete operational stage require different information organization systems like metadata schemas, specifically designed for them. Piaget's theory has been criticized due to a lack of consideration of sociocultural influence and individual variations regarding time periods of each developmental stage. Nevertheless, Piaget's theory provides good theoretical support in terms of selecting the ages of children for research. Based on the characteristics of cognitive development suggested by Piaget, researchers can obtain broad ideas about certain age groups. Therefore, Piaget's theory can assist in defining participants' ages and in creating proper experimental tasks.

Piaget's theory also brings concerns about the terminological representation of subjects. Children at the concrete operational stage cannot think about an abstract concept. In other words, children may not be able to understand subject headings described in an abstract

term such as “husbandry,” “animal rights,” or “world hunger.” These concepts and terms can be understood by children at least from the formal operational stage. For instance, subject headings for elementary school libraries may need to be described in a more concrete way like “taking care of animals” or “having a pet” instead of “husbandry.” In this point of view, Piaget’s theory can be used to evaluate children’s subject headings.

Therefore, Piaget’s theory is applied to this study not only for defining children, but also interpreting children’s information seeking behaviors. Given that much of the previous literature purposely or randomly chose child participants between ages 5 and 11, children’s ages in this research may range between 6 to 11 years old. More specific information about selecting participants will be addressed in Chapter 3 Methodology.

### **2.2.2. Metadata**

Abbas (2005a) generally discusses some issues in metadata schemes development by introducing OPAC interfaces and digital libraries. Through the overall reviews of examples of OPAC interfaces and digital libraries for children, Abbas (2005a, p. 313) reveals the research gaps in developing child-centered systems:

What we do not know much about is (1) children’s understanding of or mental models of systems or how they work; (2) how this lack of understanding affects their information seeking; (3) if the new child-centered systems have had a positive effect on their information retrieval, and (4) how the use of age-appropriate metadata schemes and metadata

will alleviate some of the information retrieval obstacles children encounter.

Previous literature has not studied metadata schemas for children. In addition, there is no single metadata schema designed by children or specifically targeted for children's user groups. This research plays a role in filling the research gaps that Abbas (2005a) points out above. However, Abbas' focus of metadata means a different scope of metadata schema than that of in this study (Beak, 2012; Beak & Olson, 2011a; 2011b). The focus about metadata in this study pays attention to metadata's properties or elements, whereas Abbas (2005a) examines the gaps of research in metadata for children through the values of metadata such as controlled vocabularies.

As the particular focus of metadata between Abbas (2005a) and this study differ, there has been no clear definition among metadata scheme(s), schema, and schemata. This could cause confusion in understanding the concept of metadata in this research. To clarify the scope of metadata schema(s) in this study, a concept of metadata schema for this study is defined based on two studies by Greenberg (2005) and Tennis (2007).

Greenberg (2005) reviews the definition of metadata and the conceptualization of a metadata scheme. She defines a metadata scheme by its functions. A metadata schema is (Greenberg, 2005, p. 24):

1. A collection of metadata elements gathered to support a function, or a series of functions (e.g., resource discovery, administration, use, etc.), for an information object.
2. A collection of metadata elements, forming a structured container, to which data values are added. Data values may be uncontrolled or controlled (e.g., taken from a source such as LCSH or a standardized list of values).
3. A collection of data elements, with their attributes formalized in a specification (or a data dictionary). Examples of element attributes include the metadata element's "name," "identifier," "label," "definition," and the "date the element was declared."

According to Tennis' study about a scheme versioning (Tennis, 2007, p. 87):

Schemas are the total set of assertions that can be made about a resource .  
 ... Schemes are the range of values that can be provided for an assertion about a resource (date-time format, authority list, controlled vocabulary, etc.) ... schemas allow us to say that a resource has an attribute (a subject), and a scheme allows us to make explicit what that subject is (the value of that attribute).

These two studies use the term, metadata scheme, slightly differently. However, based on the two articles, it is clear to see there are at least two aspects of metadata standards:

structural design of metadata elements, and data values or contents of metadata elements. Since Tennis' study (2007) distinguishes two terms, this study refers to metadata schema(s) as a set of metadata elements and metadata scheme(s) as the values or the contents of individual metadata elements.

### **2.2.3. Information**

The concept of information in the literature of children's information seeking behaviors tends to be defined by subjects, genres, or situation. Much of the literature on children's information seeking behaviors is from experimental studies in a certain domain. The science domain has been most frequently studied for children's information seeking behaviors (Borgman, Chignell, & Valdez, 1989; Borgman et al., 1995; Bilal, 2000; Bilal & Wang, 2005; Revelle et al., 2002) and other subject domains such as history (Beheshti et al., 2010; Large et al., 2009b) are also studied. Without referring to specific subject domains, general information meant by many studies includes non-fiction and fiction. Some studies specifically focus on picture books as a type of children's book (Robinson et al., 1997; Yu, 2012). Compared to non-fiction, studies about children's fiction information seeking behaviors have not been widely studied. Pejtersen's Book House OPAC project examines users' information needs for fiction retrieval (Pejtersen, 1986; 1989). Last, task-based experimental studies are likely to be subject-related or education-related information, whereas studies in a natural setting often observe children's information behaviors for leisure purpose or fictional information (Reuter, 2007b). Based

on these concerns, a working definition of information for this study includes non-fiction, fiction, and picture books without a certain subject domain.

#### **2.2.4. Context**

Context in a study is important to understand children's information seeking behaviors. For instance, a place for an interview or observation does matter for children's behaviors. Gross (2006, p.8) specifically mentions about issues related to children in context.

In any research setting, the importance of making the research situation relevant to child participants cannot be enough. When child participants do not understand and share the researcher's goals, are bored, or are taken away from a preferred activity in order to participate in the research, the potential for validity problems increase . . . . Understanding children, attitudes about children, and the context within which they are observed and studies all contribute to an increased ability to make sense of research data and to evaluate the impact of the environment on the children and the children on their environment.

Context may consider physical and social aspects of the environment "such as gender, culture, and age as well as understanding the environment in terms of the norms for behavior in that place" (Gross, 2006, p. 8). For example, Beak (2012) explains the limitation of the study by physical aspects of book shelving. Since the children in her



research interact with books that are already shelved, the information that the children first face may be limited to the titles of book spines or author's names. Describing a physical context enables audiences to understand children's information behavior in a situation of a research environment, so that it brings more reasonable interpretation about children's information behavior.

Given that this study aims to understand children's intuitive cognitive processes during book selection, a natural setting will be more effective than a task-based study. A task-based study means that child participants are required to solve certain problems or to perform given tasks. For instance, finding resources about a subject for an assignment is a task. However, a study in a natural setting refers that there is a no given task. Instead, child participants are asked to interact with books. Child participants can simply browse books or find books for fun reading.

The distinction between a task-based study and a study in a natural setting can be addressed by contexts of information needs and information wants. Walter (1994, p. 112) points out the difference between children's information needs and wants by citing Andrew Green (1990): "The element, however, that most clearly distinguishes a need from a want or a demands is that there is no necessary self-awareness of a need." Walter (1994) asserts that children's information needs tend to occur without being aware of needs, but by necessity. On the contrary, information wants are likely to be generated by "self-awareness of a need." For instance, children need information for school

assignments, but children want a book for fun reading. Children's information needs tend to be imposed by school teachers or other adults. "Children surely have self-identified information needs and wants, but much of the information that is provided to them is information they never asked for" (Walter, 1994, p. 112). Since the concepts of information needs and wants are different, this difference may influence not only children's information seeking behaviors, but also the information organization. Children with information needs might have certain information or ideas regarding how to find information. Studies of information needs tend to be conducted in a tasked-based setting. Task characteristics influence children's information behaviors. When children know a subject that they need to find, they directly look for the subject. In this case, a subject is the best and most obvious access point for find resource. However, when children look for books that they want to read for fun, various access points such as genres, characters, or illustration can exist. Information organization also needs to understand the differences that can be caused by information needs and information wants. Therefore, this research is more likely to be concerned with information wants rather than information needs. Studying information wants in a natural setting seems more effective to understand children's natural cognitive processes and information seeking behaviors.

### **2.3. Dominant and alternative perspectives in the discourse**

So far this chapter has reviewed literature in children's information seeking behaviors, interface design, and several topics related to children's information organization. After

reviewing the literature, the dominant aspects and minor aspects of the literature emerge in the discourse.

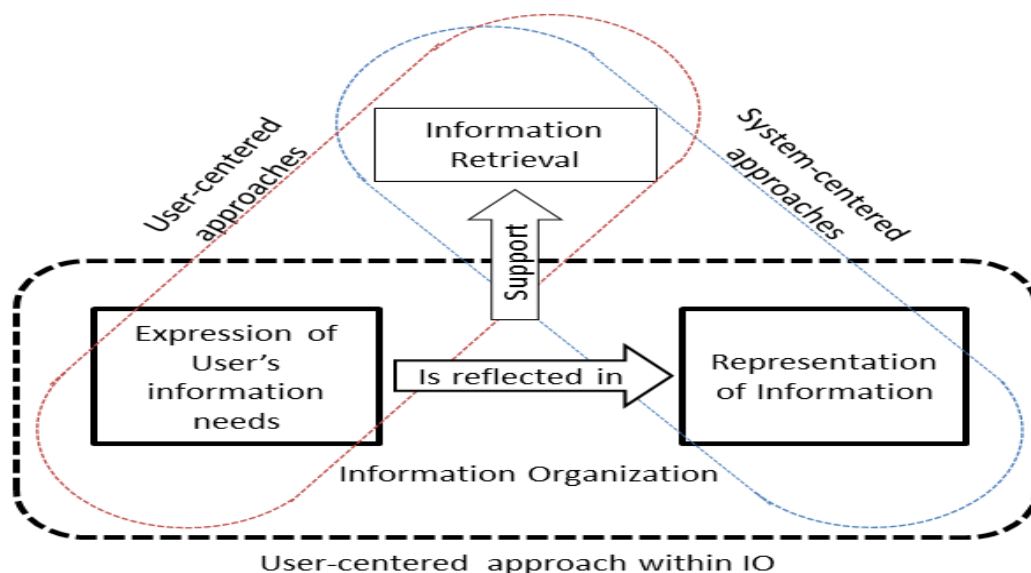
First of all, the most dominant view of the discourse in children's information seeking behaviors seems to take a cognitive constructivist stance. In addition to the cognitive constructivism, the dominant assumption about children agrees that children have different cognitive processes, so that their information seeking behaviors differ from adults. "Cognitive constructivism in IS [information science] starts from the assumption that the individual mind generates knowledge by creating knowledge structures and mental models which represent world and mediate – or filter – information" (Talja, Tuominen, & Savolainen, 2005, p. 83). There are many researchers taking into account cognitive constructivism, studying user's information seeking behaviors, and developing information processing or seeking models; these include Dervin's sense-making model, Bates's berry-picking model, Belkin's ASK (Anomalous States of knowledge) model, and other information processing models by Saracevic, Kuhlthau, and Ingwersen. Cognitive constructivism is introduced when LIS moves from a system-oriented to a user-oriented paradigm. Dervin and Nilan (1986) call for a paradigm shift in information needs and uses research, identifying six aspects of the paradigm shift (p. 12-16). One aspect of the paradigm shift is the research focus's movement from external behavior to internal cognition. "Traditionally, research has focused on externals (e.g., contacts with sources and uses of systems as indicators of needs) rather than internals (e.g., cognitive assessments)" (Dervin & Nilan, 1986, p. 15). "System-centred research that focuses on the system aspects of information retrieval including retrieval algorithms, indexing,

interface design, and so on, and user-centred research that focuses on the human information behavior (HIB), and user-centred or cognitive approaches to the design of information retrieval system” (Chowdhury, 2004, p. 216).

As the focus of research in the user-oriented paradigm shows, the user-centered perspective considers users as active information seekers and cognitive processors. Bowler et al. (2011) assert that user-centered design “places users at the center of the design so that the outcome of a design – the artifact- can be easily used by the people for whom it was created” (Bowler et al., 2011, p. 724). A user-centered design paradigm also brings different methods or strategies such as participatory design (Bilal, 2002a), cooperative inquiry (Druin, 2002; 2005), or bonded design (Large et al., 2007) for developing user-centered interface design for children (Bowler et al., 2011 p. 732-734).

Beak and Olson (2011a) take into account a user-centered approach and a system-centered approach in relation to information retrieval and two aspects of information organization; expression of users’ information needs and representation of information (see Figure 2-1). In terms of research focus, it is clear that a user-centered approach dominantly influences children’s information behavior studies. However, what does the discourse of children’s information behaviors with user-centered approach suggest for implementation? As figure 1 shows, there are two ways of improving information retrieval systems: 1) reflecting users’ perspectives and information needs into retrieval systems and 2) developing searching algorithms, indexing, or other knowledge representation systems.

Figure 2-1. IR and two aspects of IO (Beak &amp; Olson, 2011a, p. 3)



So far, current discourses of children's information behaviors tend to combine both user-centered approach and system-centered approach only for the sake of information retrieval. The dominant implementations by the discourses of children's information behaviors suggest the changes of information retrieval systems or the changes of interfaces rather than information organization. Information organization, at least in developing metadata schemas for children, hardly takes into account user-centered perspectives or users' information seeking behaviors. Given that information organization plays a fundamental role in supporting information retrieval, current discourse shows a paucity of studies about knowledge organization systems reflecting users' perspectives and information seeking behaviors.

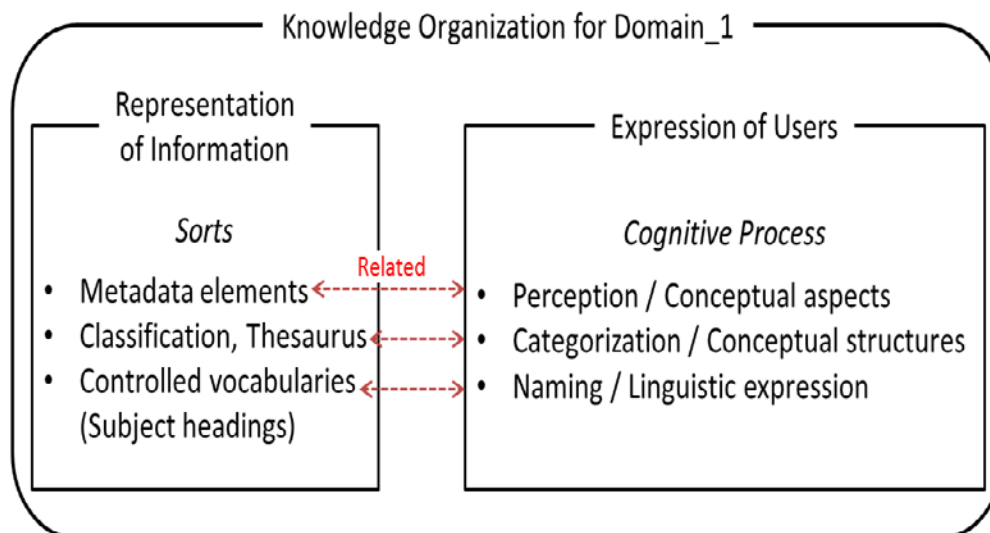
Compared to dominant implementations for information retrieval purposes, there are very few studies interpreting or using the results of children's information seeking behaviors

in order to improve KOS. Children's perspectives or information seeking behaviors are associated with three types of knowledge representations. Beak (2012, p. 2) addresses the theoretical relationships of two components of information organization; representation of information and expression of users (see Figure 2-2):

The representation of information consists of various KOS, e.g., metadata schemes, classification, thesaurus, controlled vocabularies, and taxonomy. On the other side, users express their information needs. As pointed out above, users' expression takes place in three types of cognitive processes. When it comes to the relationship between representation of information and expression of users, metadata elements correspond to conceptual aspects of information. Existing metadata elements tend to represent facets of information, that implies that metadata elements are able to reflect users' cognition related to perception. Secondly, results of categorization in cognitive processes can be depicted by classification, thesaurus, taxonomy, etc. Lastly, a naming process suggests that, to some extent, controlled vocabularies like Sears subject headings use child-friendly terminology.

Figure 2-2. Relationship between representation of information and expression of users

(Beak, 2012, p.2)



Within an information organization domain, current literature has paid relatively less attention to the creation of metadata schemas for children than any other discourse associated with cognitive processes of categorizing and naming. It is surprising that there has been no single metadata schema describing children's resources and targeting children as a user group. Although the ICDL created its own metadata schema, because of limited information access about its metadata schema, there are problems with its examination or evaluation as well as questions about interoperability. As a matter of fact, there is a no metadata schema for children. Therefore, I aim to develop a child-driven metadata schema describing children's resources and targeting children's user group through a study of children's information seeking behavior and cognitive processes during book selection.

## Chapter 3: Methodology

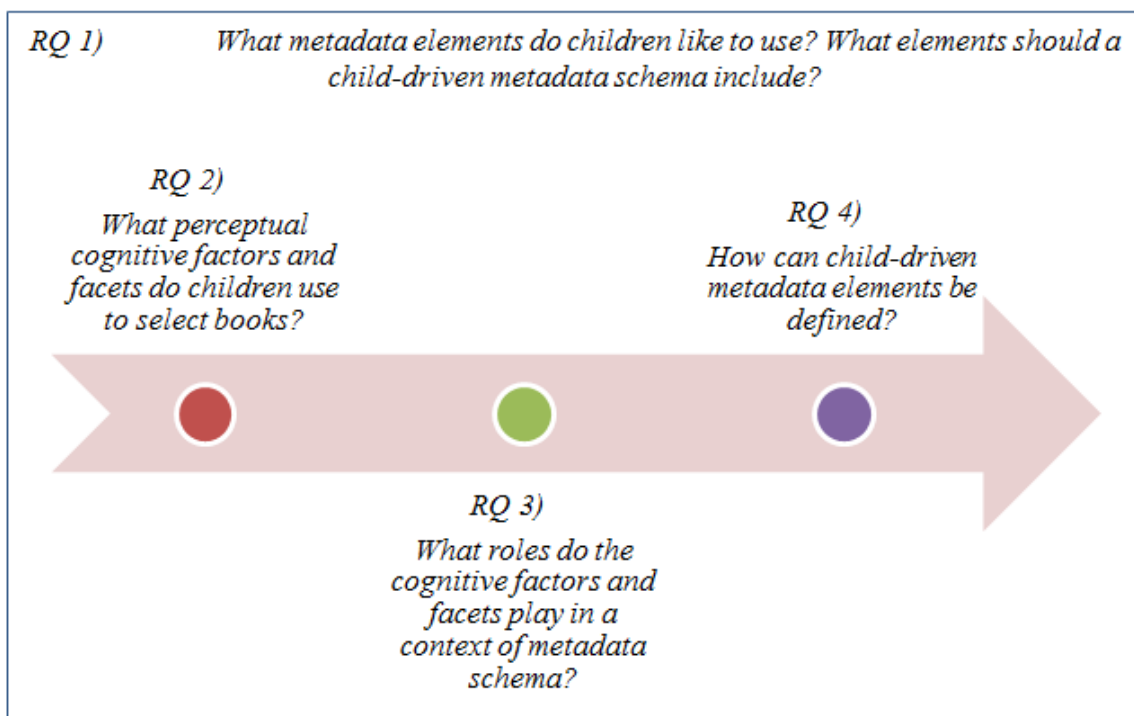
This chapter describes an overview of the research design including research questions, data collection and analysis. The aim of this study is to understand children's perceptual cognitive factors related to book selection in multiple dimensions in order to develop a child-driven, child-appropriate metadata schema for children's resources. Previously, Reuter (2007b) examined children's book selection behavior in a recreational setting. This study proposes different research topics and points of view. Given that both Reuter's study and this study focus on children's information behavior in a broad sense, this study has been methodologically influenced by Reuter's study. The methods of the two studies, however, are not identical. Based on experience gained from a pilot study (Beak, 2012), this study modifies data collection components. It uses triangulated qualitative research methods consisting of questionnaire, observation, interview, and anecdotal diary.

### 3.1. Research questions

This study addresses the following research questions. The first research question (RQ 1) is a broader question regarding the purpose of the study. Research question 2, 3, and 4 represent sequential and specific goals during development of a child-driven metadata schema (see Figure 3-1).



Figure 3-1. Research questions



*RQ 1) What metadata elements do children like to use? What elements should a child-driven metadata schema include?*

In order to create a metadata schema that is driven from children' cognitive processes and behaviors, the broader research questions are designed to understand what metadata elements children like to use when they select and browse books. The focus of this research question is related to a child-driven approach. In other words, while various existing metadata schemas tend to be designed by a resource-centered approach, the main research question represents a general epistemological stance of this study, which is user-driven.

*RQ 2) What perceptual cognitive factors and facets do children use to select books?*

This research question is designed to explore and discover children's cognitive processes during book selection. In other words, what components or aspects of books do children perceive when they interact with books? There are many components in books such as titles, authors, pictures, publishers, texts, or book shapes. Among these various components of books, children might perceive certain components and aspects more than others. Concrete and sensible components of books can be interpreted as cognitive factors that children perceive by looking or touching, while abstract and conceptual aspects can correspond to cognitive facets that children aim to perceive by perceiving factors. Thus this research question is intended to identify children's cognitive factors and facets during book selection.

*RQ 3) What roles do the cognitive factors and facets play in a context of metadata schema?*

This research question is designed to reinterpret the cognitive factors and facets that children perceive during book selection for the sake of the development of a child-driven metadata schema. This study consists of two main parts in terms of data analysis. The first part is related to children's cognitive processes and information seeking behaviors, which is answered by the second research questions. The second part of data analysis is based on the first stage of data analysis. In other words, children's cognitive factors and facets are used as a foundation for developing a child-driven metadata schema. Therefore,

the third research question enables me to translate the meaning and functions of children's cognitive factors and facets into a metadata context.

*RQ 4) How can child-driven metadata elements be defined?*

The last research question is designed to provide clear and concise definitions for each metadata element. A child-driven metadata schema consists of several attributes such as element name, definition, comment, refinement, and value type.

## **3.2. Research design**

### **3.2.1. Recruitment**

A snowball sampling strategy was employed for this study. Recruitment occurred onsite and online. First, I contacted branch library directors in the Milwaukee Public Library (MPL) and other city library systems in the Milwaukee area in order to distribute information fliers for recruitment and to obtain permission for conducting the study (see Appendix A). Recruitment fliers (see Appendix B) were also distributed at a summer concert at Washington Park, Milwaukee, Wisconsin. The concert was open to the public, and there were many parents with their children at the park. Therefore, I visited a public park and met many parents and children. In addition, information fliers were also posted on a social network, Facebook, to advertise the study. Social network sites not only allowed information about this study to be available online, but people on the social network site played a role in advertising the study, so that participants were recruited by

snowball sampling. Once children decided to participate in the study, parents were required to complete a registration form (see Appendix C), which asked for demographic information such as age, grade, gender, library use, language, contact information, a friend's name, and so on. This online registration form was one of two questionnaires used in this study.

Participants were recruited in pairs. When a child wanted to participate in the study, he or she was asked to invite a friend. Instead of matching children assigned by me, participants recruited their friends. This type of the recruitment allowed participants to encourage thinking aloud in a more comfortable setting. More than 22 children registered for the study, but budget constrained the number of participants. Basically, a first-come first-served method was applied for participants. However, some pairs were selected based on recommendations of librarians or parents. As an incentive, I provided \$50 book store gift cards to participants at the end of data collection.

### **3.2.2. Participants**

This section summarizes data from a demographic questionnaire used for recruitment. The questionnaire was completed by participants' parents in order to obtain socio-demographic information, education level, family information, library usage, etc. (see Appendix C). This questionnaire was available online and in hard copy. Table 3-1 shows children's demographic information, including academic achievement level. Table 3-2 shows demographic information about parents and family information.

Table 3-1. Children's demographic information

Pair	Child	Gender	Age	Grade	Primary language	Other language(s)	Average grades in school
1	A	Male	8	3rd grade	English	German	Mostly A's
	B	Female	8	3rd grade	English	German	Mostly A's
2	C	Female	6	1st grade	English	German	A's and B's
	D	Female	8	3rd grade	English	German	A's and B's
3	E	Female	6	1st grade	English		Developing
	F	Female	6	1st grade	English	Spanish	Mostly A's
4	G	Female	7	2nd grade	English		Mostly A's
	H	Male	7	2nd grade	English	French	Mostly proficient
5	I	Male	7	2nd grade	English	German	Mostly A's
	J	Male	7	2nd grade	English	German	J's school doesn't do As-Fs, he has been mostly proficient in all of the areas of grading
6	K	Female	6	1st grade	English		Mostly A's
	L	Female	7	3rd grade	English		Mostly B's

7	M	Female	6	1st grade	English		Mostly A's
	N	Female	6	1st grade	English		They use a different grading system ranging from 1 (lowest score) to 4 (highest score). N scored virtually all 4s on her final report card.
8	O	Male	7	2nd grade	English	German	Mostly A's
	P	Female	7	2nd grade	English	Frisian and Dutch	Mostly A's
9	Q	Male	6	1st grade	English		
	R	Male	6	1st grade	English		Mostly A's
10	S	Male	7	1st grade	English		Mostly A's
	T	Female	8	3rd grade	English		Mostly A's
11	U	Male	6	1st grade	English	Starting German	A's and B's
	V	Female	7	1st grade	English		Mostly A's

Table 3-2. Demographic information about parents and family information

Pair	Child	Relationship to child	Occupation	Hours worked per week	Highest level of education completed	# of children in household
1	A	Mother	Kindergarten teacher	40	Graduate degree	2
	B	Mother	Teacher	40	Graduate degree	2
2	C	Mother	Stay at home	Lots	Bachelor's degree	3
	D	Mother	Stay at home	Lots	Bachelor's degree	3
3	E	Mother	Nail-technician	16	Associate degree	2
	F	Mother	Induction Specialist	40	Graduate degree	1
4	G	Mother			Bachelor's degree	2
	H	Mother	Student		Some graduate school	3
5	I	Parent	Attorney	<20	Graduate degree	2
	J	Mother	Auditor	40	Graduate degree	2
6	K	Mother	Speech Pathologist	8	Graduate degree	4
	L	Mother	Graphic Designer	40	Bachelor's degree	1
7	M	Mother	Stay at home mom		Some college	3

	N	Mother	Homemaker		Graduate degree	5
8	O	Parent	Stay at home mom		Some graduate school	2
	P	Mother	Mom	24/7	Bachelor's degree	4
9	Q	Mother	Portfolio manager	40	Bachelor's degree	1
	R	Mother	Financial Aid	40	Bachelor's degree	2
10	S	Mother	College professor	30	Graduate degree	3
	T	Mother	College professor	30	Graduate degree	3
11	U	Mother	Retail manager	40	Some college	2
	V	Mother	Macy's sales associate	10	Bachelor's degree	2

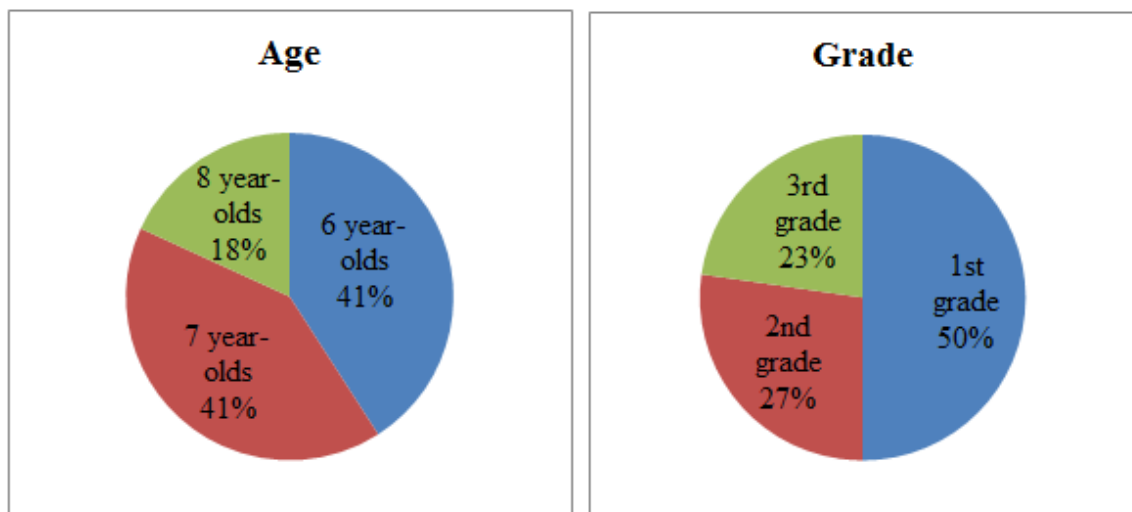
### 3.2.2.1. Age and Grades

The range of children is very broad. “The Association for Library Service to Children defines ‘children’ as individuals age fourteen and under” (Gross, 2006, p. 3). This scope is made based on Jean Piaget’s four stages of children’s cognitive development (Piaget, 1960). Piaget divided children’s cognitive development into four stages: 1) sensorimotor, 2) preoperations, 3) concrete operations, and 4) formal operations. Children at each stage show different characteristics in cognitive development. Section 2.2.1 in Chapter 2



defines a concept of children in this study by using Piaget’s cognitive development (see Table 2-5). Given that children in the formal operational stage tend to think like adults, cognitive ability of children in the formal operational stage is able to learn how to use current OPAC systems. In order to design a metadata schema for children younger than those in the formal operational stage, this study was focused on children in the concrete operational stage. Therefore, the term “children” in this research refers to early elementary school students, aged 6 to 9 or in 1st to 3rd grade.

Figure 3-2. Participants’ ages and grades

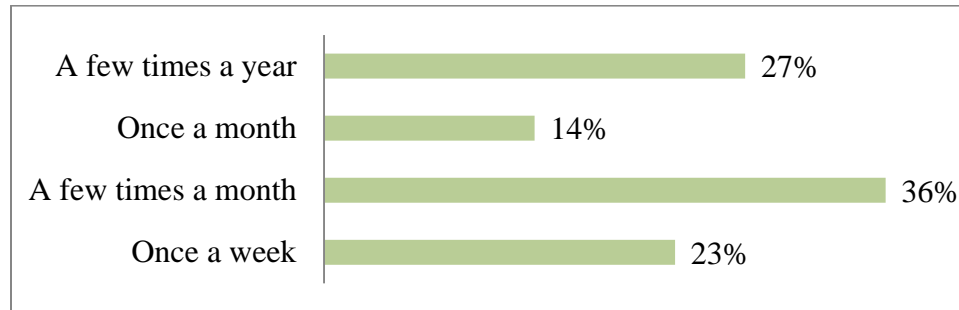


Among 22 children (or 11 pairs), there were nine participants age 6, nine participants age 7, and four participants age 8. In terms of grades, eleven were in the first graders, six were the second graders, and five were the third graders (see Figure 3-2).

### 3.2.2.2. Library use

Parents answered the question regarding how often children visit the public library (see Figure 3-3).

Figure 3-3. Participants' Library Use



### 3.2.3. IRB and Confidentiality

The University of Wisconsin-Milwaukee's Institutional Review Board (IRB) approved the study involving child subjects (see Appendix E). To protect their privacy, participants' names were replaced by letters of the alphabet. All data, including video files, questionnaire (online and hard-copy), and transcriptions have been securely stored.

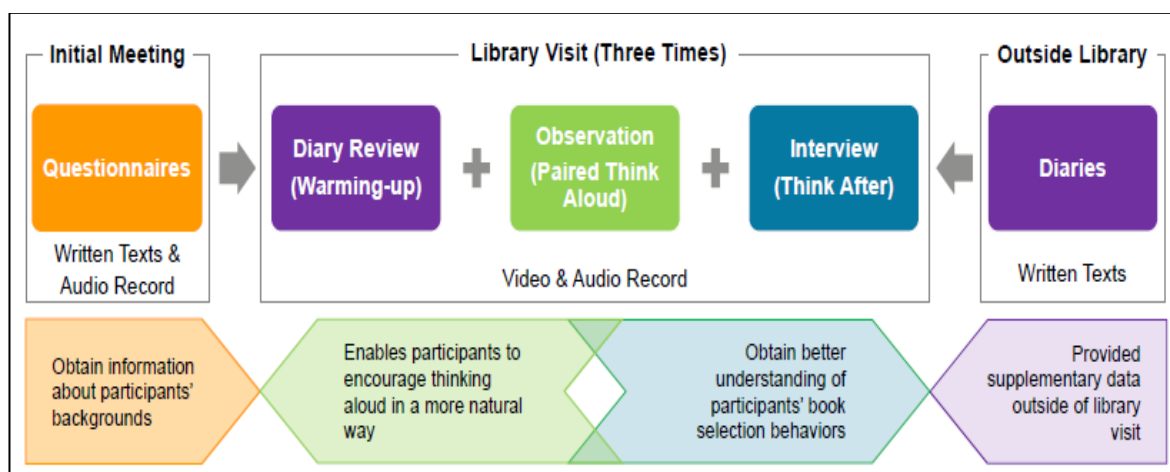
## 3.3. Data collection

### 3.3.1. Data collection methods

When research deals with child subjects, there are some questions of data validity or relevance. Gross (2006) points out that children tend to provide answers in a way that they think a researcher or an adult wants to hear rather than disclosing what they are

really thinking. In addition, children sometimes provide irrelevant answers so they can finish the interview (Gross, 2006, p. 15). This kind of interview data cannot provide a good understanding of participants' perspectives or experiences. To understand data generated by children, triangulated mixed methods are useful. For instance, observation or other methods like diaries can complement interview data. By combining multiple methods, I was able to gain an in-depth understanding of participants' perspectives and behaviors. Therefore, this study used triangulated mixed methods consisting of questionnaires, observation, interview, and diary. All these different methods complemented each other. Figure 3-4 shows the data collection procedures. The following section describes the specific procedure of each data collection method.

Figure 3-4. Data collection procedures



### 3.3.1.1. Questionnaires: Demographic questionnaire and Background questionnaire

There were two types of questionnaires: one for participants' parents in order to obtain socio-demographic information, educational level, family information, library usages, etc.

(see Appendix C), and the other one is for child participants to obtain information on prior reading or multi-media experiences, hobbies, current activities, etc. (see Appendix D). The first questionnaire was used during the recruitment phase; the second questionnaire was used after recruiting child participants and during the initial meeting. While most participants filled out the questionnaire in written format, some children were not proficient in writing. Therefore, the second questionnaire was partially audio recorded.

According to Reuter's study (2007b), reading attitude, media-use, or reading habits influence cognitive processes during book selection. Understanding participants' reading habits, activities, or hobbies provides more holistic insights of children's information seeking behaviors. Therefore, the second questionnaire was designed to obtain background information such as prior reading experiences, knowledge, hobbies, current activities, and so on. The questions used in the second questionnaire were influenced by Reuter's study (2007b). Data collected from the second questionnaire is described in Chapter 4, Findings.

### **3.3.1.2. Observation of children's interaction with books: Paired think aloud method**

Think aloud method has been developed in psychological research (Ericsson & Simon, 1984) and has been widely used in various research areas such as cognitive science, education, human computer interaction, psychology, sociology, etc. Think aloud

generates data of verbal reports. Therefore, think aloud is often referred to as verbal protocol analysis. The verbal protocol analysis method is very useful in studying cognitive processes. Think aloud asks subjects in a study to verbalize their thought processes while solving a problem or performing a task. The use of the think aloud method enables researchers to develop mental models or models of cognitive processes (Van Someren, Barnard, & Sandberg, 1994).

The LIS discipline also adopts a think aloud method. As a qualitative research method, think aloud has been used to provide rich and in-depth data about human information behavior including information seeking and searching behavior, usability, and user evaluation studies (Xie & Benoit III, 2013; Lemieux, 2013; Lucassen et al., 2013; Xie & Joo, 2012; Bauer & Peterson-Hart, 2012; Branch, 2000; 2001; Williamson et al., 2012; Beak, 2012). Reuter (2007b) studied children's book selection behaviors in a recreational setting with a perspective on literacy development. Although Reuter (2007b, p. 148) didn't use a think aloud method while examining children's book selection behavior and thought process, she suggested a think aloud method to make sense of children's behavior through the thought process:

Because children mentioned the factors that influenced their selections retrospectively, the actions observed do not always coincide with the factors mentioned. As a result, this aspect of the model is currently hypothetical. Future research is needed to explore the relationship between the behavioral and cognitive processes of book selection. Think-aloud

protocols might be used to align children's behaviors and thought processes more comprehensively.

Although the think aloud method has been popularized in LIS, most studies using think aloud methods were conducted with adults or young adults. There are few studies that apply a think aloud method for children or adolescents (Branch, 2000; 2001; Beak, 2012). A think aloud method requires participants to describe information occurring in a working memory. In other words, participants need to report whatever they are currently thinking, feeling, looking at, or hearing. All of these kinds of conscious and concurrent information are temporarily held in working memory. Adult participants not only have more working memory, they also have better cognitive ability to report their working memory, whereas children have comparatively limited space in working memory, limited vocabularies and cognitive abilities to verbalize their thoughts. Van Someren, Barnard, and Sandberg (1994) also briefly mentioned some difficulties in think aloud by children. They suggested possible reasons why children have difficulty with think aloud: "due to their verbalization skills, to the content of their thought processes or to the general difficulty of concentrating on a problem-solving task" (p. 36). Therefore, in order to apply a think aloud method to child participants, previous training is required or child participants needs some type of assistance to think aloud.

This study modified a traditional think aloud method to a paired think aloud method. Paired think aloud is not a novelty. Lemieux (2013) used it to analyze archivists' thought

processes while they conducted archival procedures. As a cognitive task analysis, this study used a verbal protocol and visual analytics. The interesting fact on Lemieux's study is modification of a verbal protocol. A think aloud method in this study has been combined with pair analytics (Arias-Hernández et al., 2011). Before explaining pair analytics, it is necessary to address some shortcomings of a think aloud. Van Someren, Barnard, and Sandberg (1994) identified five issues related to validity of data generated by a think aloud method (p. 32-33).

- Invalidity due to disturbance of the cognitive process
- Invalidity and incompleteness due to memory errors
- Invalidity due to interpretation by the subject
- Incompleteness due to synchronization problems
- Invalidity due to problems with working memory

A common problematic situation in a think aloud method is that participants tend to verbalize their thoughts less frequently as they are engaged in a task. This is related to invalidity due to disturbance of the cognitive process and synchronization problems. Lemieux (2013) attempted to overcome the weakness of a think aloud method by allowing participants to work in pairs of two (p. 469). Working as a pair enables participants to encourage thinking aloud while performing a task. This seems to work for child participants as well. Before conducting this study, a pilot study was conducted with 6 children using interview and observation (Beak, 2012). This pilot study also faced similar problems, including lack of verbalization of the subjects' thought processes. After engaging in playing with or selecting books, participants tended to forget about thinking aloud. Although the researcher tried not to interrupt the children's thought process, which

is related to “invalidity due to disturbance of the cognitive process” (Van Someren, Barnard, & Sandberg, 1994, p. 32), intervention was required during the children’s interactions with books in order to encourage them to think aloud. Based on this previous experience, for this study I tried to adopt a pair analytics method to a think aloud method.

Participants in this study were recruited as a pair. Each pair was trained in how to think aloud in an initial meeting. Children have difficulty thinking aloud without my assistance. However, interaction between me and a child participant can introduce bias into the participant’s thought process. Therefore, it might be more effective to observe interactions between two child participants rather than an interaction between me and a child participant. By interacting with a peer, a participant feels more comfortable and active. This setting, of a paired think aloud, not only makes participants feel interested in the study, but also allows them to think aloud in more natural way.

During a paired think aloud, I observed participants’ conversation and interactions with books by positioning herself near bookshelves where the participants browsed, in order to hear their voices. All activities were video and audio recorded. Observation included participants’ movement and monologue in interactions with books, and interactions with their friends, parents, other people at the library, and me. I tried to be involved as little as possible in participants’ interaction with books. However, when a pair of participants did not make any comments or conversations to explain why they picked up or looked at a book, I intervened by asking questions such as “Why are you looking at this book?,”



“Why did you put down this book?,” or “What kind of books are you looking for?.” By asking these questions in the moment rather than in a later interview, participants not only required fewer cognitive work processes for recalling memories, but also their responses were more genuine and intuitive.

### **3.3.1.3. Interview with children: Think after**

There are two types of verbal protocol analysis: Think aloud and Think after or concurrent verbal reports and retrospective verbal reports. Think aloud or concurrent verbal reports generate data about cognitive processes, while a subject is conducting a task, whereas think after or retrospective verbal reports occur after task completion. Interview in this study refers to a think after method. From a paired think aloud, participants were observed and generated their thought processes while interacting with books. However, participants might not have provided clear verbal reports or might not have completely reported their thought process. Moreover, I might interpret children’s behaviors differently than what the children really meant. To reduce these misunderstandings and obtain better understandings of participants’ book selection behaviors and their thought processes, a think after method was used. In the think after interview, I asked questions focusing on “why” participants selected books. The following are some examples of think after questions.

- How did you choose this book? Why did you look at this book?
- What was important to you when choosing this book?
- What kinds of things did you look for when choosing a book?

- What was the most important thing about choosing a book?
- What do you like about this one? What made you choose this book?
- Why did you put down this book?

#### 3.3.1.4. Diaries

A diary method provided supplementary data on children's book selection behaviors and cognitive processes. Participants were given a diary consisting of semi-structured questions (See Appendix F). Participants were required to keep an anecdotal diary about what they read a couple times a week. The semi-structured questions include the following questions:

- What did you read today?
- Why did you select this book to read? Or what made you choose this book?
- How do you describe this book?
- Did you like this book or not? Why?
- How do you think you can find other books like this one?

Instead of asking a question such as "What is the title of a book that you read?," a semi-structured question in a diary asked "What did you read today?." Asking for the title of a book might influence participants' cognitive perception. By allowing participants to describe a book that they read in any narrative style, I tried not to bias their responses by providing any cues related to books.

Given participants' writing proficiency, it was determined that writing a diary might be challenging for participants. Therefore, a Skype meeting was offered. Instead of writing a diary, participants could meet me through Skype and discuss what they read using diary questions. However, none of participants chose to use the Skype option. The other alternative was dictation. Parents were asked not to force children to answer in certain ways. Instead, parents helped participants keep a diary by dictating what the children said.

### **3.4. Data collection procedures**

#### **3.4.1. Initial meeting and background questionnaires**

An initial meeting was designed to understand participant's background information using questionnaires. In addition, I explained the data collection procedures during participants' library visits. Two participants, as a pair, attended an initial meeting. Locations for the initial meeting were chosen for participant convenience. During the initial meeting, participants were also trained in how to think aloud. By practicing think aloud with favorite books, the participants became accustomed to the think aloud process.

It is important to build trust between researcher and participant at the initial meeting. The relationship might influence a participants' cognitive thought process. For example, if participants feel that they are observed, their thought process may be changed and they may answer with what they believe I want to hear instead of what they truly think. To

reduce this risk, it is necessary to spend a good amount of time with participants before the actual data collection in order to build comfortable and trust-based relationship.

### **3.4.2. Library visits**

Participants visited a library three times. Each visit took between 30 minutes and an hour. Libraries were chosen based on participant convenience. During the library visit, observation for paired think aloud, interview for think after, and diary review were conducted. All activities during the library visits were recorded using a digital video camera (Canon Vixia HFS21) and digital audio recorder (Canon DM-100).

### **3.4.3. Library Settings**

This section describes the physical settings of each of the four local public libraries in Metropolitan Milwaukee, Wisconsin. Brown Deer Public Library, Greendale Public Library, Wauwatosa Public Library, and Zablocki Public Library were visited for this study. All libraries have similar arrangements for children's materials. Library settings influence children's book selection behaviors. Since this study took a place in physical library setting, it is necessary to provide information about unique library settings in order to understand participants' book selection behaviors better.

Among four libraries, only the Wauwatosa Public Library has a separate room for children's materials. Children's materials were generally organized by easy readers,

picture books, chapter books, graphic novels, juvenile fiction, non-fiction books, and special collections like new books, Spanish books, Christmas, or Mysteries. Within each section, children's materials tend to be alphabetically organized by author's last name. Appendix G shows photographs of libraries.

The Greendale Public Library organizes children's picture books differently than do other libraries. It uses yellow shelf markers showing character's images (see Photo 3-1). First, picture books are organized by author's last name. When picture books by the same author have unique characters, such as Clifford (a dog character in Photo 3-1), yellow shelf makers are used to indicate the characters. Picture books are sort of organized by characters, but not by character's names. This organization system is not novel, given a basic organization is author's last name.



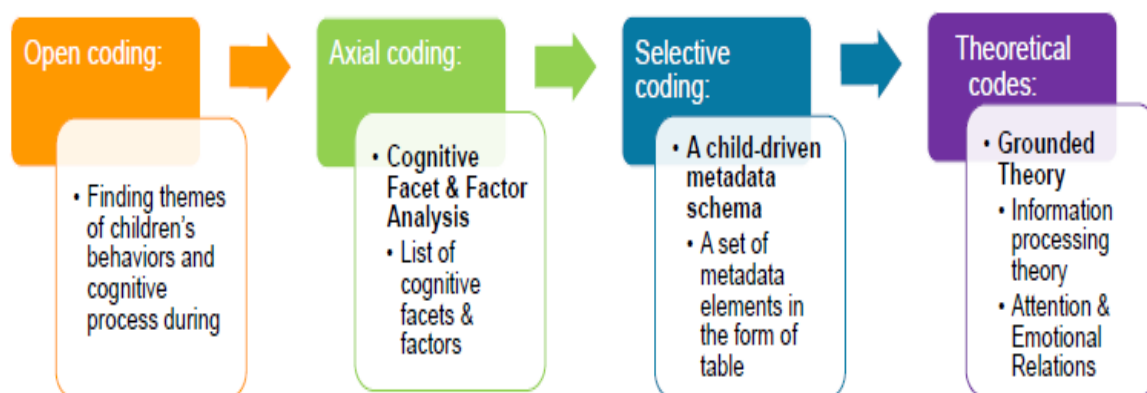
Photo 3-2. Shelf markers of characters at the Greendale Public Library.

However, adding character's shelf markers in picture book section allows children to easily recognize characters more than other factors like author's name. Character's shelf markers also influence children's book selection behaviors. The detailed description about children's book selection behavior related to character's shelf markers is discussed in Chapter 4, Findings.

### 3.5. Data analysis

This section describes data analysis procedures. After completing video and audio recordings and collecting diaries, video data were transcribed. For the sake of participants' privacy, participants' names were replaced by letters of the alphabet. In addition, my name was also replaced by the letter Z throughout all transcriptions. Transcribing processes consisted of two steps. For the first draft transcriptions, two undergraduate students were hired to transcribe data. Once this was done, I edited the transcriptions by adding field notes. In sum, 34 transcripts were generated in Word document format. Other data, including written data of questionnaires and diaries, were scanned and created as PDF files.

Figure 3-5. Data analysis process: Grounded theory approach



To analyze the data, I used a grounded theory approach (see Figure 3-5). Grounded theory has been used in LIS and its applicability, opportunity, and challenges have been discussed in a LIS context (Seldén, 2005; Mansourian, 2006; Tan, 2010). According to Barney Glaser and Anselm Strauss who are the creators of grounded theory, grounded theory is “the discovery of theory from data” (Glaser & Strauss, 1976, p. 1). After the

book, *The Discovery of the Grounded Theory: Strategies for Qualitative Research*, written in 1967, Glaser and Strauss suggested different approaches of grounded theory, thereafter there have been many divergences in grounded theory. However, Haig (1995) notes a general and comprehensive definition of grounded theory:

The general goal of grounded theory research is to construct theories in order to understand phenomena. A good grounded theory is one that is: (1) inductively derived from data, (2) subjected to theoretical elaboration, and (3) judged adequate to its domain with respect to a number of evaluative criteria.

A benefit of using grounded theory tends to be more highlighted when a phenomenon has not been explored, therefore, when a researcher aims to discover new core concepts or theory out of empirical data. From the literature review in Chapter 2, I see that there has not been a study about children's cognitive processes and information seeking behaviors during book selection in relation to the development of a child-driven metadata schema. In that respect, a grounded theory approach enables me not only to explore and understand children's cognitive processes and information seeking behaviors through empirical data with an open mind, but also to generate a child-driven metadata schema through the interpretation of emergence of new concepts and their interrelationship.

Mansourian (2006, p. 388) notes that the divergence in grounded theory is due to different methodological procedures:

In fact, the later divergence in GT [Grounded Theory] and disagreements between the originators is not about the ontological and epistemological aspects of the GT, but it mainly arises from their differences about the details of methodological procedures, such as how to code the data and how develop the categories.

Tan (2010, p. 102-106) and Mansourian (2006, p. 391-392) contrast the different coding strategies in grounded theory (see Table 3-3):

Table 3-3. Coding strategies in different GT versions (Tan, 2010, p. 102)

	Glaser and Strauss (1967)	Glaser (1978, 1992)		Strauss and Corbin (1990, 1998)
Coding process	Explicit coding and constant comparative method	Substantive coding  Theoretical coding	Open coding Selective coding	Open coding Axial coding Selective coding

Glaser and Strauss (1967) explained a constant comparative method regarding how to code data. The basic idea of a constant comparative method is to code each incident and to compare a code with the previous codes by checking whether they are similar or different to integrate and create categories. Later, Glaser (1978, 1992) suggested two levels of coding, substantive coding and theoretical coding, while Strauss and Corbin (1990, 1998) expended to three levels, open coding, axial coding, and selective coding. Because there are so many divergences in grounded theory, it is hard to follow a specific notion of grounded theory. Therefore, I quoted Creswell's words (2007, p. 106):



Grounded theory provides a procedure for developing categories of information (open coding), interconnecting the categories (axial coding), building a story that connects the categories (selective coding), and ending with a discursive set of theoretical propositions.

All transcripts were transferred to qualitative data analysis software, QSR Nvivo 10. At the open coding stage, codings (or nodes in a term of Nvivo) were created based on findings of the pilot study (Beak, 2012). At the axial coding stage, coding was categorized by cognitive facets. Cognitive factors are referents often directly mentioned or pointed out by participants or observable children's behaviors noticed by me. Cognitive facets emerge from these factors by representing certain aspects of the children's perceptions. Chapter 4 identifies and explains the cognitive facets and factors with examples of the children's accounts. After identifying cognitive factors and facets, I interpret the meaning of the cognitive factors and facets in a context of development of a child-driven metadata schema. Through the selective coding process, a child-driven metadata schema is developed in Chapter 5. As the last step of the data analysis, I provide a holistic understanding of the children's cognitive processes during book selection in Chapter 6. In addition, Chapter 6 discusses the findings by reviewing the literature in order to look at how previous literature such as topics in information process theory, attention, and emotion could interpret the children's cognitive processes.

### 3.6. Limitations

There are four explicit limitations of this study. First, this was a qualitative study with no attempt to generalize results from the sample participants to a larger population. That said, there were 22 children in 11 pairs recruited for this study, which was larger than that participant group used by Reuter (2007b), who recruited 20 children (p. 42). Still, it is likely that the small group of 22 participants here have not represented all possible children's book selection behavior and cognitive behavior.

A second limitation was that the study was conducted in a library setting and participants were interacting with physical books, not with an OPAC systems or e-books. Section 3.4.3 describes unique arrangements of the books in these libraries. These physical settings might influence children's cognitive processes and book selection behaviors. It might also cause cognitive processes different from those used when children find books with an OPAC system or e-books.

Third, the participants visited a library three times for this study. Each library visit took between 30 minutes and an hour. Although diaries generated supplemental data outside of the library settings, the limited library visits and diaries together might not cover the full range of children's book selection behaviors.

Finally, think aloud data generated by child participants might not be as profound and natural as think aloud data generated by adults. During the initial meeting, participants learned how to think aloud. Moreover, a think after interview and diaries were used to complement the think aloud method in this study. Possibly, the lone one time practice of thinking aloud might not have been enough training for child participants.

## Chapter 4: Findings

This chapter discusses the findings of the child participants' book selection behaviors. The first section of this chapter describes the child participants' background information asked during the initial meeting. The second section describes cognitive factors and facets occurring while the children interacted with and selected books at libraries. The last section of this chapter discusses emergent vocabularies representing emotion and how emotion is associated with the cognitive factors and facets.

### 4.1. Initial meeting and background questionnaire

#### 4.1.1. Description of the children

This section describes the background information of child participants in each pair, which was asked during the initial meeting. The purpose of the initial meeting was not only to understand information that might influence the children's book selection behaviors, but also to create trust between me and the two children in each pair in order to ensure that the children felt comfortable participating in the study. The semi-structured questionnaires helped me lead the conversation for the initial meeting. However, sometimes the children did not have an answer for some of the questions. In these cases, I let the conversation flow, so the children were able to share whatever they wanted to talk about regarding their reading and other personal activities. For this reason, some of the descriptions of the children's background information are not consistent with the sequential order of the questions. The data in tables of this section were either transcribed from participant's writings or transcribed from audio recordings. *Italics* mean titles of

books, TV shows, or movies. Quotation marks mean accounts from participants, either in a written format or in an audio format. Descriptions in brackets indicate a summary of the children's answers by me or when I added information for the sake of clarification.

### Pair 1: Child A and Child B

Questions	Child A	Child B
Favorite Book(s) “Why?”	<i>Horse Diaries</i> “It tells about horse’s life”	<i>Disney books</i> “I like it because it has a lot of people in them.”
Favorite Movies or TV shows “Why?”	<i>Scooby Doo</i> “I like it because I like trying to figure out how the monster is.”	<i>River Monsters</i> “They have scary fish and animals.”
Favorite Characters	Characters from <i>Horse Diaries</i>	Humphrey
Hobbies	Swimming, Gymnastic, Dancing, Signing, Art	Baseball, Soccer, Swimming, Signing sometimes, and Football
Activity Program	Swimming, Gymnastics	Soccer, Baseball
Genre	Fiction, Non-fiction	Fiction
How to select or find books?	Go to a bookshelf and find books. Looking at back of books to know what it is about	Ask a librarian, or go to computer

Child A did not talk about a particular topic that she wanted to read about. Child A tends to browse bookshelves to see whether there are any books she might be interested in rather than finding books by specific topics or subjects. An interesting answer by child A regarding how to select books was to look at a back of a book in order to know what it is about. This implies that child A considers subjects or topics.

Both children said that they sometimes found books related to their hobbies. For instance, child B was interested in baseball, so he asked his mom where to find books about baseball. In this instance, child B usually asked a librarian when he needed to select books on a specific topic. In addition, child B mentioned using an online catalog, but he did not explain how to search books in an online catalog.

### Pair 2: Child C and Child D

Questions	Child C	Child D
Favorite Book(s) “Why?”	<i>A Series of Unfortunate Events</i> “It’s sort of like a lot of mysteries all in one.” [She likes characters like Sunny in the series.]	<i>Lego books</i> <i>Fancy Nancy</i>
Favorite Movies or TV shows “Why?”		Aurora, Sleeping Beauty “Because she is pretty princess.”
Favorite Characters	Donald Duck	Mini Mouse, Aurora
Favorite Subject, Topic or Thing to read	Math, Art, and Music	“I like learning numbers.”
Hobbies	Reading	Playing with friends
Reading Program	Need to	
Activity Program	Ballet and Irish Dance	Ballet for a week
Genre	Fairytales, Chapter books	Picture books, Fairytales
How to select or find books?	Look at book cover’s or back covers to see if a book is funny. Having an alien or three kids on a book cover is a funny book.	

Children C and D were sisters. Child C was the oldest. They have a younger brother. They usually read books together or child C often reads to her younger sister, child D. (“Sometimes, I [Child C] read ‘Hop on Pop’ or Dr. Seuss’s books to D.”) Therefore, they shared many common experiences in terms of reading. Child C was good at writing, but child D has just started to learn how to read and write. However, child D’s reading skill is better than writing. Child C mentioned that her favorite author was Bruce Coville. She also remembered titles of Bruce Coville’s books like *My Teacher Is an Alien*. It was interesting that child C remembered a specific author’s name. While child D had less experience finding books by herself, child C explained that she usually looked at a book cover or the back of a book to see whether it was funny. Child C described funny books as books having an alien or three kids on a book cover.

### Pair 3: Child E and Child F

Questions	Child E	Child F
Favorite Book(s)		Animals
Favorite Movies or TV shows	Movies with a ballerina or princess	
Favorite Characters	Piggie and elephant	Peppa Pig
Favorite Subject, Topic or Thing to read	Dog, cat, fish, or other animals	
Hobbies	Reading	
How to select or find books?	Look at books or pages.	Mom picks

Participants in pair 3 were not able to answer the written questionnaire. Therefore, the initial meeting was casual conversation to get to know each other. The general finding of

the initial meeting was that neither child E and child F understood the difference between fiction and non-fiction. Instead, they answered that they liked to read picture books and fairytales. In addition, they were not able to recall any book title as their favorite. Child F described her favorite book with a subject; Animal.

Child E did not have any siblings. She liked movies with characters of a ballerina or a princess. Her favorite characters were in the “*Elephant and Piggie series.*” The character’s names are Gerald, an elephant, and Piggie, a pig. However, she referred their names as “*piggie, and elephant.*” She liked to read about dogs, cats, fish, or other animals. She mentioned that she liked reading in her free time. Because she was learning how to read, reading itself seemed to be the most important when she selected books. She answered that she usually found books by looking at books or pages.

Child F had a hard time articulating the answers for the questionnaire. Therefore, I tried to focus on developing a relationship between us rather than forcing her to answer questions. Based on the data from the initial meeting, she liked books about animals. Her favorite character is Peppa Pig, a main character in a British Children’s animated TV series, “*Peppa Pig.*” She usually read books her mom selected for her.



#### Pair 4: Child G and Child H

Questions	Child G	Child H
Favorite Book(s)	Willy Grandpa's [??] adventure [not accurate title]	Gerald and Piggie
Favorite Movies or TV shows	Robot	
Favorite Characters	A blue robot	Scooby Doo
Hobbies	Game (video game) Playing outside Skateboarding Scooter	Playing outside Learn about bird
Genre	Chapter books and some picture books	Fairytales
How to select or find books?	Pick favorite from the shelf	Look online tell us whether books is on shelf or someone took it.

Child G said that he liked a robot movie, but didn't mention a specific movie title or a name of a robot. Instead, he described his favorite character as a blue robot. It shows that child G perceived the color of character more strongly than other aspects of a character, such as the name of a character. Child H described her favorite book as Gerald and Piggie. Gerald and Piggie is not a book title, but rather the names of characters in the *Elephant and Piggie* series. It shows that child H perceived characters more importantly and series title or individual titles of the series.

Child H was able to distinguish fiction and non-fiction (“*non-fiction book is non-believe book, and fiction book is believe book, that is real.*”), whereas child G didn't know the difference. However, child G answered that he liked to read chapter books and picture

books, not fairytales. While child G generally described that he selected books by picking favorite books from a shelf, child H answered that she found books by using an online catalog to find where the books in located.

### Pair 5: Child I and Child J

Questions	Child I	Child J
Favorite Book(s)	<i>The secret of NIHM</i> Snakes and Reptiles <i>Star Wars</i>	Crystal and Gem Snakes
Favorite Movies or TV shows	<i>Beyblade</i>	<i>Animal planet</i>
Favorite Characters	Saggetario [From Beyblade]	Kittens
Favorite Subject, Topic or Thing to read	Beyblade, Legos	Crystal
Hobbies	Playing video games, Playing soccer, baseball, football, Tae kwon do	Playing Wii, Catching butterflies, Playing with neighbors, Fishing, swinging
Activities	Soccer, Tae kwon do	Soccer, Tae kwon do
Genre	Fiction, Picture books, Chapter books	Non-fiction, Picture books, Fairytales
How to select or find books?	I don't know.	I usually just pick a book from where I was and see if I like the book. Or sometime I usually read a front of the book to see what it says

Children I and J mentioned that their favorite books were snakes, reptiles, crystal, and gem. These were not particular books' titles; they represented subjects. Children I and J not only did many activities together, such as playing on the same soccer team and doing tae kwon do together, they shared the same reading experiences. Neither had knowledge

about fiction and non-fiction. However, in general, both liked non-fiction books, and child I seemed to like reading fiction books as well. Child I showed much knowledge about characters. In terms of how to select or find books, child I was not able to answer. However, child J mentioned that he picked a book from where he usually found books. It means that he likes to read certain topics that he usually finds books in a specific location. In addition, child J also noted that he read the front of the book to see what the book says it is about. The front of a book means a book cover.

### Pair 6: Child K and Child L

Questions	Child K	Child L
Favorite Book(s) “Why”	<i>Tacky the Penguin</i> “It is funny, I like Tacky, and he is funny and nice.” <i>Amelia Bedelia</i> “They are nice to each other. [...] It is really nice to make new friends.”	<i>Harry Potter</i> Jack and Annie books.
Favorite Movies or TV shows “Why”	<i>Tooth fairy I &amp; II</i> “Funny, nice, and there is a girl really cute!”	Movie: <i>James and the Giant Peach</i> Show: <i>Lab rats</i> <i>Wizards of Waverly Place</i>
Favorite Characters	Girls not boys	Emma Watson (Hermione Granger) Daniel Radcliffe (Harry Potter)
Favorite Subject, Topic or Thing to read	<i>Harry Potter</i> Rest of <i>Amelia Bedelia</i> Math	Read Harry potter by herself Series of Jack and Annie
Hobbies	Dance	Jump rope, Singing
How to select or find books?	Ask mom Pick my favorite books like snakes Look at a book cover and inside	Ask parents if a book is big (long) or not

Child L's favorite book was the *Harry Potter series*. She said that she liked the book because all her friends read it. However, her reading level was not advanced enough to read the series, as she said that her dad or mom read it to her. Another one of her favorite books was one of *The Magic Tree series*. Instead of saying the name of the title of series, she described the book as the Jack and Annie book. Like child H, child L also perceived series by the characters' names. When child L talked about TV shows and movies, she used titles. Child K noted specific books title like *Tacky the Penguin*, but she was not able to recall her favorite character's name. She said that she liked girl characters, not boy characters, although one of her favorite characters was a boy ("*I like girls, not boys. Boys are mean. [...] I don't remember his name. But he is boy. That boy is nice.*").

Child K wanted to read Harry Potter because her older brother read it. She liked to pick books for her younger brother. Both children seemed to ask their parents to pick books for them, or they asked parents whether the books were good or not. Since child L was read books by her parents, when she picked books, she asked her parents if the books were too long or not. Child K also described that first she picked her favorite books by a subject like snakes, and then looked at a book cover and looked inside to see whether she liked it or not.

#### Pair 7: Child M and Child N

Questions	Child M	Child N
Favorite Book(s)	"Lot of funny books and Water books"	"Lots of funny books" Animal books
Favorite Movies or TV shows	<i>Good Luck Charlie</i>	<i>Camp Rock</i>

Favorite Characters	Annie from a movie, <i>Annie</i>	Characters that do what child N likes to do.
Favorite Subject, Topic or Thing to read	Dolphin	Animals
Hobbies	Recess, Music	Making stuff, Art
Genre	Non-fiction, Fairy tales, Chapter books	Non-fiction, Picture books, Fairytales
How to select or find books?	“My mom said that I usually pick out the chapter books that are hard for me to learn” Looking at a cover	“My mom tells me to pick yellow and orange ones.” Looking at a cover then look at the book for the story

Child N described her favorite books as funny books and animal books. She liked four animals, dolphin, reptile, cheetah, and pony. Child M also liked to read funny books and water books. Water books as meant by child M were books about undersea animals like dolphins (*“water books are like how dolphin swims like stuff”*). Child N could not identify her favorite character. Instead, she mentioned that she liked a character that did what child N liked to do. Child N and M knew about genres, but child N did not understand a word title. Child M also confused titles with authors (*“words that are on the covers that tell you whom made the story”*), and then corrected her answer to *“a title is what the story is.”*

Both children seemed to be told by their parents how to select books. Child M said that her mom told her to pick out chapter books that were hard for her to read (*“My mom said that I usually pick out the chapter books that are hard for me to learn new books”*). Child N also said that her mom told her to pick books from a reading level section that

indicated reading levels by yellow and orange colors (“*My mom tells me to pick yellow and orange ones*”). When the children picked books by themselves, they liked to look at a cover to see if the cover had something that they liked (Child M: “*It has a favorite thing on it that I like. [on a book cover] like pinkish*”). In addition, child N liked to look at a book for the story.

### Pair 8: Child O and Child P

Questions	Child O	Child P
Favorite Book(s)	<i>Summer of the Sea Serpent</i> (Magic Tree House #31) <i>Winter of the Ice Wizard</i> (Magic Tree House #32)	Julie and Molly books <i>Harry Potter books</i>
Favorite Movies or TV shows	Star Wars Ep. 2 There are 3 of my favorite characters.	American girl movie, Molly
Favorite Characters	Count Dooku [From Star Wars]	R2-D2 [From Star Wars] Pokemon
Favorite Subject, Topic or Thing to read	The Clone Wars [Star Wars 2 and 3]	Star wars, American girls, Harry Potter 5 and others
Hobbies	Play Super Mario Galaxy Wii	Play games, reading
Genre	Fiction, Non-fiction, Picture books, Fairytales, Chapter books	Fairy tales, Chapter books
How to select or find books?	Find books by taking out and looking at book’s front and inside.	Look at names or alphabets

Child O mentioned two different books’ titles and their volume numbers from *The Magic Tree House series*. Given that other participants did not remember specific volume numbers and titles of each volume in a series, it was interesting that child O remembered

individual titles from a series. On the other hand, child P did not mention her favorite books by different titles in a series. Instead, she remembered a series title like Harry Potter. Moreover, child P described her favorite book with a character's name like Julie and Molly who were from the American Girl series.

Child O showed strong interest in Star Wars. He seemed to have various prior experiences with Star Wars books and movies. After child O mentioned Star Wars, child P also talked about Star Wars. Child P's favorite character was R2-D2 who was from Star Wars. However, child P could not remember a name of the character, but described R2-D2. Child O helped her remember the character's name.

Both children showed advanced reading skills and knowledge about genre. However, child P seemed to have hard time writing. Child P tended to focus on reading letters. Once she started to read words in a book, she wanted to finish reading an entire book. It also related to how child P selected books. Child P explained that she looked at names or alphabets when she selected books. Child O usually selected books by looking at a book's front and inside to see whether the book had something that he liked.

### Pair 9: Child Q and Child R

Questions	Child Q	Child R
Favorite Movies or TV shows “Why”	Iron Man 3 “I like the battle at the end [...] I like how a suit is made.”	
Favorite Characters	Captain America	
Favorite Subject, Topic or Thing to read	Iron man books	
Hobbies	Baseball, Run	Soccer, Baseball
Genre	Fiction, Non-fiction, Picture books, Chapter books	Fiction, Non-fiction, Picture books, Chapter books
How to select or find books?	Pick characters Look around	See what characters I like Covers that I like

Child Q and child R were in the same classroom and participated in many activities like soccer together. During the initial meeting, the children asked many questions about me so that we could develop a friendly relationship. However, child R answered most questions with “*I don’t know,*” whereas child Q talked about his favorite movie and a character. Both children did not want to read fairytales.

Both children said that they looked for characters when they picked books. It was because of the organization of picture books in the library they usually visited. This library (Greendale Public Library, see a section of library setting in Chapter 3) organized picture books by characters. It seemed to influence the children’s book selection behavior.

### Pair 10: Child S and Child T



Questions	Child S	Child T
Favorite Book(s)	Jack and Annie Donut shop	<i>A-Z Mysteries</i> <i>The Boxcar children</i>
Favorite Movies or TV shows “Why”	Star wars “It has different creatures”	Sophia
Favorite Characters	Luke Skywalker Ted Jake and Annie	From Books: Dink, Josh, Ruth Rose From TV: Sophia, Amber, James
Favorite Subject, Topic or Thing to read	People, Sports, Places I’ve been, Pigs	Mysteries, Art
Hobbies	Play and watch baseball, art, all sport	Art, Read, Clean, Sports
Genre	Fiction, Non-fiction, Picture books, Fairytales, Chapter books	Fiction, Non-fiction, Picture books, Fairytales, Chapter books
How to select or find books?	I look around and try to find one. I like the cover-look at the picture on cover. Mom picks she thinks I would like.	I usually find a series and read it. I try other books that my friends like.

Child S and child T were siblings. Child S was a younger brother and child T was the older sister. Child T had very advanced reading skills, whereas child S was learning how to read. Therefore, child S read with his mom, and his sister, child T, helped him read too.

Child S liked a character called Ted, but he said he could not remember a book’s name. Also child S tended to name books by himself. For instance, Donut shop was not an accurate title, but he called a book Donut shop. It shows that remembering titles might be challenging for child S. As other children remembered books through characters’ names, child S also described the *Magic Tree House* by Jack and Annie who were the main

characters. Child T liked to read series or chapter books. When she selected chapter books or series, she wanted to read something that her friends read or liked. On the other hand, since child S was younger and had a lower reading level, he looked for more covers and pictures to find books.

### Pair 11: Child U and Child V

Questions	Child U	Child V
Favorite Book(s) “Why”	<i>Fancy Nancy</i> “because they have fancy words like unique.”	Geronimo Stilton books “because it is short and fun to read.”
Favorite Movies or TV shows “Why”	Brave “Funny girl’s name forgot the story”	Horse land “Horse is one of her favorite animals. Fun learn lesson from it.”
Favorite Characters	Hello Kitty	Sarah from Horse land
Favorite Subject, Topic or Thing to read	I will look around. This is second time being this library. I do like to do art.	Geronimo Stilton book “because I haven’t read it long time”
Hobbies	Go to friend’s houses Video game Read chapter books	Read, play with friends Dance
Genre	Picture books, Fairytales, Chapter books	Has knowledge of genres. Non-fiction, Picture books, Fairytales, Chapter books
How to select or find books?	Look through books on a table or bookshelves. Look for an outside and inside of books	Go to a bookshelf Look for an outside and inside of books

Child U was starting to learn German, although her first language is English. During the initial meeting, child U often kept looking at a paper sheet of child V’s questionnaire. It

implied that reading and writing in English for child U seemed to be little bit challenging. However, she was able to verbally answer questions and think aloud.

Child U did not talk about specific topics or subjects to read. For child U, the library where pair 11 visited was not familiar. Child U said that when she visited for the initial meeting, it was the second time she has been at this local library. Child U found books to read by browsing books on a table or bookshelves, whereas child V went to a bookshelf where she usually found books because she was very familiar with the library. This could mean that child V found books by bookshelves' locations or by subjects, genres, or types such as picture books, chapter books, and movies (*"I am just be here [library] so much, I know where books are like where chapter books"*).

#### **4.1.2. When I go to libraries or bookstores...?**

One of the questions in the questionnaire was when they go to libraries or bookstores, how they select books. This question provided five options:

- 1) I love to select books by *myself*.
- 2) I love to select books that my *mom* or *dad* picks for me.
- 3) I love to select books that my *brother/sister* likes.
- 4) I love to select books that my *friends* like.
- 5) I love to select books that my *teacher* picks for me.

Table 4-1 shows the children's answers for the question. "O" means that participant liked, "Δ" means less influential, and "X" and blank means that they did not like the options.

Table 4-1. Relational influences in book selection

Child \ Relationship	<i>Myself</i>	<i>Mom / Dad</i>	<i>Brother / Sister</i>	<i>Friends</i>	<i>Teacher</i>
Child A	O				
Child B	O				
Child C	O				
Child D		O			
Child E	O				
Child F		O			
Child I	O	X	Δ	Δ	X
Child J	O	X	Δ	O	O
Child K	O	Δ	O	O	O
Child L	O	Δ	N/A	O	O
Child M	O	O	O	O	O
Child N	O	O	O	O	O
Child O	O				
Child P	O				
Child Q	O	O	Δ	Δ	O
Child R	O	O	N/A	O	X
Child S	O	O		O	
Child T	O	O	O	O	O
Child U	O		O		O
Child V	O		O	O	O

Many participants liked to select books by themselves. Only two children did not answer that they liked to select books by themselves. It was related to their reading level. Those two kids were still learning how to read, therefore, their parents often picked books for them. The second most influential people were friends. Participants liked to read what their friends read or recommended.

## **4.2. Emergent factors and facets in children's book selection**

The transcripts of video recording data and field notes were analyzed by open coding with QSR Nvivo 10, in order to identify cognitive factors that children perceived during book selection. This section shows the list of cognitive factors and facets with descriptions of each facet and quotes from transcriptions. This section also includes pictures of book covers, and descriptions of library catalog, called County Cat, a catalog system of public libraries in Milwaukee County, Wisconsin.

### **4.2.1. Distinction between factors and facets**

There is a subtle difference between cognitive factors and facets. Factors are referents often directly mentioned or pointed by participants or observable children's behaviors by me. On the other hand, facets emerge from these factors. Facets mean certain aspects that participants aim to perceive by perceiving factors. Facets are not often directly addressed by participants. Rather I categorize factors based on similar facets. For instance, a child participant checked a number of words in a book. In this case, the aspect that a child participant tried to perceive was whether a book was easy or difficult to read. Although a factor of cognitive perception was a number of words, the factor was perceived in order to judge a facet of difficulty. Therefore, many factors can refer to a same facet. A number of words, pages, or reading levels are various factors for a facet of a difficulty. However, factors and facets are not mutually exclusive. In fact, many factors and facets

are intertwined. Some factors are used or mentioned several times to perceive different facets.

#### 4.2.2. Main cognitive factors and facets

The findings of children's cognitive factors and facets show results similar to a pilot study by Beak (2012) and Reuter's (2007b) study in general. Table 4-2 shows factors of book selections and facets categorizing the factors. Factors are alphabetically ordered first, and then factors in each facet are also alphabetically ordered. Figure 4-1 visually represents the relationships between factors and facets. Again few factors were used to perceive different facets. In addition, some facets were used to perceive other facets. The relationships between facets were visually represented by dashed-line.

Table 4-2. Cognitive facets and factors during children's book selection

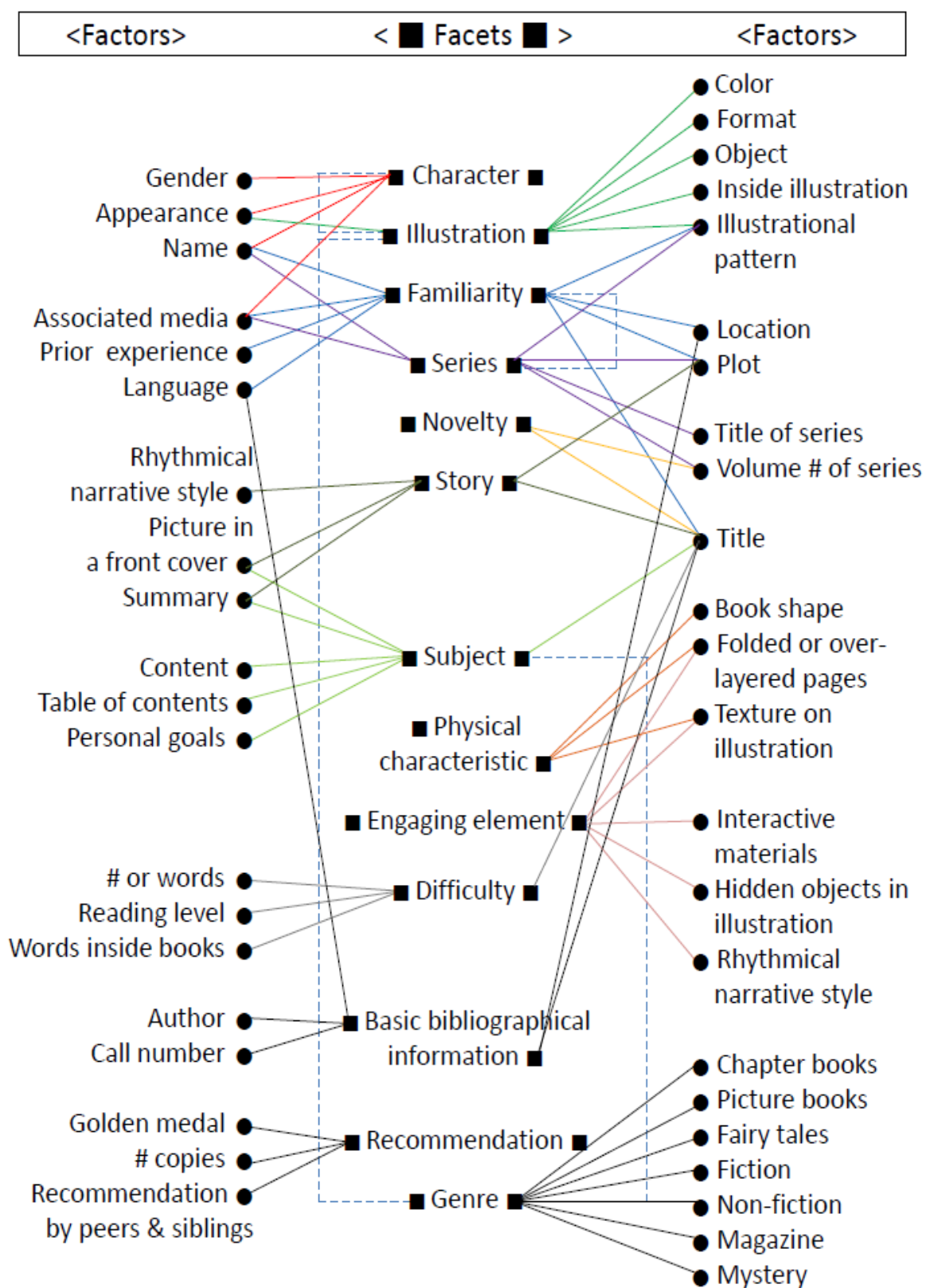
Facets	Factors
Basic bibliographical information	<ul style="list-style-type: none"> <li>▪ Author</li> <li>▪ Location of books in a library</li> <li>▪ Call numbers</li> <li>▪ Language</li> <li>▪ Title</li> </ul>
Characters	<ul style="list-style-type: none"> <li>▪ Appearance of characters</li> <li>▪ Associated media</li> <li>▪ Gender of characters</li> <li>▪ Name of characters</li> </ul>
Difficulty	<ul style="list-style-type: none"> <li>▪ Number of words or pages</li> <li>▪ Reading level indication</li> <li>▪ Titles</li> <li>▪ Words inside books</li> </ul>
Engaging elements	<ul style="list-style-type: none"> <li>▪ Folded or over-layered pages or pictures</li> <li>▪ Hidden objects in illustrations</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Interactive materials</li> <li>▪ Rhythmical narrative styles</li> <li>▪ Texture on illustrations</li> </ul>
Familiarity	<ul style="list-style-type: none"> <li>▪ Associated media</li> <li>▪ Location of books in a library</li> <li>▪ Illustrational pattern on a front cover (like an icon)</li> <li>▪ Language</li> <li>▪ Name of characters</li> <li>▪ Plot</li> <li>▪ Prior experiences</li> <li>▪ Series</li> <li>▪ Title</li> </ul>
Genres	<ul style="list-style-type: none"> <li>▪ Chapter books</li> <li>▪ Fairy tales</li> <li>▪ Fiction</li> <li>▪ Illustrations</li> <li>▪ Location of books in a library</li> <li>▪ Magazine</li> <li>▪ Mystery</li> <li>▪ Non-fiction</li> <li>▪ Picture books</li> <li>▪ Subjects</li> </ul>
Illustrations	<ul style="list-style-type: none"> <li>▪ Appearance of characters</li> <li>▪ Characters</li> <li>▪ Colors</li> <li>▪ Formats of illustrations</li> <li>▪ Illustrational pattern on a front cover (like an icon)</li> <li>▪ Inside illustration</li> <li>▪ Objects</li> </ul>
Novelty	<ul style="list-style-type: none"> <li>▪ Title</li> <li>▪ Volume number of series or chapter books</li> </ul>
Physical characteristics	<ul style="list-style-type: none"> <li>▪ Book shape</li> <li>▪ Folded or over-layered pages or pictures</li> <li>▪ Texture on illustrations</li> </ul>
Recommendation, Award	<ul style="list-style-type: none"> <li>▪ Golden medal on a front cover</li> <li>▪ Number of copies</li> <li>▪ Recommendation by peers or siblings</li> </ul>
Series or Chapter books	<ul style="list-style-type: none"> <li>▪ Associated media</li> <li>▪ Illustrational patterns on a front cover</li> <li>▪ Name of characters</li> <li>▪ Plot</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Titles of series or chapter book</li> <li>▪ Volume number of series or chapter book</li> </ul>
Stories, Themes (Picture books or fiction)	<ul style="list-style-type: none"> <li>▪ Pictures in a front cover</li> <li>▪ Plot</li> <li>▪ Rhythmical narrative styles</li> <li>▪ Summary or review from a back of a book</li> <li>▪ Titles</li> </ul>
Subjects (Non-fiction)	<ul style="list-style-type: none"> <li>▪ Contents</li> <li>▪ Personal goals or activities</li> <li>▪ Pictures in a front cover</li> <li>▪ Summary or review from a back of a book</li> <li>▪ Table of content</li> <li>▪ Titles</li> </ul>



Figure 4-1. Cognitive facets and factors during children's book selection



### 4.2.3. Stories (Picture books or fiction)

When participants browsed and selected picture books or fiction, a story was an important facet perceived by participants. Stories were perceived by several factors such as plots, pictures on book covers, or narrative style/rhyme. An interesting finding was that participants tended to perceive not only actual stories, but also imaginary stories. If participants had read a book or heard about a book before, they seemed to recognize actual stories. However, when participants had not read a book yet, they depended on pictures of books in order to guess or perceive stories. Transcript 4-1 shows some accounts related to a facet of stories from the participants.

#### Transcript 4-1. Stories (Picture books or fiction)

*N: I like the pictures and the colors and the title because **it tells you about the story**. And then it's going to be more interesting for you because you know a little bit about the story even if you haven't read it yet. And then you'll like the book.*

*M: You can figure out what you're interesting in. Because pretend this is a different book like this book. [Holds "Stories of Gilbert and Sullivan Operas", then picks up "A is for Artist"] This book is about art. And art is sometimes it can be people's favorites and can be interested for them. And so in like a different day you can sometimes you don't have time to read books so you can read it a different day and figure out what happens in the story in about like. [From Pair7\_1]*

### 4.2.4. Subjects (Non-fiction)

Subjects are a little bit different from stories in fiction or picture books. Subjects mean topics of non-fiction books. While stories in fiction or picture books are likely to show plots or themes, subjects tend to deal with specific topics such as sharks, math, or football. Participants perceived subjects through titles, pictures on book covers, contents by

looking inside of books, table of content, or summary or review from back of books. Titles, contents, table of contents, and summary are straightforward indications representing subjects. However, pictures on book covers were sometimes misperceived by participants. Transcript 4-2 shows how child D perceived a subject through pictures on a book cover.

Transcript 4-2. Subjects (Non-fiction)

*C: What's this ["Cell Biology"] about?*

*D: I think it's about underwater sea life, or something [This book is not about underwater sea life. D is interpreting a book's subject based on a picture on a cover. The picture has some red cells on a gray background.]*

*[...]*

*Z: Why are you interested in this book?*

*C: I like this one ["Cell Biology"] because it has red things [in a book cover] [From Pair2\_1]*

For instance, participants C and D were browsing the topic of biology section. They were not aware of the topic. While pulling books out from a shelf and looking at a book cover, child C selected a book titled "Cell Biology," showing it to child D. By looking at the book cover, D guessed that the topic of the book was about underwater sea life, not cell biology. The book's cover illustrated red cells on a gray background. This case shows that child D perceived pictures on a book cover, while the title of a book was not perceived.

#### 4.2.5. Series or Chapter books

Participants in this study were beginning or intermediate readers. Beginning readers tend to select picture books more often than do intermediate readers. Intermediate readers also looked for picture books, but series and chapter books are also popular for them. When participants selected series or chapter books, titles of series or chapter books (rather than different titles of each volume), main characters, themes of series, illustrational patterns on a book cover, and volume numbers were perceived. Participants remembered titles of series such as *Rainbow Magic*, *Magic Tree* (the full title of the series is *The Magic Tree House*), and *A to Z Mysteries*. However, participants did not remember titles of each volume in a series or chapter book.

The other interesting finding is that children's series or chapter books tend to have a main character. A character's name is also used as a title of the series or for chapter books, such as *Arthur*, *Madeline*, *Nancy Drew*, *Junie B. Jones*, and *Captain Underpants*. In these cases, it is hard to clearly distinguish whether participants perceive titles of series or characters' names. However, it is obvious that characters' names influence participants' perceptions in book selection. For instance, a chapter book, *The Magic Tree House*, does not include characters' names in a title. However, child S described the chapter book with the main characters' names, Jack and Annie (see Transcript 4-3.).

## Transcript 4-3. Series or chapter books

*S: I like this book [“Magic Tree House: Leprechaun in Late Winter”] because I like Jack and Annie books and I have a lot of them at my house. But I never read this one and I think I stopped at 33 [volume number of series]. I might get this book in book orders but I don't have it right now so I think I'm going to read it at home some time. [From Pair 4\_2]*

Most of the time, participants had prior experience reading series or chapter books. Therefore, they already knew about themes or stories of series. By recalling their memories of reading experiences, participants selected series or chapter books. In addition to themes in series, their prior experiences of reading series also allowed participants to recognize books by the illustrational patterns on a book cover. Transcript 4-4 shows that a child perceived a chapter book through consistent illustrations.

## Transcript 4-4. Series or chapter books

*Z: Let's- can we talk about something else now? Why did you pick this book, B?*

*B: Because I don't have it and I like Annie and Jack [“The Magic Tree House”]*

*Z: Can you show it to me? Is Annie and Jack books?*

*B: It's called “Magic Tree house” and I have a lot of them at my house.*

*Z: How do you recognize this as magic tree book?*

*B: **Because the pictures of Jack and Annie look the same.** [From Pair 1\_2]*

*L: And then I like “Nancy Drew” Because it's super good book.*

*Z: Have you ever read the Nancy Drew books before?*

*L: Yes.*

*Z: Okay, so how do you recognize Nancy Drew?*

*L: Because I really like Nancy Drew, and when I look at it, it's like, I know that side! **Because it's always yellow, almost of the time.** [From Pair 6\_3]*

An example from Pair 1\_2 showed that child B recognized a series of “*The Magic Tree House*” by the consistent illustration of characters. Child B not only perceived illustration patterns, but also recognized the characters.

#### 4.2.6. Characters

Characters in stories or illustrations are an important aspect that participants perceived during book selection. The importance of characters in children’s literature is also observed by an organization system for picture books in the Greendale Public Library (see a section of Library Settings in Chapter 3). A facet of characters was perceived by participants through titles, series, illustrations, or familiarity. In addition, participants considered various factors related to characters such as names, appearance, or gender (see Transcript 4-5.).

#### Transcript 4-5. Characters

Names: [Pair 11\_3]

*U: I want this book [“Katie Kazoo”] because I really like **Katie Kazoo** books and they’re really funny and take turns and everything each time. And I never know and every single one has **Heffer** in it. And he’s the dog, he’s really weird.*

Appearance: [Pair 4\_1]

*H: She’s ugly, he’s weird, and the giant is ugly too. He looks like a hairy lion king. [looking at a book cover]*

*H: He’s hideous, right?*

*G: Yeah.*

Gender: [Pair 6\_3]

*K: Let me check this one. Doesn’t look really cool, let’s see. No, just a **boy**.*

#### 4.2.7. Genres

Participants often talked about genres such as chapter books, picture books, fairy tales, or mystery. However, in general, participants showed a lack of knowledge between fiction and non-fiction. Transcript 4-6 shows examples of participant's perception in genres.

##### Transcript 4-6. Genres

*T: I like mysteries a lot so A-Z Mysteries are books so mysteries sort of make me excited.*

*[...]*

*T: The section is over there, but here are some of the ones mom picked out.*

*S: I want to look at the picture books over there. [while randomly pulling books]*

*Z: S, it is good.*

*[they move to picture book sections]*

*T: Yeah. These are the picture books? [From Pair 10\_1]*

*V: I don't like this book ["Henry and Mudge"] because I like read it one time and I didn't really like but I like mysteries. So I wanted to try it one more time, and then I looked through it and then I decided when I was here that I don't really want it. [From Pair 11\_3]*

Based on observations in a physical library setting, participants seem to use locations of bookshelves to perceive genres rather than using the knowledge of genres. For instance, child S said *"I know were the Junie B. Jones books are. And they're way over there by the Magic Tree House books."* Child S doesn't seem to know about a genre of *Junie B. Jones* or *the Magic Tree House*. However, child S was able to perceive these two chapter books as similar because they are on the same bookshelf.

Another way of perceiving genres was through illustration and subject (see Transcript 4-7). Table 4-3 summarize brief descriptions of each book that child J mentioned, and the

differences between a library catalog and child J's perception. Child J perceived differences between fiction and non-fiction though subject and illustration. A subject about fish for child J needed to be presented with real photos because a subject, fish, is non-fiction. Therefore, when child J perceived a book, "What's It Like to Be a Fish?" because of the illustration and comparing with a non-fiction book, "Trout", he thought that "What's It Like to Be a Fish?" was fiction. In this case, he perceived the format of illustrations as more important than the subject. On the other hand, child J thought that a subject of art was non-fiction. Although a format illustration on a book cover, "Art" was similar to "What's It Like to Be a Fish?" and "Mahjong All Day Long," because of the nature of the subject (art), he thought that the book was non-fiction. In this case, he perceived a subject more importantly than a format of illustration.

#### Transcript 4-7. Genres

Z: Do you remember this book ["What's It Like to Be a Fish"]? You picked this book.

J: Yeah.

Z: You said this book looks like fiction, right?

J: Yeah.

Z: Why do you think this book looks like fiction? What makes you think it is a fiction books?

J: Well, **it doesn't look real like this one** ["Trout" in series of "Nature's Children"]. I like the real ones, or like that one ["Art" by Patrick McDonnell], that one's actually non-fiction. [A book, "Art" is a picture book.]

Z: **This one is non-fiction?**

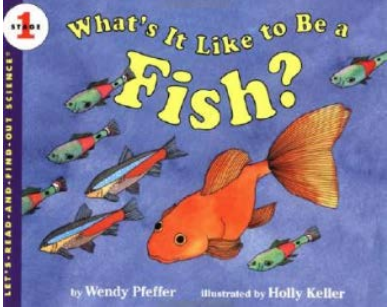

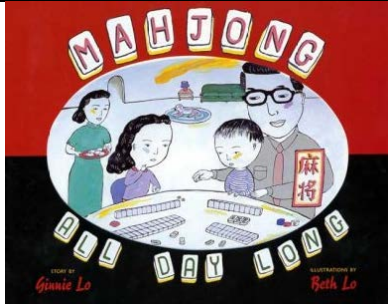
J: **Yeah! Art. It's art. Real.**

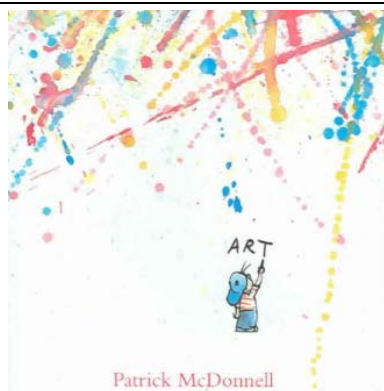
Z: Okay. I was just wondering.

J: And plus this one kind of looks like that one [pointing out a picture book, "Mahjong All Day Long"]. [From Pair 5\_3]



Table 4-3. An example of perception of genre through pictures

Book cover	Descriptions of library catalog	Genre defined by a library catalog	Genre perceived by child J
	<p>Title: What's it like to be a fish? / by Wendy Pfeffer ; illustrated by Holly Keller.</p> <p>Series: Let's-read-and-find-out science. Stage 1.</p> <p>Subject: Fishes -- Juvenile literature.</p>	Non-fiction	Fiction
	<p>Title: Trout / by John Woodward</p> <p>Series: Nature's children</p> <p>Subject: Trout -- Juvenile literature.</p>	Non-fiction	Non-fiction
	<p>Title: Mahjong all day long / story by Ginie ; illustrations by Beth Lo.</p> <p>Subject: Mah jong -- Juvenile literature.</p>	Fiction	Fiction



Title: Art / by Patrick McDonnell.

Subject: Drawing --

Juvenile fiction.

Plays on words --

Juvenile fiction.

Mother and child --

Juvenile fiction.

Fiction

Non-fiction

Although child J had an incorrect understanding of genres, his example showed that the children's perception of genre was complex and occurred by taking into account a combination of subject and illustration. In addition, it also demonstrated that illustration counts in children's perceptions during book selection.

#### 4.2.8. Illustrations

Illustrations are the most frequently perceived factors by participants during book selection. This participant perceptual behavior corresponds to the characteristics of the concrete operational stage in Piaget's cognitive development (see Table 2-5 in Chapter 2). Cognitive ability of participants in this study corresponded to the concrete operational stage, in which children are able to understand concrete, but not abstract realities. Illustrations are concrete objects, therefore it is easier for participants to perceive pictures rather than subjects or themes. Participants considered various aspects of illustrations such as colors, characters, objects, or formats of illustrations (see Transcript 4-8).

## Transcript 4-8. Illustrations

*D: "Ancient China"*

*C: Oh, I want this one!*

*Z: Why?*

*D: It is about China. "China and It's Influence on Modern Times" [subtitle]*

*C: I like the picture!*

*D: I think there might be **a lot of pictures** in here. Yeah, but they're **black and white**.*

*C: I don't care*

*Z: You don't care?*

*D: **I guess as long as it has pictures in it, you don't care.** [From Pair 2\_1]*

*M: I like this ["Skinned Knee"] because **all of the different colors**. I like all the different colors because blue is my favorite color because I like to go swimming. And I see all these blue water touched colors. [From Pair 7\_1]*

*V: I picked only these books because they look like [Gorilla].) This one looks like it would have lots of facts about gorillas. ["Gorilla Walk"] and the other one would have almost everything about monkeys. So I picked both of them to get extra facts just in case.*

*Z: Why do you think this book has just some facts?*

*V: **Because it has a gorilla picture and when I looked through it, it had real stuff in it and I wanted to read it.** [From Pair 11\_3]*

*H: "Big Words for Little People"*

*Z: Okay, why did you select this book?*

*H: Because there's a cat.*

*Z: There's a cat on the cover! So did you like this book?*

*H: No.*

*Z: Why don't you like this book?*

*H: **Well it's a drawing, it's not a coloring book, I like books that look real and it doesn't look real.***

*Z: So you like books that have a real picture?*

*H: Yeah, like my "Survivalpedia" does. [From Pair 4\_1]*

Illustrations on book covers were the most frequently perceived factor. Perceiving illustrations on book covers was related to how books were arranged. Many picture books were displayed on a bookshelf. Displayed books allowed participants to easily perceive

illustrations on book covers and the inside of books. When books were shelved, participants were often observed pulling book half out to quickly see its cover. This behavior also implied that the children wanted to perceive illustration on book covers.

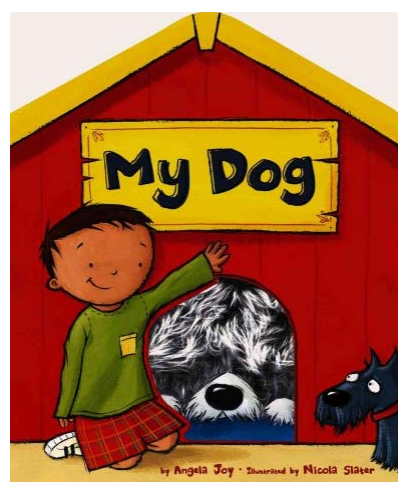
Participants mentioned colors and objects in illustrations. When an object was a well-known character, participants used the character's name, such as *Arthur*. Otherwise, participants perceived general objects in illustrations, describing books as a doggy book, a kitty book, or a ducky book.

Another factor in illustration was format. Format of illustration refers to whether an illustration is a picture or a real photo. Picture books, chapter books, and many fiction books include pictures or drawings, whereas non-fiction books contain photos. For instance, a non-fiction book about a shark shows actual photos of sharks. Illustration format also influenced the children's perception of genres (see Transcript 4-8). Although a book that child J picked was non-fiction due to the illustration format, child J thought that the book did not belong on non-fiction bookshelf.

#### 4.2.9. Physical characteristics

Physical characteristics were perceived through books' shapes or texture components in a book. Pair 8 provided a good example of participants' perceptions of physical characteristics (see Transcript 4-9). During the second library visit, two participants in pair 8 were looking for a book, "My Dog" written by Angela Joy, and illustrated by Nicola Slater. Children Q and R had seen this book during the first library visit. However, they could not remember its title or author. What they remembered were three things: 1) the book had a dog that child R called Mr. Doggy, 2) the book had fur that they could touch, and 3) the book was shaped like a dog house. In addition to the main character in a book, physical characteristics were perceived by participants as more important than basic bibliographic information such as title, author, or illustrator.

Figure 4-2.  
Book cover of *My Dog*



#### Transcript 4-9. Physical characteristics

*Q: I want Doggy.*

*Z: You want a Doggy book? Oka, Let's find one.*

*Q: No, that was the one he [R] had last time. That was all furry.*

*Z: Oh, but you [R] didn't bring it?*

*Q: He [R] did bring it, but it's probably still over there [a book cart].*

*Z: Oh, Okay.*

*Q: But she [a librarian] might have put it back.*

*[...]*

*Q: Hey, where'd you find it last time?*

R: Last time I found it here. It's not here. It's not here. It's like **that big**.

Q: As big as all those?

R: Yeah.

Q: No, it's not.

R: It's **pretty wide**.

[...]

[They are looking at other books]

Z: Okay, do we have enough books now?

Q: No.

R: Doggy.

Q: I'm still going to look.

Z: Do you want to ask a librarian?

Q: I'm afraid to.

Z: You're afraid to?

Q: I don't know what the book is called.

Z: How do you describe the book?

[Going to a librarian and asking]

Q: Oh, Excuse me. **Do you have any book where it's like a dog on it, but you can actually feel the fur on it?**

Librarian: Is it a specific book or do you want any book where you can touch?

Q: It is like a certain book. It was over there.

Librarian: Like the board books?

Q: Right over here in this area. I was looking, and it was **red**. It's not this one. **On the cover it had like a little dog house. You could feel on it.**

Librarian: You know... I don't know which one you are talking about. And if you don't know the name of the character, maybe they can look it up down at the information desk.

R: Really?

Librarian: Do you want to go down there and she can look on the computer?

R: yeah. I'll take a look on this computer.

Z: Good job. Not here, I think she means by.

Librarian: You want to go down by Sammy, she's all the way down there.

Q: Should we do that?

R: Yeah.

Z: But down run.

R: I'll look for it.

Q: You know how to work the computer?

R: Yeah.

Q: Why don't we just ask her where it is?

Z: Not here I think. Maybe there I think. They can help you guys. Do you want to ask her?

Q: You do it, R! Ask her!

**Q: Dog house book that we can like feel the dogs fur on it.**

Librarian 2: Oh, that would be with the board books. Against the wall.

Q: Yeah, we saw them but it's not really there. And he put it in here [return box]. And the person took it out.

Librarian 2: Oh, you just returned it.

Q: Yeah.

Librarian 2: You know what? It might be on the cart that the lady's putting the books away on.

R: A book dropped down there.

Librarian 2: I know I saw it. I'm going to get it in a minute, thank you.

R: Okay. Let's find the cart.

Q: Where's that girl anyway? Where's the cart? She might have out it back. Where was it? Over here? Nope. It's not back.

Z: Are you sure that it was there?

Q: Yeah, I'm looking and I can't find that book.

R: It was in that one, that one, or that one.

Q: And I'm looking at them.

**R: No, Q! It had a point and it was pointing up.**

**Q: It had a point up?**

**R: Yeah it was the book was just like a dog house. Look for a point pointing up.**

Z: R, what do you mean point up?

R: Like the book is shaped the same as.

Z: Oh, the book shaped like different.

Q: Yeah! **More like a dog house.**

R: Yeah! **It is like a little on top. Like dog houses.**

Q: It's not there right now.

Z: Ah. I see.

Q: Why don't you tell the lady that, the one over there? Tell her.

Z: Do you mean that book? I think I saw something there?

Q: Where?

Z: Over there.

Q: Yes, Doggy. ["My Dog"]

R: We found it.

Q: Doggy.

R: We found it.

#### 4.2.10. Difficulty

Difficulty or reading level is one of the facets that participants perceived during book selection. Children's libraries often organize books by reading levels. Moreover, some children's books indicate reading level on the book's cover. Participants judged difficulty or reading levels by perceiving the number of pages, reading level indication, font size, titles, or words inside books. These factors helped participants select books. Many participants in this study were still learning how to read. Therefore, whether participants could understand the words in the books or titles mattered.

#### Transcript 4-10. Difficulty

*T: Are you reader one or a reader two yet? [On picture bookshelves for reading level sections, there are signs of reading levels like Reading 1, 2, 3.]*

*S: I can do some reader two.*

*T: Okay. This is reader two and that's reader one.*

*S: What about reader three? I want to see what that's like.*

*T: Oh we already read that one, I read it to you. These, I think you'd be able to read S.*

*S: Oh yeah, I already read that. This is where mommy always looks. [From Pair 10\_1]*

*V: are there like different ones?*

*U: That ones American Girl too. **They'll look really long**, don't they? Are mom's might not like it.*

*Z: Oh you think it's too long?*

*U: Maybe our mom's might not like it or our dads.*

*[...]*

*[V is looking at a displayed book and puts it back.]*

*Z: No? Why?*

*V: **Because it's too long.** [From Pair 11\_3]*

*Z: You think this book is for the older kids?*

*F: Yeah, **for the big kids.***

*Z: How do you know this book is for big kids?*

*F: Because I have good eyes and I'm very smart and I know everything, but really*



*everything, and this looks like a big kid book to me actually.*

*Z: Because why? Because it has a lot of pages?*

*F: Yeah, well some books that can be for kids that have lots of pages, right?*

*Z: That's true, why do you think this book is for big kids?*

*F: Because the pages really look like for big kids and stuff, and it's really like you know, a little, not like, it looks a little weird to me, because-*

*Z: Because it has lots of, what?*

*F: Lots of like stuff*

*Z: Letters?*

*A; yeah, that stuff.*

*Z: Lots of words, right?*

*F: Yeah. [From Pair 3\_1]*

#### 4.2.11. Familiarity

A facet of familiarity is associated with prior experience. Prior experience played a role as a trigger or a token to bring memories related to books, so that participants felt familiar with them. Since prior experience varies from one to another, it is very individual and personalized. However, when it came to analyzing the patterns of prior experience, some factors such as associated media, characters, book covers, series, contents or story, or bookshelves' location in the library were used to recall participant's memory. For instance, a child might have watched a movie or TV series, or had experience with other media involving the same character, such as American Girls, Scooby Doo, or Mary-Kate and Ashley Olsen.

#### Transcript 4-11. Familiarity

*A: "Mary-Kate and Ashley"? Oh! I know who Mary-Kate is. You know these two people? Have you seen "Full House"? ["Full House" is a TV series. Child A recognizes two characters by looking at pictures on a cover]*

*B: No.*

*A: The show?*

*B: I don't know.*

*A: These two people play that girl. I have to show my mom!*

#### 4.2.12. Novelty

Novelty was perceived when books were newly published or participants had not yet read them. Some libraries had a separate book section for books. In addition, new books were identifiable by a colorful sticker on the spine. However, participants hardly perceived stickers on a book spine or a sign pointing at new book. Instead, they showed more interest in novelty by finding books that they had not yet read or by looking for new volumes in familiar series. For instance, series or chapter books include several volumes. Although participants had read some volumes of series, if they found a new or previously unread volume, they wanted to select the books. In this case, participants were usually looking at series' volume numbers.

#### Transcript 4-12. Novelty

*H: That ["A Dragon Christmas"] looks cool.*

*G: We both got the same book.*

***H: But we never read it before.***

***G: Maybe we should read it!***

*H: Yeah.*

*Z: Why do you like this book?*

***G: We've never read it before!***

*H: The dragons look funny.*

*G: Yeah, they do.*

*H: Look at him [a dragon character]! He has a lot of presents.*

*G: It says, "A Dragon Christmas: Things to Make and Do by Loreen Leedy."*

*H: There's a little dragon Santa! [They are looking at a cover and talking about the illustration]*

*G: That's so cute!*

*H: A kitty cat!*

*G: That has nothing to do with Christmas, that's spring!*

*H: That's not Christmas, That's not Christmas, That's not Christmas, That's not Christmas.*

*G: That's not Christmas, That's not Christmas.*

*H: That's Christmas, that's not Christmas.*

*G: There's no such thing as a dragon Santa! [From Pair 4\_1]*

*M: ["The Princess who had Almost Everything"] I Like this book because it looks delicious and um I like all the colors on here. And **something's you can try new things in here.** [From Pair 7\_1]*

*L: See? And then I really like "Tinker Bell" Because I watched the two movies, and these are like new ones, so I really want to watch them.[From Pair 6\_3]*

#### **4.2.13. Recommendation and Award**

Recommendation by peers or siblings influenced participants' perceptions of books. Since participants in each pair were either friends or siblings, both participants knew what kinds of books his or her friend or siblings liked. Therefore, they often picked books for their friends or siblings. Also some participants wanted to read a book that his or her friend picked first. For instance, whenever child R picked a book, his friend, child Q, wanted the same book. In another case, child G and child H in pair 4 often picked two books if the books were same and shelved next to each other. As a part of a recommendation, participants seemed to consider the number of copies so they could share the same reading experience. Another type of recommendation is awards. An award book was also perceived as good by participants. Child Q and R pointed out a gold medal on a book cover of "Kitten's First Full Moon", saying the book must be a good

book because of the medal. A book, “Kitten’s First Full Moon” has several awards including in the ALA Notable Children's Books - Younger Readers Category.

Transcript 4-13. Award

*Q: Okay. It’s a gold medal. [“Kitten’s First Full Moon” has a gold medal in a book cover. A gold medal indicates an award.]*

*R: Yeah.*

*[...]*

*Q: I like this one and one reason is it must be a good book.*

*Z: Oh because of the gold medal on the book?*

*Q: Yeah, cause it won that.*

*[From Pair 9\_2]*



#### 4.2.14. Engaging elements

Engaging elements are interactive materials or components in a book. Some books included folded or over-layered pages or pictures (like in Eric Carle’s picture books), textual materials (like fur in “My Dog”, see Transcript 4-9 for physical characteristics), hidden objects in illustrations (as in “A to Z Mystery Series” or “I Spy Series”), or rhythmical or rhyming narrative styles (like Tikki Tikki Tembo-no Sa Rembo-chari Bari Ruchi-pip Peri Pembo in “Tikitiktembo”). Transcript 4-14 shows examples of rhyming or rhythmical elements in titles, so that participants engaged in singing the titles. These elements enabled participants to engage in reading (see Transcripts 4-14-16). Some engaging elements were related to physical characteristics, whereas other elements were embedded in illustrations or the contents. Physically engaging elements were perceived without prior experience with books, but embedded elements were often recognized due to participants’ prior experience.

## Transcript 4-14. Rhyme and rhythm in title

T: *Yeah. Oh I love Tikki Tikki Tembo [They pick this book together. They recognize this book.] Tikki Tikki Tembooh so Rambo [T is singing]*

T: *It is like, picture books have words but they have pictures on them. Tikki Tikki Tembooh so Rambo. Ching ching ching.*

S: *Okay, I'll ask if we can get this one. There are a lot a lot of picture books.*

T: *[Picks Tikki Tikki Tembo] **I like this book because it has like a big rhyme in it.***

Z: *Oh. Have you ever read this book before?*

T: *Yeah. [From Pair 10\_1]*

S: *[“Boom Boom Go Away!”] I picked this book because I think it looks interesting and it has a person hitting a drum on the front of it.*

Z: *So when you picked this book, did you read the title?*

S: *Boom Boom Boom.*

Z: *Do you like.*

S: *Yeah. [gesturing drumming]*

S: ***Boom Boom Go Away!** [S reads a title rhythmically.] [From Pair 10\_1]*

## Transcript 4-15. Interactive element

D: *“It Came From Ohio”?*

C: *Wait! Actually, I like this one.*

Z: *Why? You just said you don't like it, it's scary.*

C: *Only the inside it's not scary.*

D: *It looks like a comic book, or some kind of fun book. Do you want this one?*

*[They play with a hologram picture on a book cover. Its texture is scratchy]*

Z: *Are you touching? Feel weird?*

D: *I've seen pictures like this and it feels cool.*

C: *How do you make it go away? Go away Go away!*

D: *I think I would like this book*

C: *I want this one [From Pair 2\_1]*

## Transcript 4-16. Interactive element

E: *Both those kind of like there stickers of fairies, and there stickers you can put on like your wall. And the paints like all pink, and that means umm*

F: *I don't really see stickers.*

E: *Umm no there not. Umm because those kind of stickers umm can like can like they don't rip the whole wall cause like in pieces cause those are why those are cool stickers. Cause they really do not, and help the walls not fall apart. Those why those kind of*

*stickers help. [Pair 3\_1]*

#### **4.2.15. Bibliographic Information**

Bibliographic information is basic information that describes books, such as titles, authors, languages, or call numbers. Most frequently, participants perceived book covers. Book covers included much information, from a title and author(s) to pictures. While at the same time perceiving much information from book covers, participants tended not to notice author(s). However, when I asked participants how they thought they could find another book similar to the one they picked, few participants answered that they would look for authors. For the following question, when I asked participants whether they knew who the author was, participants did not know or remember the author's names. The participant's answer might be due to library user education; that is, participants might have been taught to find books by author names. After completing every library visit, I often had a casual conversation with parents. Through the conversation, I realized that some parents have taught participants to find books using author's names.

Language was also one factor that participants perceived during book selection. Many participants could speak a second language, such as German, French, or Spanish. This does not mean that participants specifically looked for books in other languages. Rather, while randomly browsing bookshelves, participants recognized books written in languages that they were able to read.

Call numbers were used to find locations of books. At a library, there were signs of call numbers on each bookshelf. Participants used the information to perceive subjects rather than call numbers. Participants did not know about the *DDC* system.

### 4.3. Emergent vocabularies of Emotion (EVE)

Beak (2012) briefly notes that there are two types of emotional interests: 1) emotional interest from external stimuli, and 2) self-directed emotional interest. Emotional interest also emerged in this study during the children's book selection. Participants expressed emotional interest while perceiving many factors related to book selection. Participant's emergent vocabularies of emotion (EVE) showed experience of feelings or psychological states of emotional interest. Emotional vocabularies included words such as like (don't like), interesting, fun, cool, awesome, wow, happy, scary, etc. Transcript 4-17 shows examples of EVE.

#### Transcript 4-17. Emergent vocabularies of Emotion

*T: Oh, I know where I want to look! S.*

*S: Where?*

*[They move to a section where locates in front of an entrance. This section displays few books]*

*S: Oh here, this looks **good**. [Picks "Twinkle, Twinkle, Little Star"]*

*T: Do you want to get that?*

*S: Yeah.*

*T: Twinkle, Twinkle, Little Star. That is what is called.*

*Z: Why do you pick this book, S?*

*S: Because **the pictures look really interesting**. [Looks at a cover and pictures inside]  
[From Pair 10\_1]*

[E is pulling a book, "Special Effects," looking at a cover, and then putting it back.]  
 Z: No? It is not interesting? Can you tell me why it's not interesting, E?  
 E: Because it kinda **looks scary**.  
 F: What does?  
 Z: Do you want to show it to F?  
 F: [By looking at a cover] Woooo, it does **look scary**.  
 E: It's like half of a monkey and half of a robot. [Describing pictures in a book cover]  
 F: **It looks scary** because it's trying to show you.  
 E: That's why **I don't like scary books**  
 F: I'm going to close this because of this [A picture inside of a book jacket]  
 E: What?  
 F: This!  
 E: Yeah you better! It's **creepy!**  
 F: What is this? I just want to look at this book.  
 [They are looking inside of the book.]  
 E: It's **too creepy**.  
 F: Look at this!  
 E: What is that? **It looks creepy, too creepy!**  
 Z: We can find another book.  
 F: I've seen this in a movie. There was like a storm.  
 E: Like that one?  
 F: Yeah and everyone like almost died.  
 E: Well there was this movie. And that's creepy and so is that.  
 F: Look at!  
 E: What is that? Now **that is creepy!**  
 F: No, it's **beautiful!**  
 E: No, it's **creepy!**  
 Z: Okay, do you want to find another book?  
 E: I hate the hands [in an illustration]. When we went to the museum  
 F: Maybe this is the man's hands turning into a wolf like this to this to this. How did it turn into a wolf?  
 E: I saw that movie were the girl turns into a wolf because she stepped onto a wolf thing.

Beak's pilot study (2012) does not show the relationships between EVE and other cognitive factors and facets identified in previous sections. For this study we looked for those emergent emotional vocabularies, and then analyzed what EVE referenced. Referents of EVE were cognitive factors that participants perceived during book selection.



Table 4-4 shows the top thirty codes that co-occurred with emotional vocabularies. The codes were used during the open coding stage in the data analysis process. The co-occurrence was analyzed and generated by a function of a matrix coding query in the Nvivo 10. The list was ordered by the frequency of co-occurrence.

Table 4-4. Top 30 codes occurring with emotional vocabularies (Top: Higher frequency)

Pictures
Pictures on a cover
Title
Previous experience
Personal relationship
Character(s)
Cover
Subject
Guessing aboutness
Things that a child likes
Series
Pictures inside of a book
Character's name
Interpreting or guessing a story through illustrations
Genre
Plot & Story
Characters in pictures
Related media
Recommendation
Engagement element
Color
Chapter books
Reading level
New book (Novelty)
Back of a cover
Picture book
Series' volumes or orders
# of Copies
Physical characteristic
Author(s)

Pictures or pictures on a book cover were most strongly associated with emotional vocabularies. Title, previous experience, characters, subjects, and series were also perceived with emotional expression. A physical characteristic was relatively less associated with emotional expression, but that might be attributed to the fact that few books had such physical characteristics. In other words, during book selection throughout the library visits, children did not find many books having unique physical characteristics, such as a dog house shape. The number of the co-occurrence frequency between cognitive factors and facets, which were based on codes in Table 4-4, and emotional vocabularies, might not represent the importance of the cognitive factors and facets.

In order to understand the relationship among the cognitive factors, the codes cluster analysis was used by Nvivo 10. For the codes cluster analysis, the codes in Table 4-4, and an emotional vocabularies code were included. Figure 4-3 shows how emotional vocabularies were associated with other cognitive factors in a multidimensional scaling (MDS) plot. This plot was generated based on a dendrogram in Figure 4-4.

Figure 4-3. Multidimensional scaling plot of coding cluster by similarity

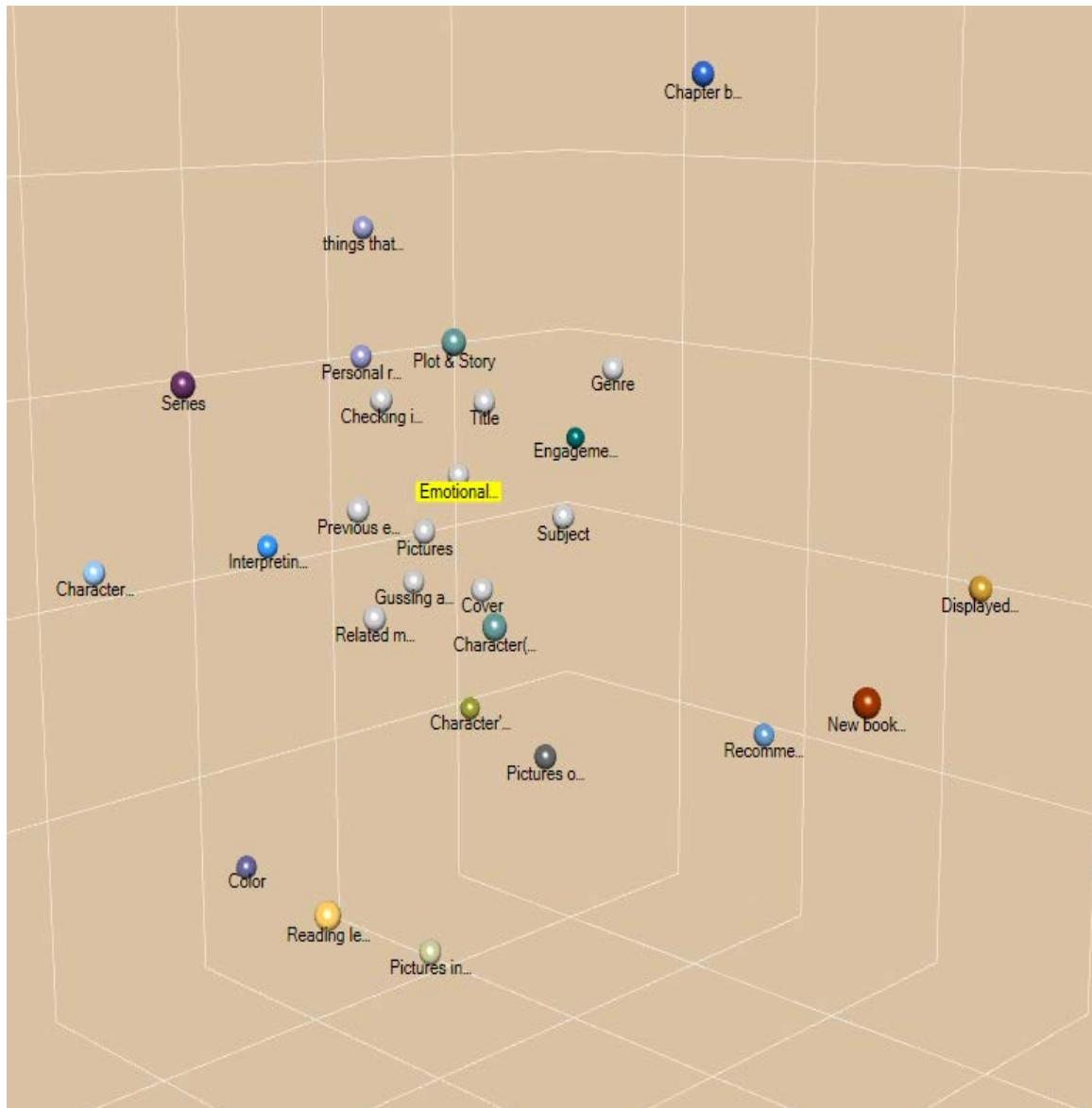
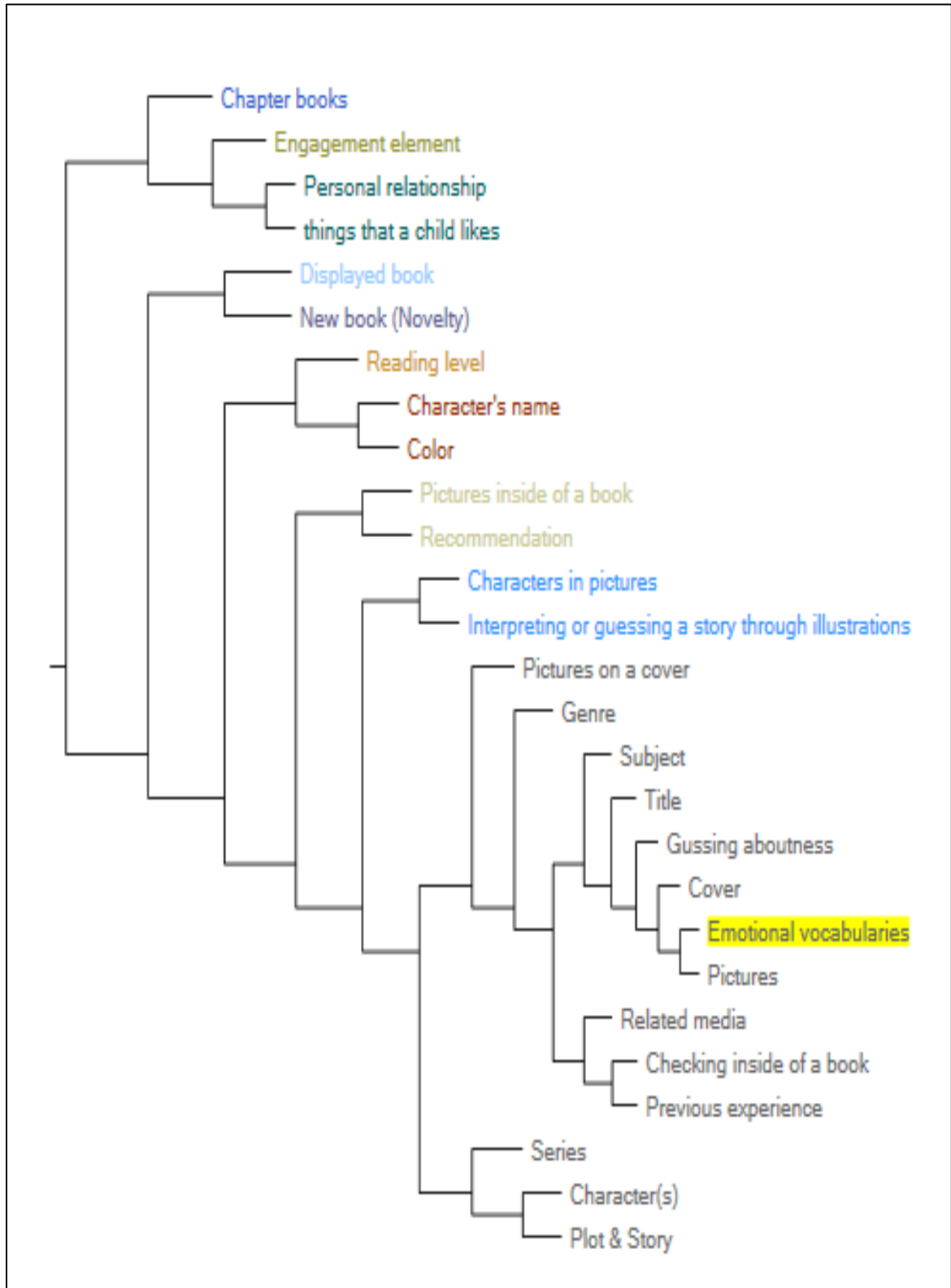


Figure 4-4. Dendrogram of coding cluster by similarity



As an MDS plot shows, emotional vocabularies play a central role in the relationship among the children's cognitive factors and facets. A dendrogram shows that pictures are most directly associated with emotional vocabularies. In addition, pictures from book covers and titles were used to guess book subjects. Other factors such as book cover, title, subject, characters, plot, series, genre, etc. were also connected with emotional vocabularies. In other words, when participants perceived those factors, they experienced emotional states.

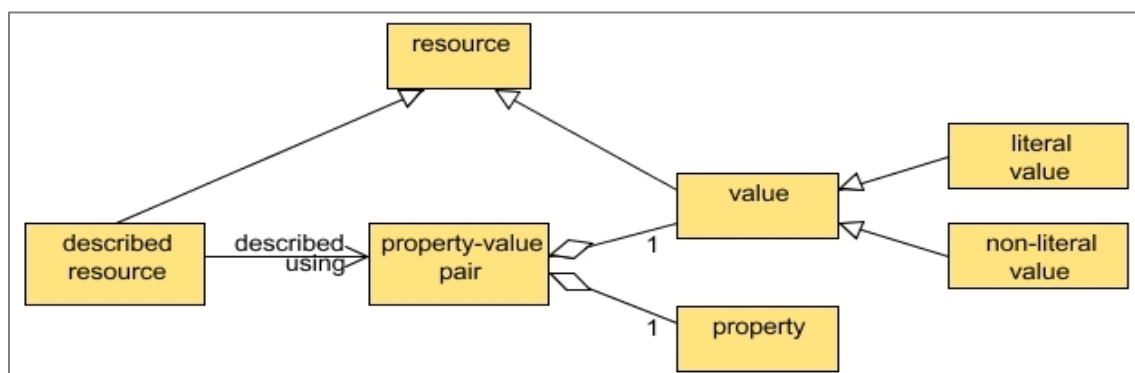
## Chapter 5: A child-driven metadata schema

This chapter introduces a child-driven metadata schema (CDM) based on the findings of children's cognitive processes during book selection reported in Chapter 4. First, this chapter explains the scope and main terms of a CDM based on the Dublin Core Metadata Initiative (DCMI). The format of a CDM is influenced by DCMI. The terms that structure the format of this CDM are adopted from DCMI Metadata Terms (<http://dublincore.org/documents/dcmi-terms/>) and DCMI Abstract Model (<http://dublincore.org/documents/abstract-model/>). In the second section, the ways in which the cognitive factors and facets found in Chapter 4 were interpreted in order to become child-driven metadata elements is described. The third section suggests child-driven metadata elements with definitions of each element. Lastly, two exemplary metadata records were introduced by comparing the CDM with Dublin Core (DC) version metadata records from the OCLC Connexion database.

### 5.1. Introduction

The purpose of this study is to create child-driven metadata elements with metadata elements (or properties) that support description, access, and other functions. In other words, a CDM focuses on the development and definition of various descriptive metadata elements rather than suggesting values of elements. The terms such as elements (properties), values, and terms, used in a CDM are defined by the DCMI Metadata Terms and DCMI Abstract Model.

Figure 5-1. DCMI Resource Model



The DCMI Abstract Model explains the differences between elements and values. Figure 5-1 shows how a resource is described. A resource is a described resource and is a value. A described resource is described by using a property-value pair. A property-value pair contains at least one property and one value. Values can be either literal or non-literal. A property-value pair is a basic concept of the DCMI resource model. The DCMI Abstract Model defines property and values: Property is “a specific aspect, characteristic, attribute, or relation used to describe resources”<sup>4</sup>, which is interchangeable with Elements. Value means that “the physical entity, conceptual entity or literal (a resource) that is associated with a property when a property-value pair is used to describe a resource.”<sup>5</sup> In a context of a CDM, a value associated with a property of a character is Scooby Doo (a physical entity). Based on these definitions, this study focuses on developing properties reflecting the children’s cognitive processes to describe children’s resources rather than developing values or other encoding schemes. A format of a child-driven metadata schema consists of the following attributes in Table 5-1. Furthermore, to be consistent with terms between property and element, the term element will be used through the rest of the study.

<sup>4</sup> 7. Terminology in DCMI Abstract Model. <http://dublincore.org/documents/abstract-model/>

<sup>5</sup> 4. Values in DCMI Abstract Model. <http://dublincore.org/documents/abstract-model/>

Table 5-1. Attributes in a CDM

Attribute	Definition
Element Name	The human-readable label assigned to the term.
Definition	A statement that represents the concept and essential nature of the term
Comment	Additional information about the term or its application.
Refinement	A Property of which the described term is a Sub-Property.
Value Type	Possible type(s) of value for an element such as free text, constrained format, controlled vocabularies, or image.

Some attributes in a CDM such as an element name and its definition are required, whereas other attributes are additional if applicable. The value type attribute is added in order to help understand the nature of values in elements, but it does not suggest specific languages or vocabularies for those elements. In other words, there are many standard controlled vocabularies such as *LCSH*, *Sears Subject Headings*, or *MeSH* for a subject element. However, CDM does not suggest what languages or vocabularies should be used for elements.

## 5.2. Operationalizing cognitive factors for CDM

Child-driven metadata elements were developed based on the findings of the children's perceptual cognition during book selection. In addition to the findings reported in Chapter 4, this study also referred to a pilot study of the current research with 6 children (Beak, 2012). From two studies, many perceptual and cognitive factors and facets were identified. However, not every factor and every facet were used to develop a CDM. Some factors and facets such as personal goals, previous experience, or emotional experience were different for all participants. Therefore, instead of directly adopting these factors



and facets to a CDM, the study modified the cognitive factors and facets for the sake of the development of operational metadata elements. In other words, the children recalled previous experiences to induce familiar feelings regarding a book. Previous experience was perceived through more operational factors such as characters, pictures, or related resources such as movies. Therefore, for this CDM I sought to use operational factors in order to develop child-driven metadata elements rather than using the cognitive factors and facets described in the previous chapter.

### 5.3. Child-driven metadata elements

Elements are introduced by a class, “a group containing members that have attributes, behaviours, relationships or semantics in common.”<sup>6</sup> Classes are in bold, italic, and uppercase, and elements are bold with sentence case. Elements not categorized by class are alphabetically ordered at the end. Table 5-2 shows child-driven metadata elements with definition and attributes.

Table 5-2. Child-Driven Metadata Elements

<b><i>STORY</i></b>	
Definition	The theme of the resource.
Comment	Story in fiction or picture books can be described by a major plot or summary.
Value Type	Free text
<b>Storyline</b>	
Definition	Thematic narrative description of the resource. An account of the resource.
Comment	Storyline or major plot comes from summary, abstract, or review of the resource. It is more likely to be represented with narrative style rather

<sup>6</sup> 7. Terminology in DCMI Abstract Model. <http://dublincore.org/documents/abstract-model/>

Value Type than using authorized subject headings.  
Free text

**Story setting: when**

Definition The temporal setting when a story of the resource takes place.  
Refinement Story setting  
Value Type Free text, Controlled vocabularies

**Story setting: where**

Definition The spatial setting where a story of the resource takes place.  
Refinement Story setting  
Value Type Free text, Controlled vocabularies

**Subject**

Definition The topic of the resource.  
Value Type Controlled vocabularies

**Table of content**

Definition A list of subunit of the resource.  
Value Type Free text

**CHARACTER**

Definition A description related to main character(s)  
Comment Any descriptive information like appearance of characters can be provided. For character's gender and name, see Character's gender and Character's name elements.  
Value Type Free text

**Character's name**

Definition A name given to the main character(s) in the resource.  
Value Type Free text

**Character's gender**

Definition A gender of the main character(s) in the resource.  
Value Type Constrained format

**Character's origin**

Definition A title of the resource that includes character(s).  
Value Type Free text

**Character's image**

Definition An image of main character(s) in the resource.  
Value Type Image

**ILLUSTRATION**

Definition A representative image of illustration in the resource

Comment	Recommended best practice is to provide a front book cover's image.
Value Type	Image
<b>Color</b>	
Definition	A description of colors dominant in a front book cover.
Value Type	Constrained format
<b>Objects</b>	
Definition	A description of objects in a front book cover.
Comment	If an object is a representative character, use a class of Character.
Value Type	Free text
<b>Format of illustration</b>	
Definition	The format of illustration in the resource.
Comment	A format of illustration includes photography, pictures, cartoon, etc.
Value Type	Constrained format

### ***PHYSICAL CHARACTERISTIC***

Definition	A description related to physical characteristic in the resource.
<b>Book shape</b>	
Definition	A description of the material or physical carrier of the resource.
Comment	Recommended best practice is to describe if the physical carrier of the resource is not designed traditionally.
Value Type	Free text
<b>Textured material</b>	
Definition	A description of textured material included in the resource
Value Type	Free text

### ***UNDERSTANDABILITY***

Definition	Indicators and information that can be used to judge difficulty of the resource.
<b>Length</b>	
Definition	A number of pages or indicators for length of the resource.
Comment	Recommended best practice is to categorize length of books by short, medium, or long.
Value Type	Constrained format
<b>Reading level</b>	
Definition	A reference to a reading level for the resource is intended or useful.
Comment	Recommended best practice is to categorize reading levels by easy reader, beginner, intermediate, or advanced.
Value Type	Constrained format

<b>Age range</b>	
Definition	A reference to an age range for whom the resource is intended or useful.
Value Type	Free text
<b>Grade level</b>	
Definition	A reference to a grade level for whom the resource is intended or useful.
Value Type	Free text
<b>Award</b>	
Definition	A reference to an award that the resource has been given.
Comment	Recommended best practice is to provide an image that represents an award like a gold medal.
Value Type	Free text
<b>Creator</b>	
Definition	An entity primarily responsible for making the resource.
Comment	Creator includes writer, illustrator, or editor.
Value Type	Controlled vocabularies
<b>Engagement element</b>	
Definition	An element encouraging children to engage in the resource.
Comment	Recommended best practice is to categorize engagement elements in a broad group such as riddle, folded or over-layered pages, hidden pictures or letters, textured materials, or stickers. Or a description of an engagement element can be provided.
Value Type	Free text
<b>Language</b>	
Definition	A language of the resource.
Value Type	Constrained format
<b>Recommendation</b>	
Definition	A reference to a recommendation by peers, teachers, librarians, or parents.
Comment	Recommended best practice is to provide a recommendation statement that can be based on a circulation rate of a local library, rating from book reviews, or opinions from teachers, peers, librarians, or parents.
Value Type	Constrained format
<b>Related resource</b>	
Definition	A reference to a related resource.
Comment	Recommended best practice is to provide a type and a title of a related resource like Movie: <i>Arthur's Missing Pal</i> .
Value Type	Free text
<b>Release date</b>	
Definition	A release date of the resource.

Comment	To inform that the resource is new to a collection of a local library, provide either an actual date for releasing the resource or use an indicator like New Book.
Value Type	Constrained format
<b>Series</b>	
Definition	A name given of the series and a numbering of the resource within the series “A statement identifying a series to which a resource belongs and the numbering of the resource within the series.” (RDA)
Value Type	Free text
<b>Title</b>	
Definition	A name given to the resource.
Value Type	Free text
<b>Tone</b>	
Definition	The mood of the story in the resource.
Comment	The psychological states or experiences of feeling that the resource evokes in the reader.
Value Type	Constrained format

Five classes and thirty three metadata elements were named and defined. Some elements such as title, creator, and language are commonplace, and have already been defined by currently existing metadata schemas such as DC, AACR2, and *Resource Description and Access (RDA)*. Although we do not here consider the interoperability of a CDM with other current schemas, other metadata schemas were referenced in order to define the common elements.

In terms of naming elements, element names were created for the purpose of describing children’s resources in light of a child’s point of view, not to be directly used as labels for search interfaces for children. Selecting elements for a browsing searching interface and

labeling elements in the interface might need to be modified by a child-friendly vocabularies and the purpose of a local library.

#### **5.4. Metadata record example with child-driven metadata elements**

This section shows two examples of metadata records for two books: 1) *My Dog*, and 2) *Locked in the library!* Each book was described with two metadata records: One metadata record described with child-driven metadata elements, and the other metadata record described with DC elements. Two metadata records with DC elements from two books were collected from the OCLC Connexion web interface in order to compare them with metadata records described with the child-driven metadata elements. The metadata records from OCLC Connexion were collected on March 13, 2014. The books used in the following examples were selected in order to highlight the uniqueness of CDM. When it comes to labeling metadata elements in a metadata record, two examples use the original names of elements, without considering how CDM elements are labeled in the public view of an OPAC interface.

##### **5.4.1. Example 1: *My Dog***

The first example is the book *My Dog* written by Angela Joy and illustrated by Nicola Slater. This book was mentioned in Chapter 4 to describe children's cognitive facets of physical characteristics and engagement elements. Unique characteristics are that the book is shaped like a doghouse and includes fabric patches representing dog fur. By

using this book as an example, two metadata records are compared.

Figure 5-2. Book cover of *My Dog*

A metadata record example 5-1 is from OCLC Connexion. A metadata record example 5-2 is created with child-driven metadata elements.



#### Metadata Record Example 5-1. OCLC Connexion record for *My Dog*

(number: 56128259)

- > Title: My dog /
- > Identifier.LCCN: 2004017630
- > Identifier.ISBN: 1589257596 (hardcover)
- > Identifier.ISBN: 9781589257597 (hardcover)
- > Contributor.namePersonal: Slater, Nicola, • ill.
- > Creator.namePersonal.MEntry: Joy, Angela.
- > Date.issued.MARC21-Date: 2005
- > Description.note: Includes fabric patches representing dog fur.
- > Description.note: Shaped like a doghouse with die-cut opening in front cover.
- > Description.note: Cover title.
- > Description.summary: When Joe's mother takes him to pick out a dog, she suggests many different ones, but Joe knows right away which is the right dog for him.
- > Format.extent: 1 v. (unpaged) : • col. ill. ; • 28 cm.
- > Language.ISO639-2: eng
- > Publisher: Tiger Tales,
- > Publisher.place: Wilton, CT :
- > Subject.class.LCC: PZ7.J824 • Jo 2005
- > Subject.class.DDC: [E]
- > Subject.topical.LCSHac: Dogs • Fiction.
- > Subject.topical.LCSH: Dogs • Fiction.

The record from OCLC Connexion used 10 different metadata elements with 9 different refinements to describe *My Dog*. Information about doghouse shape and fabric patches were described in a description element with a note refinement. A description element

cannot function as an access point in a browsing search. Beak (2011) pointed out the limitation of the note field in AACR2+ in relation to children's searching behavior and the nature of a browsing search interface. In other words, information described in a description element could be searched by keyword, but could not be functioned as category-based browsing search.

#### Metadata Record Example 5-2. CDM metadata record for *My Dog*

<p><b>Title:</b> My Dog  <b>Illustration:</b> [Image of a front cover]  <b>Object:</b> Boy, Dog  <b>Book shape:</b> Shaped like a doghouse with die-cut opening in front cover.  <b>Color:</b> Red  <b>Tone:</b> Fun  <b>Engagement element:</b> Textured material. Includes fabric patches representing dog fur.  <b>Textured material:</b> Fabric patches  <b>Format of illustration:</b> Picture  <b>Storyline:</b> When Joe's mother takes him to pick out a dog, she suggests many different ones, but Joe knows right away which is the right dog for him.  <b>Subject:</b> Dogs  <b>Creator:</b> Joy, Angela (author). Slater, Nicola (illustrator)  <b>Length:</b> Short (14 pages)  <b>Reading level:</b> Beginner  <b>Age range:</b> 4 and up  <b>Grade level:</b> Preschool and up  <b>Recommendation:</b> ★ ★ ★ ★ ★  <b>Language:</b> English</p>
---

CDM allows a metadata record to describe different aspects of the book. Although many online catalogs provide the front book cover's image along with bibliographic information, they do not describe information listed on front book covers. Given that children perceived many aspects of books through a front cover, simply displaying the cover in an online catalog may not be sufficient to represent it. In this sense, CDM

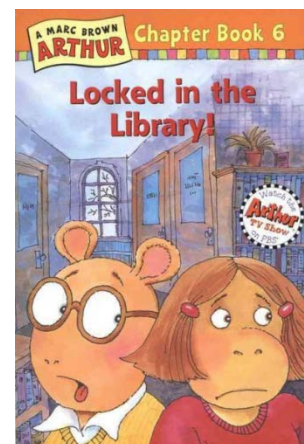


provides more information associated with book covers through metadata elements such as color, book shape, or object. In addition, one of the most memorable characteristics that the children recalled about this book was fur, a textured material. While DC describes the textured material information with a Description.note element, CDM describes it with metadata elements of a textured material and an engagement element. It allows books to be gathered by textured materials or whether or not a book includes an engagement element.

#### 5.4.2. Example 2: *Locked in the library!*

The second example shows a famous character for children, Arthur Read, who was created by Marc Tolon Brown. There are several series of *Arthur* such as the *Arthur chapter books series*, *Arthur adventures series*, and *Arthur good sports chapter books Series*. As the series titles show, the character's name is a part of the title. Moreover, most titles of individual books in series have the character's name, but not always. The character, Arthur, is usually illustrated wearing a yellow sweater, blue jeans, big round glasses, and red-and-white sneakers. There is also a TV series, *Arthur*, based on books of the *Arthur* book series and created by the Public Broadcasting Service (PBS). PBS provides information about characters in the *Arthur* series and other educational materials for children. The following examples describe a particular volume of the series,

Figure 5-3. Book cover of *Locked in the library!*



titled *Locked in the library!* Metadata record example 5-3 is a record from OCLC Connexion, and metadata record example 5-4 is created with CDM elements.

Metadata Record Example 5-3. OCLC Connexion record for *Locked in the library!*

(number: 733725622)

- > Title: Locked in the Library.
- > Identifier.LCCN: 97075973
- > Identifier.ISBN: 9780316115575
- > Identifier.ISBN: 0316115576
- > Identifier.ISBN: 9780316115582 pbk
- > Identifier.ISBN: 0316115584 pbk
- > Creator.namePersonal.MEntry: Brown, Marc Tolon.
- > Date.issued.MARC21-Date: 1998
- > Description.summary: Although Arthur and Francine aren't speaking to each other, they must find a way to set aside their differences when they are locked in the library after it closes.
- > Format.extent: library.
- > Language.ISO639-2: und
- > Publisher: Little, Brown & Co.,
- > Publisher.place: New York :
- > Relation.isPartOfSeries.MARC21-490: Marc Brown Arthur chapter book ; • 6
- > Relation.isPartOfSeries.MARC21-830: A Marc Brown Arthur chapter book ; • 6.
- > Subject.class.LCC: PZ7.B81618 • Lo 1998
- > Subject.class.DDC: [E]
- > Subject.topical: Arthur series.
- > Subject.topical: Libraries--juvenile.
- > Subject.topical: Chapter Books.
- > Subject.topical.LCSH: Libraries • Fiction.
- > Subject.topical.LCSH: Schools • Fiction.
- > Subject.topical.LCSHac: Schools • Fiction.
- > Subject.topical.LCSHac: Libraries • Fiction.
- > Subject.topical.LCSHac: Friendship • Fiction.

Metadata Record Example 5-4. CDM metadata record for *Locked in the library!*

Title: Locked in the library!  
**Illustration:** [Image of a front cover]  
**Character's name:** Arthur Read  
**Character's gender:** Boy

**Character's name:** Francine Alice Frensky

**Character's gender:** Girl

**Character's image:**



**Character:** “[Arthur] wears round brown glasses, a yellow V-neck sweater, a white shirt underneath, plain jeans, a brown belt, a white undershirt, white briefs, white socks, and red-and-white sneakers.” (from Arthur Wiki, [http://arthur.wikia.com/wiki/Arthur\\_Read](http://arthur.wikia.com/wiki/Arthur_Read))

**Format of illustration:** Pictures

**Color:** Yellow

**Tone:** suspenseful adventure

**Storyline:** Although Arthur and Francine aren't speaking to each other, they must find a way to set aside their differences when they are locked in the library after it closes.

**Story setting (Where):** Library

**Subject:** Friendship

**Series:** A Marc Brown Arthur Chapter book, 6

**Related resource:** Arthur TV Show on PBS, Season 1, Episode 6a

**Creator:** Brown, Marc (author)

**Length:** Medium (58 pages)

**Reading level:** Intermediate

**Age range:** 6 - 9

**Grade level:** 1 - 4

**Recommendation:** ★ ★ ★ ★ ★

**Language:** English

As the two metadata records show, a CDM metadata record example is likely to describe information related to the character, such as character's name, gender, images, and description of appearance. Some information references a Wiki website for the Arthur TV series (<http://arthur.wikia.com/wiki>). A second main character, Francine Alice Frensky, is also described in a CDM record. Therefore, a child might find a book having two characters, Arthur and Francine. On the other hand, in the OCLC Connexion record, a character's name appears only in the Relation element (or Series entry in MARC21 format. It might allow users to search books containing the *Arthur* character through a

keyword search. However, using `Relation.isPartOfSeries` element does not gather all books with the *Arthur* character. In addition, a specific place, a library, is a main setting, so a CDM record provides a spatial setting. A spatial setting might be used as an important cue when a child recalls a memory of the book and uses it as an access point for searching. The OCLC Connexion record uses `Subject.topical` element to describe spatial setting. However, libraries and schools are not topical subjects. Therefore, using `Subject.topical` element does not disambiguate whether the book is about libraries or whether the book takes place in a library. In conclusion, current cataloging standards like *DC* or *AACR2* focus on describing books with a more resource-centered perspective, whereas CDM elements describe books with a more user-centered perspective.

## **Chapter 6: Discussion: Grounded theory of holistic understanding of children's cognitive processes during book selection**

This chapter is the last stage of grounded theory, which grounds the emergent theory in the existing literatures. Mansourian (2006, p. 388) describes this stage:

GT [Grounded Theory] is an inductive process because the theory emerges through the dataset inductively. However, after emergence of the theory it can be deductively examined with existing theories in the literature to find out how compatible or different the emergent theory is with the literature body.

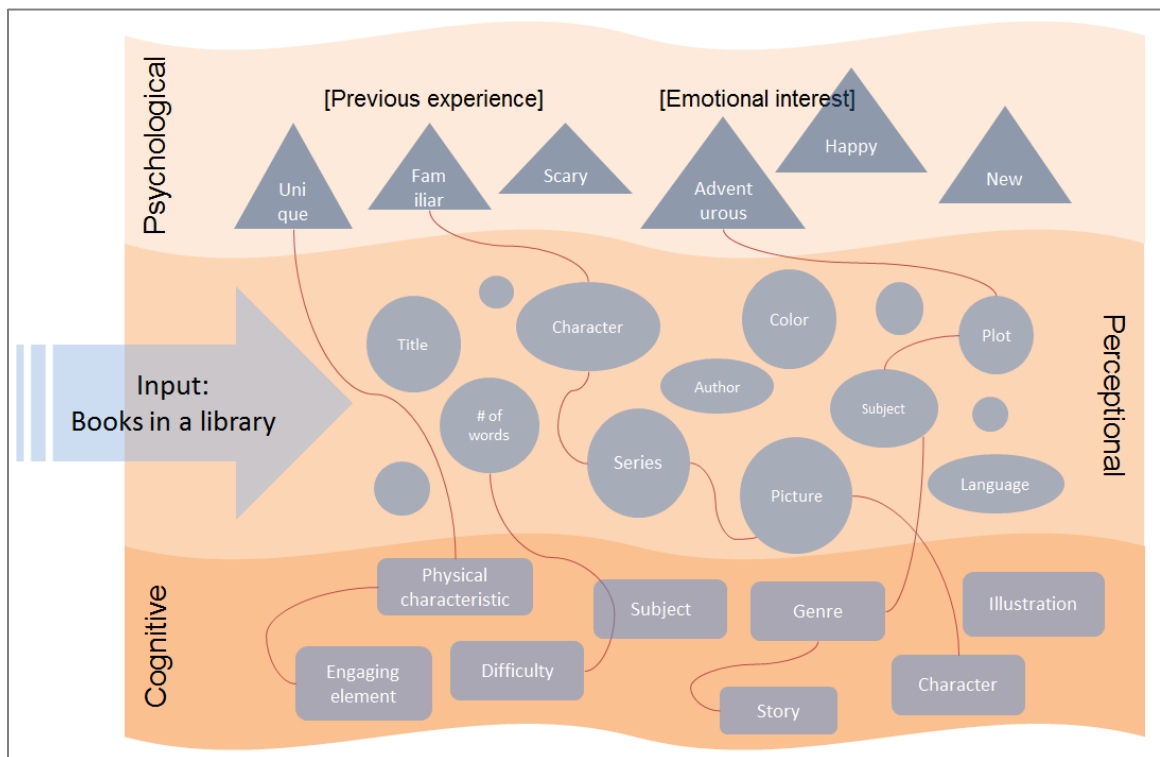
In this chapter, I address the broader research questions, what metadata elements do children like to use, and what elements should a child-driven metadata schema include, by describing holistic understanding of the children's perception and cognition during book selection using three levels of cognitive processes: 1) psychological, 2) perceptual, and 3) cognitive. Based on the phenomena of the children's cognitive processes, the purpose of this chapter is to discuss how the findings of this study are interpreted by the literature in information processing theory, attention, and emotion.

### **6.1. Holistic understanding of children's cognitive processes**

Children's cognitive processes during book selection can be interpreted on three different levels: 1) psychological, 2) perceptual, and 3) cognitive (see Figure 6-1). The first level is associated with the psychological state of emotion or affection. Psychological

experience includes attention, emotion, purpose, or intention that is consciously or unconsciously perceived at the psychological level. These psychological experiences of feeling influenced the children's perception during book selection. In particular, children's previous experience and emotional interest often created a boundary of perception like a lens to see a phenomenon. There are so many books and so much information in a library. However, somehow previous experience allows the children to look for certain books.

Figure 6-1. Three levels of the children's cognitive processes during book selection



The second level of the children's cognitive processes during book selection is a perceptual process. When the children came to a library and interacted with books, they started to perceive various aspects of the books, such as colors, characters, pictures, shape, etc. that were identified in Chapter 4. The difference from the psychological level is that the perceptual level focuses on the children's physical interaction or reaction with books rather than emotion or attention.

The third level of the children's book selection behavior is the cognitive process. By looking at books and perceiving factors of books, the children considered certain aspects of books such as stories, subjects, characters, genres, series, difficulty, engagement elements, etc. While at the second level the children perceived cognitive factors by emotional interests or psychological experiences, in the third level the cognitive facets were interpreted by me through observing what the children tried to consider and know about books through factors. For instance, the children checked the number of pages of a book or read a title or a few words inside of the book in order to perceive a level of difficulty or reading level. A concrete factor the children perceived was the number of pages, titles, or words. However, what they considered was an abstract facet of difficulty.

These levels in the children's cognitive processes during book selection are not independent; they are intertwined. Three different levels do not mean a linear process. Rather, the cognitive processes are more dynamic. For instance, sometimes the children perceived some factors first and then those factors evoked a psychological experience. Or

the children perceived abstract aspects of books, cognitive facets, like physical characteristic first, so that they were describing a specific concrete aspect of the book, a perceptual factor, such as the shape of a book.

Based on general and holistic understanding of the children's cognitive processes during book selection, the following sections discuss how previous literature in information processing theory, attention, and emotion can be connected with the children's cognitive processes.

## **6.2. Information processing theory (IPT) and Attention**

The field of cognitive psychology has developed many theories including Information processing theory, learning theory, motivation theory, developmental theory, etc. LIS has adopted many theories from Cognitive Psychology to interpret user's information seeking and searching behaviors, information retrieval, or human-computer interaction. IPT examines the cognitive processes regarding the perception, storage, encoding, and retrieval of information, focusing on how people perceive the stimuli around them, how people store the stimuli in their memory, and how people recall the memory (Miller, 2011). As the scope of information processing theory explains, the cognitive processes in an information processing theory are closely associated with memory systems. This section briefly describes the three main components of IPT and the cognitive process occurring during the information processing. It then discusses how IPT can be interpreted in children's book selection behaviors in a knowledge organization context.



IPT consists of three memory systems: sensory register, working (or short-term) memory, and long-term memory. Figure 6-2 shows a basic model of information processing.

Figure 6-2. Basic model of cognitive processes (Ormrod, 2012)

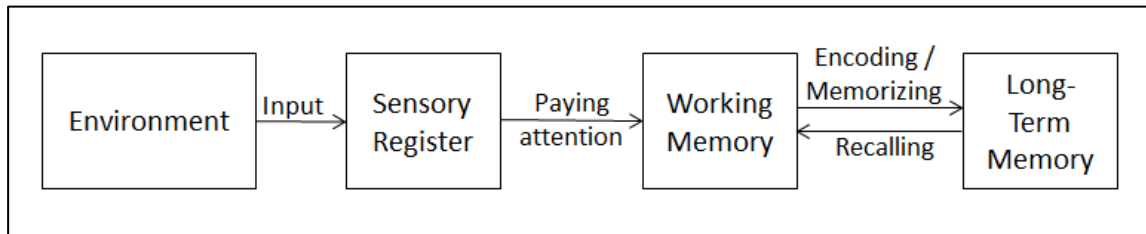


Table 6-1 shows a summary of the characteristics of each memory system.

Table 6-1. Characteristics of each memory system (Ormrod, 2012)

	Sensory register	Working memory	Long-term memory
Capacity	Large	Limited $7 \pm 2$ chunks	Unlimited
Forms of storage	Usually visual or auditory form	Various forms (auditory, visual, spatial, and tactile)	Declarative knowledge or Procedural knowledge / Explicit memory or Implicit memory
Duration	Very short and temporary	Short	Permanent

### 6.2.1. Sensory register

We interact with the environment surrounding us, and receive many inputs from that environment. The sensory register is where incoming stimuli from a person's environment are temporarily held, which is the earliest cognitive process. The stimuli are usually sensed visually or auditorily. At this point in the cognitive process, the stimuli are raw pieces of information that have not been understood by or are not meaningful to the

individual. A good example of attention is the cocktail party phenomenon studied by Colin Cherry (1953). People at a party hear noisy sounds and see many things. However, people often can hear their names better than other sounds in a noisy party, while other noise is ignored. This phenomenon is called the cocktail party phenomenon. These sensory stimuli are received from the environment to the sensory register without making in effort to obtain these pieces of information or stimuli. We might not even notice that we are hearing, seeing, and smelling. Therefore, all stimuli do not have meaning to an individual. The cognitive process at the sensory register occurs unintentionally and some stimuli held in the sensory register selectively moves into the working memory.

### **6.2.2. Working memory**

Working memory is the place where active thinking occurs. Information people are currently using is held in the working memory. Because the working memory stores information for a short time, it is also called the short-term memory. Working memory can hold information from both the sensory register and long-term memory. Working memory “identifies information in the sensory register that warrants attention, saves the information for a longer period of time, and processes it further. It might also hold and process information that it retrieves from long-term memory information that will help in interpreting newly received environmental input” (Ormrod, 2012, p. 168). Information traveling from the sensory register and information traveling from and to the long-term memory are processed differently.

### **6.2.3. Long-term memory**

The long-term memory stores information for a longer period (or permanently) and its capacity is unlimited. The working memory stores information currently in use or in consciousness. The long-term memory, in contrast, stores knowledge in organized structures that allow information to be retrieved later. The long-term memory also processes information in various ways to organize information and to make sense of it. In this respect, meaningful learning is often considered as a cognitive activity to construct knowledge in the long-term memory.

### **6.2.4. Attention in IPT**

As figure 6.1.1 shows, information processing occurs differently between the sensory register and the working memory or between the working memory and the long-term memory. Put simply, between the sensory register and the working memory, attention influences information processing. Between the working memory and the long-term memory, there are two types of cognitive processes; encoding and retrieving. Encoding refers to the cognitive process occurring when information is transferred from the working memory to the long-term memory. In contrast, when information that has been already stored in the long-term memory is recalled to the working memory, retrieval processes occur.

The children paid attention to different aspects of books than that mainly described in library catalogs. In other words, the children perceived some factors such as characters, book cover's colors, or physical characteristics more often than bibliographic information such as titles, authors, or publishers, described in most current library catalogs. It shows that attention influences the children's perception. Therefore, in order to interpret the children's book selection behaviors in the context of IPT, this section focuses on information processing between the sensory register and the working memory. This is attention.

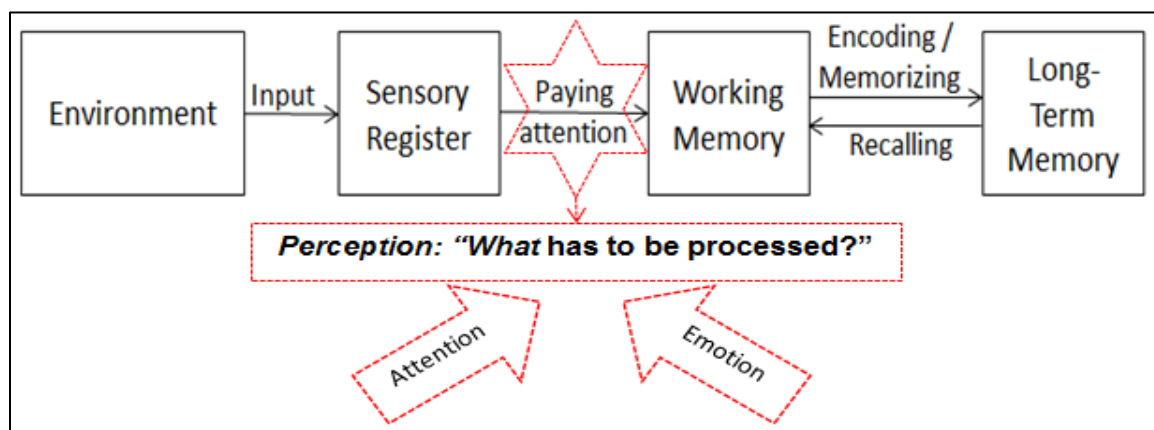
Attention, as an intuitive and initiative cognitive process, plays a vital role during information processing. The influential American psychologist William James noted that attention functions to decide what has to be processed (James, 1980). Although people receive various stimuli (raw information) from the environment, only some information is moved to the working memory by attention. This is because people pay attention to certain information (James, 1980; Cowan, 1995).

In Chapter 2, I explained the relationship between representation of information and expression of users in a knowledge organization context (see Figure 2-2). When it comes to users' expression, Beak (2012) describes three cognitive processes involved in users' expressions: perception, categorization, and naming. Information processing theory accounts for a series of information processing regarding how people perceive (attention), organize (encoding), and retrieve information. The cognitive process in users'

expressions and the series of processing in information processing theory seem to share some similar cognitive processes.

Perception is about what information is to be perceived and processed. In other words, what aspects of books are perceived or processed by children? In this study I identified the aspects of books that the children perceived and used the cognitive factors to develop child-driven metadata elements. Now let's look at the figure of a basic model of IPT again (see Figure 6-3).

Figure 6-3. Attention and Emotion Factors in Information Processing



The children interacted with books at libraries (environment) and many data of books such as title, author, publisher, book cover, pictures, and so on, were input to the sensory register. However, only certain aspects of book information were processed and moved to the working memory because of the influences of the children's attention and emotion. In

addition, Ormrod (2012) notes that “even when people pay attention to a particular stimulus, they don’t necessarily attend to its most important aspects” (p. 163). It means that attention directs children and adults to perceive certain information when they are looking at the same book, but information perceived might be different.

Generally speaking, there are several factors influencing attention, such as emotion, personal significance, novelty, social cues, motion, size, intensity, or incongruity. Table 6-2 summarizes descriptions of each factor by quoting from Ormrod (2012, p. 165-167).

Table 6-2. Factors influencing attention (Adopted from Ormrod, 2012, p. 165-167)

Factors influencing attention	Description
Emotion	“Stimuli with strong emotional associations attract attention”
Personal significance	“the meaning and relevance people find in an object or event”
Novelty	“Stimuli that are novel or unusual in some way tend to draw people’s attention”
Social cues	“People are more likely to pay attention to thing they see others looking at and reacting to.”
Motion	“Moving objects are more likely to capture attention than stationery ones”
Size	“Attention tends to be drawn to large objects”
Intensity	“More intense stimuli-bright colors and loud noises, for instance-attract attention”
Incongruity	“Objects that don’t make sense within their context”

These factors are also explained in the context of the children’s cognitive processes during book selection. Children’s resources such as picture books tend to include illustrations using bright colors or being emotionally appealing. For instance, many participants mentioned that pictures were cute or interesting. In this case, emotion and

intensity factors cause the children to pay attention to pictures. Another example is social cues. When one of the children in a pair picked a book, the other child wanted to read it or at least wanted to check what it was. The factors influencing attention seem to overlap with the cognitive factors and facets that this study identified in Chapter 4. It explains that child-driven metadata elements created in Chapter 5 might play a role in capturing children's attention to browse and search for books.

#### **6.2.5. Criticism of IPT in the children's book selection behaviors**

In spite of the advantages of using IPT for understanding children's book selection behaviors related to metadata elements, the theory has several weaknesses. First of all, studies of information processing tend to be conducted in a task-based laboratory setting. Miller (2011) considers a task analysis approach and quantitative measurement methods, such as recording reaction time, as a merit of information processing studies. "Information-processing researchers use stringent and precise experimental methods . . . . Laboratory research on basic processing often makes precise measurements of processing time . . . by cleverly designing different types of problems, researchers have discovered that young children are using simpler, less-complete rules, procedures, or strategies than are older children" (Miller, 2011, p. 315). Although Miller (2011) considers a task analysis approach more beneficial to understanding different sets of information procedures, the tasks might influence outcomes by limiting various cognitive process activities. For example, if the children were asked to find a book by using an online cataloging system (as a task), children's cognitive processes might be changed or limited

due to the limited functions of the online cataloging systems. Therefore, a task-based laboratory study has difficulty capturing intuitive cognitive processes during information processing.

Secondly, Johnston and Dark (1986) contend that many studies about attention focus on only external sources, mentioning that there are two sources of information: internal sources (memory and knowledge), and external sources (environmental objects and events). Similarly to Johnston and Dark (1986), Beak (2012) also addresses resource-centered factors/facets and user-centered factors/facets. Some factors/facets, such as a physical characteristic, are directly associated with the resources, whereas others, such as familiarity, come from users' ideas or previous experiences. These two different types of factors/facets are related to two different types of processes: PAL (Paying Attention by Looking) and BAR (Being Aware by Recalling). The PAL process is likely to deal with external sources, whereas the BAR process seems to be led by internal sources (Beak, 2012). The reason the children paid attention to different sources of information might be due to the nature of the sources. In other words, external sources tend to be tangible, concrete, and objective, whereas internal sources are likely to be abstract and subjective. Therefore, in a task-based laboratory study, it is more convenient to control variables with external sources rather than with internal sources. However, internal sources such as prior knowledge or personal experience play an important role in attention. The children in this study tended to re-read the same books or to read different books in the same series. In this case, their prior knowledge or positive emotional experience about the books were cues to pay attention to choose other books. In this sense, to understand



comprehensive cognitive processes, it is necessary to consider internal sources such as personal experience, emotional state, and cognitive ability, as it is to consider external sources.

The third weakness of IPT is the lack of consideration concerning social and cultural influence. In other words, IPT claims that a basic simple model of IPT as illustrated in Figure 6-2 is applicable to all people, without considering social or cultural influence. Miller (2011) also criticizes neglecting the context of behavior in information processing studies. As a member of a society or culture, a person might be educated or accustomed to perceive and organize information in certain ways that the society or culture has constructed. “[E]ven basic attention processes are culturally formed; when a culture values children’s attending simultaneously to multiple events in the community around them, cultural practices guide children in that direction” (Miller, 2011, p. 319). When this study was designed, social and cultural influences were not considered. Therefore, simply interpreting the children’s cognitive processes during book selection through IPT might not provide deeper understanding of why the children perceived certain information. For instance, even among group of children, gender differences or sociocultural backgrounds might lead to different kinds of information processing. Therefore, it is important to keep in mind the ways in which the society and culture influence information processing and information organization.

### 6.3. Role of emotion and affection

Emotion is an especially important factor relating to cognition and perception because it captures and maintains attention. Emotional appeal has been studied in many fields such as advertising and political science in order to understand how emotion influences users' information processing or selection and decision making. Norman (2004) notes that in humans "the emotional system is also tightly coupled with behavior, preparing the body to respond appropriately to a given situation" (p. 12). Nahl (2007) also emphasizes a central role of the affective in information behavior, noting that "cognitive processes cannot be understood without recognizing the mechanism by which feelings and emotions control the parameters of every cognitive operation" (p.24). Although Norman's emotional system and Nahl's affect control theory are not specifically explained in the context of children, this study showed a common view point in the role of emotion. It is obvious that emotional factors influence children's book selection behavior. There is a great volume of literature about emotion in psychology (including cognitive psychology, social psychology, or neuropsychology). However, attention to emotional and affective factors in LIS is relatively nascent. Since a user-centered perspective has been introduced in LIS, attention has begun to be paid to affective or emotional factors. Affective and emotional factors are considered in understanding user's information behaviors, including information seeking and searching behaviors or human-computer interaction. While the terms affective and emotion are interchangeably used, the scope of affection and emotion cover many aspects of user's information behaviors. Generally speaking, studies about emotional and affective factors in information behavior use terms such as emotional or affective in order to represent factors relating to feeling,

motivation, satisfaction, uncertainty, anxiety, frustration, appealing, self-efficacy, etc. Lopatovask and Arapakis (2011) grouped theories of emotion into two main categories: cognitive and somatic. Emotion in relation to cognition “stresses the importance of cognitive evaluation (appraisal) in establishing the meaning of stimuli and ways of coping with it” (p. 588). On the other hand the emotion in relation to somatic factor emphasizes “perception of emotional experiences in terms of bodily responses” (p. 588). Emotion used in LIS, especially information retrieval and human-computer interaction, seem to consider the first category of emotion, cognitive evaluation rather than somatic emotion. Julien, McKechnie, and Hart (2005) analyzed to what extent affective issues have been considered in articles about systems work in LIS. In this content analysis of articles published between 1999 and 2003, the definition of affect is “emotion, mood, preference, and evaluation” (Julien, McKechnie, & Hart, 2005, p.457). There has been no further exhaustive content analysis study looking for affective issues in LIS in the last decade. However, Dinet, Chevalier, and Tricot (2012) note that “since the early 2000s, numerous studies have investigated causes and/or effects of various emotions during the web search” (p. 57). A body of studies focusing on affective and emotional factors in information behaviors has grown. One of comprehensive works on emotion in LIS is published as a monograph titled “*Information and emotion: The emergent affective paradigm in information behavior research and theory*” edited by Nahl and Bilal (2007). This book consists of 17 chapters dealing with emotion in diverse contexts such as children’s digital libraries, information literacy and reading, or library anxiety. In addition to this work, emotional and affective factors are considered in other LIS research streams such as usability (Khanum & Trivedi, 2012), information retrieval and searching

(Lopatovska & Arapakis, 2011; Dinet, Chevalier, & Tricot, 2012; Bronstein & Tzivian, 2013), health information behavior (Fourie, 2009), or social tagging (Kipp, 2008; Ding et al., 2010).

Many studies on emotions in LIS use self-reporting methods including self-rating on a satisfaction scale, think-aloud, interviews, questionnaires, or standardized tests for measuring affect such as positive affect, negative affect scale (Lopatovska & Arapakis, 2011, p. 581-584). Using these methods assumes that users are able to report their emotions, which assumes that emotion is a conscious cognitive response. However, Albright (2011) recently introduced psychodynamic perspectives in information behavior. The psychodynamic perspective focuses on the role of the unconscious “underlying motivations and emotions that affect information behaviour in general, and specifically information use,” rather than conscious interaction between users and information. Although Albright (2011) does not suggest specific methods to understand and to measure the role of unconsciousness, this new direction seems to bring richer understanding of the role of motivation and emotion to studies in user’s information behaviors.

Despite the growth of attention to emotion, Dinet, Chevalier, and Tricot (2012, p. 57) point out that: “the disciplines that study HCI [Human Computer Interaction] and IR [Information Retrieval] have only recently started to investigate this phenomenon and gain understanding of its [emotion] causes and effects by collecting objective data.” Like

Dinet, Chevalier, and Tricot's argument, the current point of view regarding consideration of emotion in LIS is more likely to be descriptive rather than suggestive of practical solutions to improve information systems. The following section discusses how emotional factors are embodied in knowledge organization systems or information retrieval systems.

### **6.3.1. Emotion in knowledge organization systems**

I analyzed the relationship between emergent vocabularies of emotion and other cognitive factors in Chapter 4. The analysis shows that emotional vocabularies have a strong connection with pictures. In addition, other cognitive factors such as title, subject, or characters are also closely clustered from a center of emotion. It implies that emotion influences the child-driven metadata elements to be more child-friendly and appropriate, so that emotional-based metadata elements play a role in capturing and maintaining children's attention.

In the context of knowledge organization for children's resources, emotional factors are also considered. However, it is not explicitly discussed in published articles. There are few published articles addressing emotional perspectives. Articles tend to focus on the development of interface design for children's digital libraries (Liu et al., 2012; Reuter, 2007a; Druin et al., 2001; Druin, 2002; 2005; Hutchinson, Druin, & Bederson, 2007; Hutchinson et al., 2005), rather than focusing on knowledge organization systems.

This section discusses how emotional factors are considered in knowledge organization systems through an example of the NoveList K-8 (Plus) database. NoveList K-8 is a leading database about fiction and non-fiction books for children and juveniles. Although the NoveList website claims that the NoveList databases, specifically the NoveList K-8 (Plus), is for younger readers in order to help children find books for their reading level and interest<sup>7</sup>, it is questionable how effective it is and how often child users search for books using the NoveList database. Rather, it is more often used by parents, teachers, librarians, or researchers who search for books for children. Therefore, it is hard to simply claim that a main target user group of the NoveList K-8 is children. However, the reason this section uses the NoveList database as an example is because the NoveList provides tools for finding books using four types of appeal factors: 1) storyline, 2) pace, 3) tone, and 4) writing style. Recently, they added an illustration appeal factor. Regarding the appeal factors in the NoveList databases, there is only one published article written by Tarulli and Caplinger (2013). As a cataloging supervisor and reader's advisory specialist at NoveList, Tarulli and Caplinger (2013) explained the motivation and procedures of developing appeal factors and terms. The following definitions of each factor were quoted from Tarulli and Caplinger's article (2013) and the information about "appeal terms for ages 0-8" from the EBSCO website<sup>8</sup>.

- Storyline: "terms that help readers find books with the overall structure they are looking for."
- Pace: "the rate at which the story unfolds for the reader."
- Tone: "the feeling that a book evokes in the reader."

<sup>7</sup> <http://www.ebscohost.com/novelist/our-products/novelist-k8>

<sup>8</sup> [http://support.ebsco.com/help/?int=novp&ver=live&lang=en&feature\\_id=BabyAppeal](http://support.ebsco.com/help/?int=novp&ver=live&lang=en&feature_id=BabyAppeal)

- Writing style: “the language used in the book and the level of detail in the background.”
- Illustration: “a range of terms that cover everything from color and drawing style to the mood evoked in the reader by the illustrations.”

Figure 6-3. Example of a search by the appeals (From NoveList handout information)

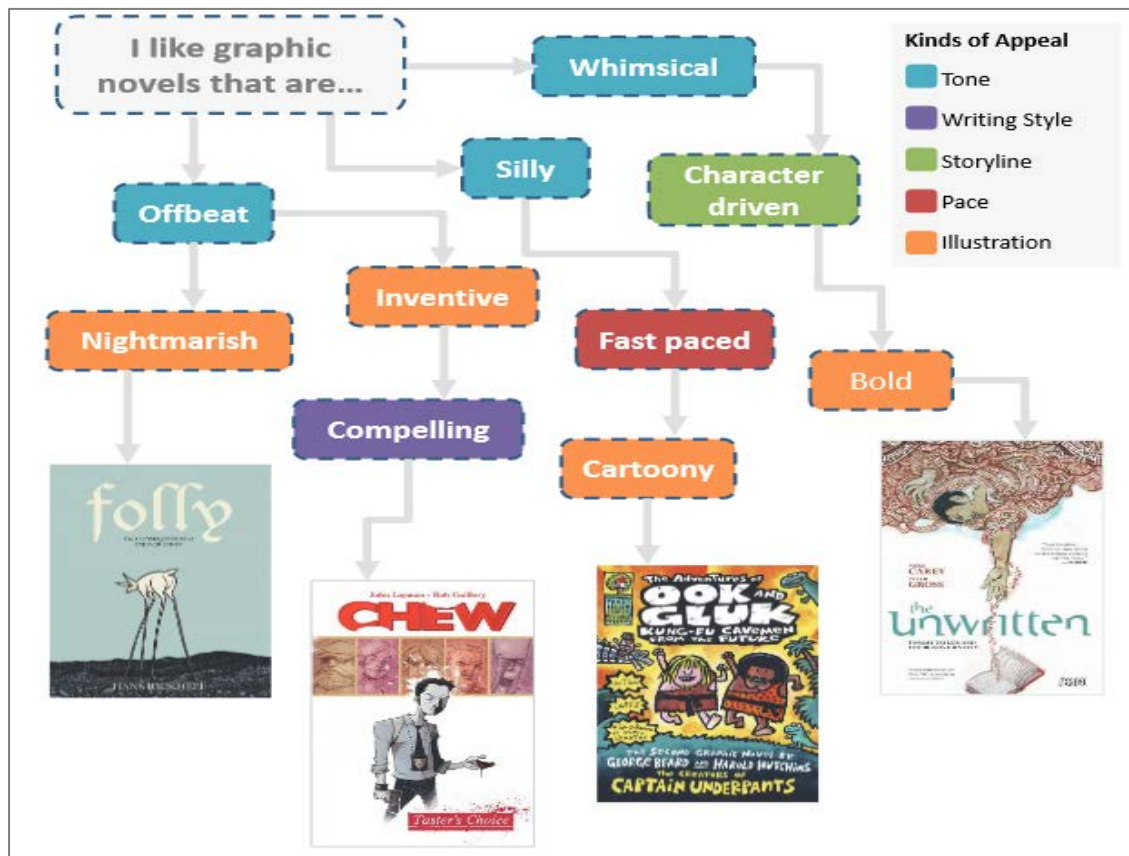


Figure 6-3 shows an example of finding books by appeal factors.<sup>9</sup> The five appeal factors do not directly describe emotional information about a book. However, they seem to consider emotional perspective in cataloging. In other words, the appeal factors play a role in captivating users' attention by connecting user's emotional interests with

<sup>9</sup> <http://www.ebscohost.com/novelist/news-article/novelist-adds-tools-for-finding-visual-appeal>

information about storyline, pace, tone, writing style, and illustration. In particular, a tone appeal factor deals with more emotional factors than the others. According to Tarulli and Caplinger (2013), “tone is where we focused most of our initial energy, as this reaches the emotional core of the book. This category also includes terms that talk about the setting of the book, basing this decision on Joyce Saricks’ statement that ‘setting as an element of appeal really means background and tone, not geographic place.’<sup>[10]</sup>” (p. 288). These appeal factors, except a pace factor, are also found in this study, although the interpretation and names of cognitive factors in this study are slightly different from those of NoveList. Storyline and writing styles in NoveList can be matched with a metadata element, story and sub-properties of story such as storyline, story setting: when and where in CDM. Tone in NoveList is equal to a tone element in CDM, defining it as the mood of the story in the resource. But while a tone appeal factor seems to deliver the emotional statement about the story of a book, a tone element in CDM intends to convey the emotional aspects that could be perceived through not only a story, but also illustration and character in a book. Illustration appeal factor is similar to a book cover and an illustration element in CDM. Appeal terms in illustration factors include abstract, cartoony, colorful, photographic, realistic, and so on. These terms are also described in CDM, but by several elements like color or format of illustration. For instance, a CDM element, format of illustration, describes whether an illustration is photography or a cartoon.

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<sup>[10]</sup> Saricks, Joyce G. (2005). *The Reader’s advisory service in the public library*, 3<sup>rd</sup> ed. Chicago: ALA. (pp. 59).



Appeal factors of NoveList and the analysis of the relationships between emergent vocabularies of emotion and cognitive factors in this study share the similar idea that providing emotionally appealing or interesting access points for searching is important. Through this study, I learned that illustration, especially book cover, story and subject, and characters caught children's eyes or attention. It means that these factors need to be provided as access points in book searches for child users. NoveList's appeal factors and terms seem to be the most practical application of emotional factors in cataloging for children's books. Given that NoveList calls these factors "appeal" factors, the term appeal implies that storyline, pace, tone, writing style, and illustration play a role in intriguing a user's emotional interest. "Adding appeal to a book record augments standard cataloging information on genres and subjects, and makes it possible for users to conduct appeal-based searches" (Tarulli & Caplinger, 2013, p. 290). Tarulli and Caplinger also believe that a new approach to cataloging should be able to describe not only the content of a book, but also "the experience of the book for the reader" (p. 290). Descriptive and experiential cataloging noted by Tarulli and Caplinger (2013) are in accord with Wilson's two kinds of power in the bibliographical universe: 1) descriptive and 2) exploitative power or control (Wilson, 1968). Descriptive power allows information professionals to create "arbitrary order" (Wilson, 1968, p.25) of writings or texts, whereas exploitative power is "the ability to make the best use of a body of writing" (Wilson, 1968, p. 25). Smiraglia (2012) reinterprets Wilson's two kinds of powers by using the word, domains instead of power or control. "The descriptive domain is the dimension where people labor to make indexes and catalogs of all of the texts of knowledge that they know to be extant. The exploitative domain is where scholars toil to

create new knowledge by synthesizing that which is already known” (Smiraglia, 2012, p. 4). Another key concept in Wilson’s theory is efficacy. Smiraglia (2012) notes that “anything descriptive that makes exploitation possible is efficacious” (p. 4). These ideas suggest that simply describing bibliographical information or resource-centered cataloging is not an effective mechanism by which to create new knowledge-encountering experiences for children. In order to emphasize the exploitative power in a knowledge organization system for children’s resources, appeal-based searches and emotion-based metadata elements provide a new direction for knowledge organization systems.

#### **6.4. Cognitive ability and Husserl’s ideas**

As the findings of this study show and CDM suggests, the factors and facets that children perceived to select books were different from the access points available in current online cataloging systems. In other words, while the children perceived colors, characters, or pictures more naturally or intuitively, current online cataloging systems tend to provide bibliographic information access points such as title, authors, ISBN, or keywords for users. Adult users might perceive similar factors. However, the difference between adult and child users is cognitive ability. These differences in cognitive ability were introduced through Piaget’s cognitive development stages in Chapter 2. Adult users might have been educated in terms of how to use online cataloging systems, therefore, they are able to adapt their thought processes in order to retrieve books by title, author, or ISBN. However, children’s cognitive abilities are not developed enough to adjust their search

behaviors in this manner. Limiting access points to bibliographic information means that cataloging systems force children to learn search strategies instead of supporting their intuitive information searching behavior.

The cognitive processes are also interpreted by Husserl's ideas about noesis, ego, and epoche (bracketing). Smiraglia (2012, p. 12-13) concisely explains about Husserl's ideas:

Essentially, Husserl suggested (in alignment with semiotic theory) that each perception was subject to the interpretation of the individual. For Husserl the process of perception was viewed through the lens of personal experiences. *Noesis* was the Husserl's perceptual component of analysis . . . For Husserl, all perception stemmed from the *Ego*, which is all that is. In the beginning of perception, nothing is, except that which is perceived by the *Ego*. The method of perception entails a sequence of *epoche*, brackets around specific entities in the perception of the *Ego*.

Among the many aspects of books, what children perceive depends on the child's ego, which is created by and evolves from personal experience. Because the children in this study did not have enough library education experience, they did not know how to use library online cataloging systems or did not know what call numbers meant. In Husserl's language, the child's noesis differs from an adult's noesis. When the children interacted with books and perceived information, they bracketed different entities in books. The concept of bracketing is related to attention in IPT. In other words, Husserl's sequences

of perception can be reinterpreted by which of many aspects of books particularly appealed to and were paid attention to by the children.

## Chapter 7: Conclusion, contributions, and future research

One of Cutter's cataloging objectives is "to assist in the choice of a book." (1891, p. 12). Cutter's choice objective was likely to suggest narrower meanings of descriptions by bibliographical information or literary or topical information. These descriptions were more likely to emphasize the characteristics of resources, not the user's perspective. However, nowadays the scope of choice objective includes the reader's advisory. It means that cataloging or knowledge organization systems such as metadata schemas need to consider how to reflect users' information behaviors and represent users' voices in knowledge organization systems. In this sense, the purpose of this study was to understand children's cognitive processes during book selection and to develop a child-driven metadata schema based on the cognitive factors and facets. This chapter summarizes the findings of this study through the research questions, and provides the contributions and directions for future research.

### 7.1. Conclusion

Chapter 2 revealed the research problem through the literature review and provided a theoretical framework for this study by defining key concepts such as children, metadata, information, and context. The literature review focused on studies about children's information seeking and searching behaviors regarding information retrieval and information organization. Through the literature review, I learned that there was a lack of studies devoted to developing knowledge organization systems that reflect children's information seeking behaviors. This research gap fitted in the theoretical framework of

this study, which was the connection between two components of knowledge organization; expression of users and representation of information. Based on the research problem and theoretical framework, this study aimed to connect children's cognitive processes as an expression of users to metadata elements as a form of representation of information.

Chapter 3 introduced research questions and the methodology designed to understand the children's cognitive processes during book selection as a foundation for the development of a child-driven metadata schema. Broader research questions included what metadata elements do children like to use? What elements should a child-driven metadata schema include? In order to answer these research questions, a triangulated qualitative research method consisting of questionnaires, paired think aloud, interview, and diaries were used with 22 child participants between the ages of 6 and 9. In addition, the following operational research questions were asked.

- RQ 2) What perceptual cognitive factors and facets do children use to select books?
- RQ 3) What roles do the cognitive factors and facets play in a context of metadata schema?
- RQ 4) How can child-driven metadata elements be defined?

The following section summarizes the findings of this study by looking at each research question.

***RQ 2) What perceptual cognitive factors and facets do children use to select books?***

Chapter 4 was devoted to identifying the perceptual cognitive factors and facets the children perceived during book selection. Thirteen facets, *basic bibliographical information, character, difficulty, engaging elements, familiarity, genre, illustrations, novelty, physical characteristics, recommendation and award, series or chapter books, stories or themes in picture books or fiction, and subjects in non-fiction*, were perceived through various factors. Each cognitive facet was explained, accompanied by examples of the children's accounts. The cognitive factors were apt to be perceived directly from books by the children through sensory inputs like looking at, browsing, or touching books. The cognitive facets were created by concerning what conceptual aspects of information the children's cognition intended to perceive. Therefore, the cognitive facets tended to be abstractly processed cognition, whereas the cognitive factors tended to sensibly processed cognition.

***RQ 3) What roles do the cognitive factors and facets play in a context of metadata schema?***

***RQ 4) How can child-driven metadata elements be defined?***

The cognitive factors and facets were used as triggers to select books or cues to recall books that the children had read before from their memory. In addition, some cognitive factors and facets were associated with emotional interest. Chapter 4 showed the top 30 codings that co-occurred with emergent vocabularies of emotion, along with an MDS cluster plot of the cognitive factors and facets from a center of emotional interest. Triangulated data analysis demonstrated similar results, that illustrational information

was strongly connected with the children's emotional interest. In Chapter 6, the children's cognitive factors and facets were also interpreted as attention influencing information processing. In other words, the children tended to pay attention to certain aspects of books, which were identified as cognitive factors and facets in Chapter 4, during book selection processing.

The cognitive factors and facets were used as the foundation of the development of a child-driven metadata schema. To become child-driven metadata elements, the cognitive factors or facets needed to be considered with an eye toward operationalization. After considering how to operationalize cognitive factors and facets, thirty three metadata elements were developed and two examples of metadata records described with child-driven metadata elements were suggested in Chapter 5. The children's cognitive factors and facets provided important meaning in a context of the development of metadata elements. The cognitive factors and facets were not only evidence of how the child-driven metadata elements were developed, but also illustrated the reasons the child-driven metadata elements should be developed. In other words, child-driven metadata elements reflected the children's cognitive perception that could allow children to intuitively and easily find books in an online cataloging system.



***RQ 1) What metadata elements do children like to use? What elements should a child-driven metadata schema include?***

The children liked to perceive five aspects of books in a broader sense; illustration, character, title, and subject or stories. Overall the children tended to perceive more concrete and visual information than abstract information. Illustration, character, and title were visually or textually represented, whereas subjects and stories were more likely to be embedded in visual or textual representation. However, the children often perceived subjects or stories through illustration, character, and titles. Therefore, these five aspects of books were interrelated.

Illustrational information included various aspects of books such as characters, objects, colors, or format of illustration. Illustrational information was mostly perceived through a front book cover. It means that an image of a front cover itself might function as a surrogate, but providing description about characters, objects, colors, or format of illustration is also important for the purpose of access and retrieval. Character(s) were often perceived as illustrational representations or as a main access point of a story line. In the case of perceiving chapter book series, characters played more important roles due to the nature of chapter book series. A chapter book series usually included main characters and consistent themes. In addition, character's names are often a part of title of a series or chapter books such as the *Arthur chapter book series*. Therefore, the description of character information, including visual representation by an image of

characters, and character's names and genders, might provide different access points for finding books.

The children also used the information of title and subject or stories to perceive emotional interest. Although the children perceived subjects or stories through illustration or characters, it was obvious that the children were concerned about titles and subjects or stories. Moreover, given that title and subjects or stories are basic bibliographical information that has been described and provided as main entries in online cataloging systems, a child-driven metadata schema also needs to include these elements to support the children's information seeking and searching behaviors.

Finally, from this study emerges a portrait of how the children perceived various aspects of books. I have synthesized the results with a review of literature in information processing theory, attention, emotional factors in knowledge organization, and Husserl's ideas about noesis, ego, and epoche (bracketing). Information processing theory and attention explain what and why the children perceived certain aspects of books. In addition, Husserl's ideas also explain that the children also think and perceive information based on their egos established by previous experiences.

Overall, a holistic understanding of the children's cognitive processes during book selection as a foundation of a child-driven metadata schema displays an early stage of an

ontological contour for a children's knowledge organization systems. A child-driven metadata schema constructed in this study is apt to include different metadata elements from those metadata elements existing in current cataloging standards. The differences results from a user-driven approach when a metadata schema is constructed. Current existing cataloging standards tend to be developed by a resource-centered approach, not user-centered or user-driven approaches. On the other hand, a child-driven metadata schema reflects the children's cognitive processes so that it might function more intuitively for child user groups than adults. Given there are two components in knowledge organization, a metadata schema for children is required considering both children and children's resources in order to represent both users and information.

## **7.2. Contributions**

The purpose of this study is not to develop a "fully-functioning or complete" child-driven metadata schema. Given that children's information seeking behavior has not been studied in light of any metadata schema, this study has meaning as the first about a child-driven metadata schema. However, this study contributes to improving knowledge organization systems to better represent children's perspectives. In addition, information organization and information retrieval are often considered as two sides of one coin. Therefore, a child-driven metadata schema will contribute to the design of browsing search interfaces for child user groups. In other words, given that a browsing search is more effective for children than a keyword search, providing child-appropriate access points for a browsing search interface is important. Lastly, the influences of cataloging or

knowledge organization systems extend beyond simply describing resources. Knowledge organization is a fundamental organism that intertwines with many aspects of library services such as information retrieval, reference, literacy, and readers' advisory. Therefore, a child-driven metadata schema provides a positive experience of finding books in online setting with children, so that it also ultimately contributes to the enhancement of children's literacy skills.

### **7.3. Future research**

This study serves as a starting point for a research domain of metadata schemas for children and children's resources. In other words, this study provides a huge potential area for future research. The following section discusses future research. First, future research needs to reanalyze children's cognitive processes during book selection in multiple perspectives. The current study focused on attention and emotional factors occurring between sensory register and working memory in information processing theory. How the children's cognitive processes differ when information is transferred from working memory and long-term memory versus when information is recalled from long-term memory to working memory has not been scrutinized. Data from the current study shows slight evidence of differences. Therefore, future research should re-analyze the data in relation to two different information processing styles; recalling memory versus perceiving new information. It will contribute to a deeper understanding of children's cognitive processes.

One aspect of constructing a metadata schema is related to a domain analysis or a content analysis about children's resources. Children's resources such picture books, board books, or chapter books have unique characteristics, such as physical characteristic like covers reminiscent of dog fur. These characteristics influence children's cognitive processes and book selection behaviors. Therefore, understanding of characteristics originating from book itself should be also considered in order to develop a metadata schema reflecting both sides of knowledge organization components; children and children's resources.

Other future work on a child-driven metadata schema should include studying how to implement the metadata elements in practice. The current study only theoretically suggests descriptive metadata elements that might be used easily for children to search or browse books. However, the study does not address how to use it in an OPAC system. In order to implement the child-driven metadata schema in a practice, the metadata schema needs to consider other factors such as interoperability, cost-benefit, objectivity, or stability. In addition, user study for the evaluation should be conducted. Therefore, future research requires operationalizing children's perceptual cognitive factors in a metadata schema and testing its effectiveness by children.

Finally, this study only focuses on developing metadata elements, not values. Chapter 5 defines the differences between elements (or properties) and values. However, in order to provide a complete metadata schema, it is necessary to consider values for each element. This might include developing a standardized vocabulary such as a name authority file

for characters in children's resources. In this way, a child-driven metadata schema can be more stable, functional, and applicable to practice.

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### Appendix A: Recruitment email

From: Jihee Beak [mailto:jbeak@uwm.edu]  
 Sent: Tuesday, August 06, 2013 4:02 PM  
 Subject: Request help for recruiting research participants from your library

Dear Director of library:

I am Jihee Beak, a doctoral candidate from the School of Information Studies, University of Wisconsin-Milwaukee (UWM). I am writing this e-mail in behalf of asking your help to recruit research participants and getting permission to use your library setting.

I plan to conduct a dissertation research about children's book selection behaviors. The purpose of this study is to develop a child-appropriate metadata schema for children's libraries. In the future, the ultimate goal of this study will provide different access points for children and design a child-friendly OPAC system.

This study requires children to visit a library three times. Children will browse and select books in a children's section of your library, as they usually do in a library. Children will be video and audio recorded with parents' permission during the library visit. Each library visit will take around an hour.

In order to conduct this study, I need to recruit 10 pairs of children - a child and his/her friend - or 20 children in age of 6 to 9 (1st grade to 3rd grade). Can you please allow me to promote this study for the recruitment in your library? If you agree, I will visit your library during library programs for kids, and shortly introduce my study and leave fliers in your library. In addition, I have noticed that your library has a Facebook webpage. Can I also post a flier in your library's Facebook webpage?

After recruiting, if children want to visit your library, can you please allow me to use recording devices (a video camera and audio recorders) in your library? I try not to distract other library users as much as possible. This study has been approved by the Institutional Review Board at UWM (IRB#: 14.015). It means that there will be no risks for children or participants.

Can you please allow me to recruit children from your library and conduct this study in your library if there is any child user from your library? Your help for this study will contribute to develop a better library OPAC system for child users.

If you want to meet me in person to get more information, I am happy to visit your

library anytime. Here is my contact information.

Cell Phone: 414-465-9362

Office Phone: 414-229-4707

E-mail: jbeak@uwm.edu

Thank you for reading a long email and your consideration. I will look forward to hearing from you soon.

Sincerely,

Jihee Beak.

--

Jihee Beak  
Doctoral Candidate  
Northwest Quad Building B 2522  
2025 E Newport Milwaukee  
School of Information Studies  
University of Wisconsin - Milwaukee  
Milwaukee, WI 53211



## Appendix B: Recruitment flier

# Attention parents & guardians!

## (Recruiting children)

- Do you have a child in **1st, 2nd or 3rd grade?** Or **ages 6 to 9?**
- Does your child like to read? Or regularly visit a **local library?**
- Do you want to encourage your child to **read more** and **become a better reader?**
- **Sign up** for a **research study** on how children choose books!



### What is involved in the study?

- Ideally, the study would like to use **children in pairs** – **your child and a friend.** (If you can't find a friend, you still can participate in the study).
- Schedule **three visits** to the public library (Between August and October, 2013), at times that are convenient for you.
- A researcher will **interview and observe** your child and his/her friend about how they choose books.
- Children will be asked to keep a **brief diary** about reading habits.



### What are the benefits of participating?

- If a child completes the study, a **\$50 bookstore gift card** will be provided at the last library visit!
- By learning how your child chooses books, you can encourage your child to **read more** and **become a better reader** and you can **contribute to the design of a better children's libraries search interface.**



### How do I sign up?

Please contact the researcher directly to sign up:  
If you have more questions, feel free to ask the researcher!

---

**Jihee Beak** Cell: **414-465-9362**  
 Doctoral Candidate Office: 414-229-4707  
 School of Information Studies Fax: 414-229-6699  
 University of Wisconsin-Milwaukee E-mail: [jbeak@uwm.edu](mailto:jbeak@uwm.edu)

Thank you for your participation!!

## Appendix C: Registration form (Demographic questionnaire)

### Sign Up for a Research about Children's Book Selection Behaviors

#### About your child

Child's name \_\_\_\_\_  Female  Male \_\_\_\_\_ Date of Birth \_\_\_\_\_

Primary language \_\_\_\_\_ Other language(s) (if any) \_\_\_\_\_

#### Education

School your child attends \_\_\_\_\_  1st grade  2nd grade  3rd grade

Average grades in school

- Mostly A's     Mostly B's     Mostly C's     Mostly D's  
 A's and B's     B's and C's     C's and D's     D's and F's

#### Library use

Which public library does your child usually visit?

\_\_\_\_\_

How often does your child visit the public library?

- Every day     Once a week     Once a month  
 A few times a week     A few times a month     A few times a year

#### Parent/Guardian

Parent/guardian's name \_\_\_\_\_ Relationship to child \_\_\_\_\_

Occupation \_\_\_\_\_ Hours worked per week \_\_\_\_\_

Highest level of education completed

- Some high school     High school diploma     Some college  
 Associate degree     Bachelor's degree     Some graduate school  
 Graduate degree     Other: \_\_\_\_\_

**Household**

Location (City or neighborhood)	Langauge(s) spoken at home	# of children in household
---------------------------------	----------------------------	----------------------------

**Contact Information**

Daytime phone	Evening phone	Email address
---------------	---------------	---------------

*This study would like to recruit **children in pairs – your child and a friend**. Please ask a friend of your child if he/she can participate in this study with your child.*

*Can you recommend your child's friend?*

Name of friend	His/Her parent's name	Contact information
----------------	-----------------------	---------------------

*Thank you for your interest! I will follow up with you as soon as possible.*

## Appendix D: Background questionnaire

### Tell me about you!



My name is: \_\_\_\_\_

❖ My favorite **BOOK** is:

\_\_\_\_\_

Because

\_\_\_\_\_

❖ My second favorite **BOOK** is:

\_\_\_\_\_

Because

\_\_\_\_\_

❖ My favorite **MOVIES or TV Shows** are:

\_\_\_\_\_

Because

\_\_\_\_\_

❖ My favorite **CHARACTERS** are:

\_\_\_\_\_

❖ I love to read (Circle as many as you like)

Fiction | Non-fiction | Picture books | Fairytales | Chapter books

❖ My favorite **SUBJECT, TOPIC, OR THING** to read is:

\_\_\_\_\_

❖ My **HOBBIES** are: (or when I have free time, I love to do....?)

\_\_\_\_\_

- ❖ Currently, are you in a **READING PROGRAM** like book clubs or Battle of the Books? Or will you be in an any reading program?

- 
- ❖ Do you currently belong to any **ACTIVITY PROGRAMS** such as a baseball team, a drawing program, or foreign language program?
- 



- ❖ When I go to libraries or bookstores,



I love to select books by myself.



I love to select books that my mom or dad picks for me.



I love to select books that my brother/sister likes.



I love to select books that my friends like.



I love to select books that my teacher picks for me.

- ❖ Tell me how you usually select or find books:

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---



---

## Appendix E: IRB approval



Melissa Spadanuda  
 IRB Manager  
 Institutional Review Board  
 Engelmann 270  
 P. O. Box 413  
 Milwaukee, WI 53201-0413  
 (414) 229-3173 phone  
 (414) 229-6729 fax

### New Study - Notice of IRB Expedited Approval

<http://www.irb.uwm.edu>  
[spadanud@uwm.edu](mailto:spadanud@uwm.edu)

**Date:** July 19, 2013

**To:** Richard Smiraglia, PhD  
**Dept:** School of Information Studies

**Cc:** Jihee Beak

**IRB#:** 14.015

**Title:** A child-driven metadata schema for children's resources: A holistic analysis of children's cognitive process during book selection

After review of your research protocol by the University of Wisconsin – Milwaukee Institutional Review Board, your protocol has been approved as minimal risk Expedited under **Category 6 and 7** as governed by 45 CFR 46.110.

This protocol has been approved on **July 19, 2013** for one year. IRB approval will expire on **July 18, 2014**. If you plan to continue any research related activities (e.g., enrollment of subjects, study interventions, data analysis, etc.) past the date of IRB expiration, a continuation for IRB approval must be filed by the submission deadline. If the study is closed or completed before the IRB expiration date, please notify the IRB by completing and submitting the Continuing Review form found on the IRB website.

Unless specifically where the change is necessary to eliminate apparent immediate hazards to the subjects, any proposed changes to the protocol must be reviewed by the IRB before implementation. It is the principal investigator's responsibility to adhere to the policies and guidelines set forth by the UWM IRB and maintain proper documentation of its records and promptly report to the IRB any adverse events which require reporting.

It is the principal investigator's responsibility to adhere to UWM and UW System Policies, and any applicable state and federal laws governing activities the principal investigator may seek to employ (e.g., [FERPA](#), [Radiation Safety](#), [UWM Data Security](#), [UW System policy on Prizes, Awards and Gifts](#), state gambling laws, etc.) which are independent of IRB review/approval.

Contact the IRB office if you have any further questions. Thank you for your cooperation and best wishes for a successful project

Respectfully,



## Appendix F: Diaries

I want to tell you how I pick books!

# Reading Diary



Date: \_\_\_\_\_

What did you read today?





Why did you select this book? What do you like about the book?




How would you describe this book?




Did you like this book or not? Why??




How do you think you can find other books like this one later?





## Appendix G: Photographs of libraries



Photo 3. New book corner at the Wauwatosa Public Library



Photo 4. Book by reading levels at the Brown Deer Public Library



Photo 5. Picture books by author's last name at the Greendale Public Library



Photo 6. Spanish books at the Zablocki Public Library

## CURRICULUM VITAE

Jihee Beak

Place of birth: Daegu, South Korea

### EDUCATION

B.A., Kyungpook National University, August 2006  
Major: Library and Information Science  
School Library Media Specialist Certification

M.L.I.S., University of Wisconsin-Milwaukee, May 2010  
Specialization: Information Organization  
Thesis title: Metadata analysis for children's libraries

Dissertation Title: A Child-Driven Metadata Schema: A Holistic Analysis of Children's Cognitive Processes During Book Selection

### PUBLICATIONS

Beak, J., & Smiraglia, Richard P. (accepted). Contours of knowledge: Core and granularity in the evolution of the DCFMI domain. *13th International Conference of the International Society for Knowledge Organization (ISKO) 2014*, Krakow, Poland.

Beak, J., & Smiraglia, Richard P. (2013). With a focused intent: Evolution of DCFMI as a research community. *Proceeding of International Conference on Dublin Core and Metadata Applications*, (pp. 126-134), Lisbon, Portugal. (Finalist for the best paper award).

Olson, H., **Beak, J.**, & Choi, I. (2013). The natural is artificial: Legacy of the scientia scientiarum. *Hermès: cognition, communication, politique*, 66, (pp. 38-45) (Translated in French: French title: Le naturel est artificiel: l'héritage de la scientia scientiarum).

Beak, J., Glover, J., Martínez-Ávila, D., & Milani, S. (2013). International comparative domain analysis in knowledge organization research topics in four countries - Brazil, South Korea, Spain and United States. *Proceeding of*



4<sup>th</sup> North American Symposium on Knowledge Organization, (pp. 1-10), Milwaukee, Wisconsin.

Kipp, M., Buchel, O., **Beak, J.**, Choi, I., & Rasmussen, D. (2013). User motivations for contributing tags and local knowledge to the Library of Congress Flickr collection. *Proceeding of the CAIS 41th Annual Conference*, (pp. 1-5), Victoria, British Columbia.

Beak, J., Glover, J., Martínez-Ávila, D., & Milani, S. (2013). International comparative study analyzing knowledge organization research topics in four countries - Brazil, South Korea, Spain and United States. *Proceeding of the iConference*, (pp. 668-670), Forth Worth, Texas.

Beak, J. (2012). Children's perceptual cognitive factors in book selection and metadata schema: Pilot study. *Proceeding of the American Society of Information Science and Technology*, 49(10), 1-10.

Kipp, M. & **Beak, J.** (2012). Examining studies comparing tags and controlled vocabularies. *Proceeding of the CAIS 40th Annual Conference*, (pp. 1-4), Waterloo, Ontario.

Beak, J. & Olson, H. (2011). Analysis of metadata schemas for children's libraries. In R.P. Smiraglia, (Ed.), *Proceedings from the North American Symposium on Knowledge Organization*, vol. 3, (pp. 1-12). Toronto, Canada.

Beak, J. & Olson, H. (2011). Comparison of metadata schemas: AACR2+ vs. ICDL's metadata schema. *Proceedings from 77th IFLA conference*, (pp. 1-16). San Juan, Puerto Rico.

Beak, J. (2011). Do tags really provide more semantic concepts than LCSH does? In *Proceedings of the 2011 Great Lakes Connections Conference*, (pp. 2-3).

## PRESENTATIONS

Beak, J. (2014). A child-driven metadata schema: children's cognitive processes in book selection and metadata elements. *Jean Tague-Sutcliffe doctoral posters at ALISE*. (Honorable Mention Award)

Beak, J. (2014). Emotional metadata: Pilot study of children's book selection behaviors. Poster at *2014 ALISE Annual Conference*.

Buchel, O., Neal, D., Kipp, M., Beak, J., & Choi, I. (2013). Analyzing spatial, social,

and semantic dimensions of user interactions with collections on Flickr. Poster presented at *the 2013 Social Media & Society Conference*, September 14-15, Nova Scotia, Canada.

Beak, J. (2013, January). Children's book selection behaviors and metadata schemas, Invited speaker at *the Kyungpook National University, Department of Library and Information Science*, Daegu, South Korea.

Beak, J. (2012). Vygotsky's theory in LIS. Presented at *the SLIS/SOIS Student Research Forum*, Madison, WI.

Beak, J. (2012). LCSH vs. tags from LibraryThing in fiction genres. Poster presented at *the ALISE Annual Conference*, Dallas, Texas.

Beak, J. (2011). Comparison of LC subject headings and LibraryThing tags in GLBTQ YA fiction. Presented at *the SLIS/SOIS Student Research Forum*, Milwaukee, Wisconsin.

Beak, J. (2010). Analysis of metadata schemas for children's libraries. Presented at *the SOIS Student Research Poster Competition*. Milwaukee, Wisconsin.

Beak, J. (2009). The relationship between the school library media specialist's working environment and the level of information organization in a visual search in an OPAC system. Presented at *the SOIS Student Research Symposium*. Milwaukee, Wisconsin.

Beak, J. (2009). The relationship between the level of information organization in a visual search function and elementary school librarian's working environment. Presented at *the Wisconsin Library Association Conference*. Appleton, Wisconsin.

Beak, J. (2009). A country's economic level and the influence of subject headings. Poster presented at *the SOIS Student Research Poster Competition*. Milwaukee, Wisconsin. (1<sup>st</sup> Winning Award).

## TEACHING EXPERIENCE

2014 Guest lecture in L&I SCI 511 *Information Organization* (Onsite), SOIS, UWM

- Guest lecturer on Authority Control and Access Points

- 2013      Instructor
- INFOST 230 *Knowledge Organization* (Onsite, Spring & Fall semester), SOIS, UWM
- Teaching an undergraduate core course for two semesters
- 2012      Teaching assistant
- L&I SCI 714 *Metadata* (Onsite), SOIS, UWM
    - Guest lecturer on Conceptual models of metadata records
    - Facilitating in-class exercises
    - Grading
  - L&I SCI 511 *Information Organization* (Online & Onsite), SOIS, UWM
    - Guest lecturer on Metadata in L&I SCI 511 Online class
    - Guest lecturer on Authority Control in L&I SCI 511 Onsite class
    - Facilitating in-class exercises and online discussion
    - Grading
- 2009      Teaching assistant
- L&I SCI 240 *Information Architecture I* (HTML & JavaScript), SOIS, UWM
- Assisting lab classes and student's assignments
- 2008-      Teaching assistant
- 2010      L&I SCI 440 *Information Architecture III* (PHP & MySQL), SOIS, UWM
- Assisting lab classes and student's assignments

#### RESEARCH EXPERIENCE

- April 2010-      UWM's Digital Future Project
- September 2011      ([http://www4.uwm.edu/acad\\_aff/digitalfuture/](http://www4.uwm.edu/acad_aff/digitalfuture/))
- Spring 2009      Korean American University Professors Association Directory Project: (<http://www.kaupa.org/directory.html>)

Fall 2008          Storytelling Project conducted by SOIS, UWM and granted by the Korean National Library for Children & Young Adults

#### FIELD EXPERIENCE

Spring 2010          Fieldwork Student, Collection and Resource Management Division at Golda Meir Library, UWM, Milwaukee, WI

October 2006 -      Copy Cataloger, Information Center, Samsung Economic Research  
April, September    Institute, Seoul, South Korea.

-December, 2007      - Copy cataloging: Monographs, series, journals  
                                     - Digital archive project: Digitize image data

August -              Fieldwork Student, Youngkyae Elementary School's Library  
December 2005      Daegu, South Korea

December 2003 -    Fieldwork Student, Kyungbok Middle School's Library  
February 2004      Daegu, South Korea

June – August        Fieldwork Student, Kyungpook National University Library  
2003                  Daegu, South Korea

#### PROFESSIONAL SERVICES

2013                  Reviewer, Association for Information Science and Technology (ASIS&T) 76<sup>th</sup> Annual Meeting

2012                  Assistant Conference Chair at the Second Milwaukee Conference on the Ethics of Information Organization, June 15-16<sup>th</sup>, 2012, Milwaukee, WI.

2012 - Present      President, ASIS&T Student Chapter, SOIS, UWM

2011 - 2013        Executive Officer, SOIS Doctoral Student Organization

- 2011 - Present Founder/Coordinator, Information Organization Reading Group
- 2009 - 2010 Executive Officer, SOIS Graduate Student Organization

#### SCHOLARSHIPS AND AWARD

- 2014 ALISE Doctoral Student Research Poster Competition-Honorable Mention Award
- 2014 Information Organization Research Group at SOIS travel Award \$1000 for travel to ISKO conference in Krakow, Poland
- 2013 UWM Graduate School Student Travel Award \$700 for travel to DCMI conference in Lisbon, Portugal
- 2012 UWM Graduate School Student Travel Award \$400 for travel to ASIS&T conference in Baltimore, MD
- 2012 Information Organization Research Group at SOIS travel Award \$1000 for travel to ALISE conference in Dallas, TX
- 2011 Chancellor's Graduate Student Award
- 2011 Information Organization Research Group at SOIS Travel Award \$1000 for travel to IFLA conference in San Juan, Puerto Rico
- 2010 Information Organization Research Group at SOIS Travel Award \$1000 for travel to ASIS&T conference in Pittsburgh, PA
- 2009 H.W. Wilson Foundation Scholarship
- 2009 Mary Lou Zuege Scholarship

#### PROFESSIONAL AFFILIATIONS

- Member of International Society for Knowledge Organization.
- Member of Association for Information Science and Technology.
- Member of Association for Library and Information Science Education.
- Member of Information Organization Research Group at SOIS, UWM.