ABSTRACT
This paper examines usability studies conducted on Online Public Access Catalogs that have faceted interfaces. The goal is to review the purposes, methods, and findings of the studies. Five studies representing different purposes, methods, and findings are critically evaluated. The purposes range from pre-implementation to contributing to user behavior and user interface design research. The methods range from direct observation to eye-tracking. The overall consensus is that facets are used effectively, are useful across different task types, and are preferable over traditional OPAC features as well as other features within the same systems.

Categories and Subject Descriptors
H.5.2 [INFORMATION INTERFACES AND PRESENTATION]: User Interfaces – evaluation/methodology. H.3.3 [INFORMATION STORAGE AND RETRIEVAL]: Information Search and Retrieval – information filtering; search process; selection process

General Terms
Experimentation, Human Factors, Measurement

Keywords
Usability studies, faceted interfaces, user interfaces, online public access catalogs, OPACs, library and information science.

1. INTRODUCTION
Since e-commerce websites began using faceted interfaces, numerous studies have shown that users prefer facets and use them effectively [8, 18]. Following the success of faceted interfaces in commercial websites such as Home Depot and Walmart, libraries and the vendors that serve them have sought to incorporate them into their OPACs in the effort to attract their users back to their catalogs and away from the Internet for their searching needs. Libraries recognized that one of the compelling reasons their patrons preferred the Internet as a discovery tool was that the average user lacked, according to Borgman, the conceptual and semantic knowledge and technical skills needed to effectively use OPACs [3]. Faceted interfaces address these difficulties by presenting a simplified initial query page, organizing results by categories, and allowing refinement of results. Additionally, few technical skills are needed because these interfaces are more intuitive than the traditional library catalog in that they “incorporate more human searching behaviors, such as filtering (refining), browsing, [and] exploring” [14].

The implementation of the Endeca OPAC at North Carolina State University (NCSU) in 2006 inspired other libraries to make similar changes to their OPACs. Although research has shown favorable usability findings for commercial faceted interfaces, before libraries would be willing to make such a large investment, further usability studies would be required. In addition to pre-implementation purposes, it is imperative that research be conducted to determine best design practices in concert with user effectiveness and preferences. The studies reviewed in this paper are examples of such research.

An information retrieval system is of little practical use if its users are not satisfied with both the experience and the results. A fundamental requirement toward that goal is a user interface with which the user can mitigate their information need. Usability studies are a necessary part of the design, development, implementation, and improvement of any information retrieval system and its components, and faceted interface OPACs are no exception. The articles being reviewed are examples of “formal” usability studies [9, 21]. As differentiated from the “beta testing” done by systems designers, “formal” usability studies are ones that “aim to advance the field's understanding of how people use interfaces, to determine which design concepts work well under what circumstances, and why,” and to make changes as the results dictate [9, 21]. Walbridge’s description of the necessary methods required for “formal usability testing” included direct observation, questionnaires, usage logs, and interviews [21]. Hearst adds the use of eye-tracking, which will be shown later to be a method under some controversy. Although not considered “formal research” by Walbridge, “formal” usability studies are an accepted method of user interface evaluation in both the commercial and library environments [21]. The methods employed by the reviewed studies fall under Hearst’s and/or Walbridge’s specifications.

Although the concept of facet classification—to be discussed below—has been known and studied for decades, facets as interface features are relatively new in the research and in popular applications. As such, many terms to describe these features are in use and must be clarified. Tunkelang made the distinction between “faceted navigation” and “faceted search,” in that the former presents an initial search interface without the possibility of entering a query whereas the latter does [18]. Further, as his lecture focused primarily on the interface rather than the underlying retrieval mechanics, his use of the phrase “faceted search” is interpreted to be equivalent to “faceted search interface.” Since none of the studies reviewed here assessed an interface devoid of an initial search box, but did use the terms interchangeably, for the purposes of this paper, “faceted browsing,” “faceted navigation,” and “faceted search,” will be considered synonymous to “faceted interfaces.” When not
quoting the articles, the latter will be used by the author to encompass any of the other three. Additionally, it should be noted that a considerable amount of OPAC literature discusses faceted interfaces as a feature of the so-called “Next Generation Catalog (NGC)” [13]. But since it is but one feature—if not a predominate one—of NGCs, the author will not be using the phrase here.

Before delving into the research, a brief discuss of the underlying mechanics of faceted interfaces and the commonalities of their features is necessary. The underlying structure of faceted interface OPACs is the classification of its bibliographic content into a “controlled vocabulary” of consistent, collection-specific, meaningful to both users and indexers, yet flexible, categories of terms [4, 20]. What makes this type of classification different from the systems traditionally used in libraries is primarily its ability to combine the facets in a variety of ways, rather than on a strict pre-specified manner. As some have noted in this research and elsewhere, the effectiveness of faceted interfaces is only as good as its underlying structure; libraries are still struggling to convert bibliographic content into facets that will both use and understand [2, 15]. That one of the driving forces of faceted interface usability studies is to understand which facets users do in fact use, and that some faceted interface OPACs have been implemented with considerable success shows that some progress has been and is being made in this endeavor [5, 6, 10, 22].

Most of the approximately ten different faceted interface OPACs now in use [10] and those included in this review share similar features. The initial query input screen presented to the user was similar to Google’s wherein only keywords are necessary for entry into the system. They tended to have the added feature of a search box that exhibited the facets on the left side of the screen, with some providing the number of results within each facet, and they were presented to the user as refinement tools. The facet categories most commonly provided included both administrative—e.g., item holdings information—and bibliographic—e.g., subject, author, and format—metadata [6]. Each of the interfaces included a search box at the top of the results page for beginning a new search or searching with refined results.

The organization of the remainder of this paper is as follows. First, the author’s method of research is presented. Next, the results of the author’s research is summarized, wherein each of the five studies is briefly described. Then the discussion more closely examines the studies’ purposes, methods, and findings. Finally, in the conclusion, some areas of research still needed are identified.

2. METHODS

In order to find studies representative of the research field, the author began the search in the following databases: Library and Information Science and Technology Abstracts (LISTA), Web of Science (WoS), OCLC’s FirstSearch WorldCat and ArticleFirst, and the Association for Computing Machinery (ACM) Digital Library. The terms searched were “faceted classification,” “faceted interface,” “faceted search,” and “Next Generation Catalogs.” Since the author’s original research premise was “faceted classification,” rather than “faceted interfaces,” some of the sources reviewed and referenced in this paper were discovered from the shared citations and references in the papers retrieved from the initial search.

The selection of the studies for this review is in no way a reflection of their quality in design or reporting in comparison to those not selected. They were chosen in order to review a variety of usability studies, ones that did not necessarily share purposes, methods, and findings. Also, there was no lack in the number of available resources. For as many usability studies that specifically addressed faceted interfaces in both OPACs and e-commerce applications, there was just as much literature that discussed them within the context of an entire OPAC or NGC [1, 6, 7, 10, 13, 17, 22].

3. RESULTS

Olson provided the only study to specifically address whether a faceted interface would enhance discovery and for experienced searchers [15]. It was also the only study conducted as a “business decision” in order to determine and thereby justify the implementation of such a system at the University of Chicago Library [15]. They studied twelve Humanities PhD students who were in the dissertation writing stage. Using a special demo version of the AquaBrowser faceted interface with Chicago’s bibliographic records, each of the students was asked to conduct a search on their dissertation topic and to comment aloud while doing so. The facilitators recorded the students’ search methods as well as their comments, particularly noting whether facets were used and if new materials where discovered. “New discoveries” signified the finding of resources relevant to the subjects’ dissertation topic not previously discovered through the traditional interface OPAC [15]. The findings showed that although nine out of the twelve students made new discoveries, in only four of the sessions could the facilitators be certain they were at least in part attributable to the use of facets. However, the results did show that the participants, without prior instruction, understood and effectively used the facets for refinement. That these less than stellar findings were sufficient to justify Chicago’s decision to purchase a faceted interface OPAC indicates that this was the desired result.

Although not pre-implementation studies, the next two studies, conducted purely to advance the research field, are similar to Olson in that they address user behavior with faceted interfaces in relation to specific research tasks.

In order to assess whether the stage of the “exploratory search” task and the provision of training influenced the use of facets, Kules and Capra studied eighteen freshmen at the Catholic University of America using an OPAC “testbed” adapted from the Endeca system used by NCSU [11]. They provided the students with specific search tasks designed to resemble those most often used during the early stages of research for writing term papers. They also divided the students into three groups and using two slightly different faceted interfaces, one with “help links” and one without [11]. The control group did not receive training on the interface facets and used the interface without the links. Another group also did not receive training but used the interface with the links. The third did receive the training but used the interface without the links. While the students conducted the tasks, their “gaze behavior” was recorded by an eye-tracker. Eye-tracking techniques follow the subjects’ gaze
while recording fixation “frequency, duration, and sequencing” [11]. The “gaze metrics” gathered for this study were “fixation count, total fixation duration, and gaze duration,” wherein “fixation duration” measures the total amount spent looking at each of the interface components for the entirety of the session, and “gaze duration” measures the amount of time spent looking at each of the components before transitioning to another [11]. The specific interface components of interest, in addition to the facets, were the breadcrumbs, the search box, and the results list. Following the completion of the tasks, the students filled out questionnaires regarding the task topics and their perceptions of whether their searches were successful. They also engaged in “stimulated recall interviews” with the facilitators in which, while reviewing a video capture of their search session that was overlaid with the eye-tracking data, they verbalized the particular stages and methods being employed at each instance of captured gaze [11]. The results of the gaze metrics showed that facets were looked at almost twice as much as both the search box and the breadcrumbs, although not as much as the results list. They also found that the group that was given video training used facets twice as much as those that did not regardless of the interface they used. In addition, their findings regarding facet use during specific search stages showed that facets were used most during query formulation and decision-making, the tasks most exemplary of exploratory searches. The authors rightly conclude that their findings contributed to the library field significant data for use by search behavior researchers, user interface designers, and instruction librarians.

The study Ramdeen and Hemminger conducted also addressed the “user experience” of a faceted interface in relation to specific search tasks, but for the entire range of search types. They compared time, accuracy, and user preferences between a faceted interface OPAC and a traditional OPAC, rather than assessing whether specific components of the faceted interface were a factor [16]. They studied forty students at the University of North Carolina (UNC), specifically choosing freshman in order to assess the experience of the “novice user” [16]. Although UNC had previously implemented the Endeca faceted interface, they offered it to their patrons side by side with the traditional model. The initial query entry pages did not differ between the two; the difference was manifested on the results pages. Rather than focusing on only the “exploratory search” stages as did Kules and Capra [11], Ramdeen and Hemminger made their assessments across the three main categories of search, “Exploratory,” “Partially Known,” and “Known” [16]. The students were given three pre-specified tasks, each within each of the three search categories, and on both interfaces, for a total of eighteen searches per subject. The methods used were direct observation of search methods, audio and screen capture of search actions, timing of each search session, and a follow up questionnaire to assess user preferences. Timing of each search began with the initial query and ended with answer selection. Accuracy was determined by two independent judges and on a four-point scale. User ratings were measured with a five-point Likert scale on questions designed to assess, in addition to preference, user confidence and whether they thought facets were useful. The interface comparison-related findings showed that, not unexpectedly, the accuracy of searches did not differ between the two interfaces, but did show that the faceted interface was ten seconds faster per search and was preferred by users by a 0.46 margin. The search category-related findings, however, show a more nuanced favorability for the faceted interface in the speed and user rating, but less so across the three search types. The faceted interface was faster by twelve seconds for the “known” searches, ten for the “partially known,” and thirty for the “exploratory” [16]. The faceted interface was more accurate for only the “exploratory” tasks [16]. Although the user ratings for the faceted interface did not improve for either the “partially known” and “exploratory” tasks (only a 0.35 margin), the “known” tasks showed a margin of 0.55, an increase of 0.09 above the general comparison findings [16]. Post-session interviews showed that for the faceted interface, thirty-six of the forty subjects preferred it, the subjects were more confident in the results, and they commented favorably three times more than for the traditional interface. Observations showed that although the students did not always use facets effectively, they used them predominately for narrowing down the retrieved results by subject, format, and author. Similarly to Kules and Capra, the authors justifiably conclude that their findings, particularly those that show an influence of task type on search results and on the use of facets, would assist libraries in developing both faceted and non-faceted OPACs alike.

Bauer and Peterson-Hart also compared a faceted interface OPAC to a traditional interface OPAC, but they did so in order to determine which interface showed the most use of Library of Congress Subject Headings (LCSH) as a query parameter and/or results refinement [2]. Like Olson, this study was motivated by the need to answer a site-specific question: in order to make the best use of cataloging staff at Yale University Library, were subject headings being used in either interface, and if so, how well? Similar to the UNC study, Yale provided dual entry into their OPAC, with the VuFind faceted interface on one side (reconfigured and rebranded for Yale as YuFind), and the traditional Orbis interface on the other. This two-part study utilized direct observation for the use of facets--particularly the subject headings--and log analysis for the use of subject headings in both interfaces. During the direct observation portion, two rounds of five undergraduate students were given pre-specified tasks designed specifically to “test the use of facets” [2]. Their “think aloud” search sessions were recorded for later analysis, which were used for comparison to the analyzed log data [2]. Log analysis as a usability method entails collecting and analyzing “user transactions, movements, and actions” from the logs of the server housing the OPAC’s bibliographic records [21]. It is a commonly used method of gathering and evaluating user behavior which requires large data sets and clearly defined units of user activity [9]. At Yale, logs were collected from a five-month period in 2011 which contained approximately 270,000 visits and 480,000 page views. A visit was defined as any OPAC session, regardless of the method of entry, with at least one activity which in turn defined a page view. The findings of the observations showed that most students successfully used and found useful the facets to “navigate” and narrow down the retrieved results [2]. The recorded comments suggested that subject heading facets were also effective and useful. However, the findings of the log analysis showed that although Orbis was accessed over twice as much, once users entered YuFind they utilized the subject headings facets only 20% of the time compared to 31% for the format facet and 28% for the language facet. The authors concluded that in order to increase the use of subject headings facets, the underlying LCSH metadata needed enhancement and/or the usefulness of facets was limited to
certain types of metadata. They did not disclose if these results led to a revision in cataloging practices at Yale.

The final study being reviewed, by Niu and Hemminger, is a continuance of earlier research conducted by Ramdeen and Hemminger, both of whom also based their research at UNC and on UNC’s faceted interface OPAC [14, 16]. However, this is the only study of the five to include a faceted interface OPAC from a public library—Phoenix Public Library (PPL)—as the basis for comparison. Similarly to Bauer and Peterson-Hart, this study also utilized log analysis, but as its sole method of evaluation. In addition to analyzing the log data for facet usage across specific search actions, they also conducted “cluster analysis” on the data in order to gain a larger view of the different types of search actions in both the academic and public library environments [14]. At UNC, logs were collected from a forty-day per period in 2010 which contained approximately 500,000 sessions. At PPL, logs were collected from an overlapping sixty-day period in 2010 which contained approximately 1,000,000 sessions. A session was defined as a consecutive series of requests to the OPAC with no more than a thirty minute period of inaction. The sessions were grouped into meaningful “action codes,” twenty-seven in total but only fourteen in common, not all of which included faceted-related activity. The most frequent of the common actions were “MultiTermText” (multi-term queries) and “ViewRecord” [14]. Faceted-related actions were among those the least performed excepting the “AddFacet” (for refining results) which showed only half that of “ViewRecord” [14]. Of the common faceted actions (the others being “RemoveFacet” and “ShowMoreFacet”), “AddFacet” was used in both OPACs more than three times than the other two combined [14]. Assessing the relative use of facets between the two interfaces showed that the placement and types of facets employed had a significant effect. The placement and types of facets differed between the two OPACs. In addition to presenting facets on the results page—typical of the other OPACs being reviewed here—PPL’s interface provided facets on its initial query page as well. Designed to facilitate browsing, they included books, movies, and music. On the results pages, both of the OPACs provided similar facets such as subject, author, format, and item holdings information. Not surprisingly then, both the log and cluster analyses show that facet use was over twice as high in PPL’s interface. Additionally, the facets deemed most popular were books, movies, and music in PPL and subject, author, format, and holdings data in UNC. The authors concluded that OPACs like UNC’s that only provide facets for refining results would improve their users’ search experiences by also providing facets for browsing on the initial query page.

4. DISCUSSION

Although the five reviewed studies spanned a range of purposes and methods, the overall findings indicated that facets are used effectively, are useful across different task types, and are preferable over traditional OPAC features as well as other features within the same systems. The following sections will more closely and critically examine the commonalities of the studies.

4.1 Purposes

It is difficult to discuss the purposes of the studies as divorced from their methods, but some of them are worth noting. The five studies were motivated by two broad categories of purpose: to address site-specific OPAC-related issues or to contribute to the library and information science field for the benefit of librarians, information systems designers, and researchers of information seeking behaviors.

The purposes of the two site-specific studies, Olson and Bauer et al., can be further differentiated by their underlying goals. While Olson indicated the need for pre-implementation evidence, the actual motivation for the study was the concern that, due to space saving measures in Chicago’s stacks, scholars’ access to materials would decrease. A faceted interface OPAC was seen as the answer toward alleviating the diminished discovery that would result. Yale, which had already implemented a faceted interface OPAC, also had concerns about their users’ difficulty with access and discovery. They sought answers in the relationship between facet use and metadata, rather than facet use and discovery.

As a side note, the fact that Yale had not replaced but supplemented Orbis, in conjunction with the tone of Bauer and Peterson-Hart’s article, implied a lack of commitment to the YuFind interface, rather than a desire to retain Orbis for assessment purposes. Their study may have been, like Olson’s, an effort to justify a pre-determined outcome, but one related to staff resources.

Although the two site-specific studies discussed above have practical implications for the wider library field and therefore should not be discounted, perhaps most technological advances in general have resulted from academic research, such as that conducted in the remaining three studies. Research conducted for this purpose has the potential to effect and benefit a wide swath of the population, and can have implications for a number of industries. The three such studies reviewed here originated from the rich research environment that made possible the implementation of the Endeca faceted interface OPAC at all four libraries in the Triangle Research Library Network (TRLN); Duke University, North Carolina Central University (NCCU), NCSU, and UNC [16]. UNC’s School of Information and Library Science is the academic home of these three studies’ authors and many others active in library and information science research [19]. In addition to the research published by Kules, Capra, Niu, Ramdeen and Hemminger reviewed and referenced here, many other authors have discussed the Endeca OPAC’s implementation and success, and its influence in both the library and commercial environments [1, 6, 10, 18].

4.2 Methods

Unsurprisingly, the purposes and the research questions posed by the studies were the predominant determinants of their chosen methods of assessment. The studies intent on academic research tended to employ a wider array of methods and/or ones of higher complexity than the site-specific studies did. However, the usability study methods at their disposal do not necessarily in turn dictate the purposes, and thus the five studies used many of the same methods. The entire array of methods will not be reviewed here, but a few of those commonly employed and of notable distinction will.

Three of the studies incorporated the gold standard of usability studies: direct observation. Since this is a time and resource-intensive method, it normally includes a small number of
subjects. But according to Walbridge, it is “proven…that a small number of users…will yield 80% of the problems” [21]. The fact that Ramdeen and Hemminger studied 40 subjects speaks to the comparative resources available. Direct observation entails having the study participant “think aloud” while performing a search task, which is then recorded by a facilitator [21]. When observations of search methods are also employed, such as by Olson, Bauer et al., and Ramdeen et al., and if audio capture is not used, a second facilitator records the participant’s comments. Additionally, participants are usually given pre-designed tasks, with the goal being to observe search methods and effectiveness under somewhat realistic and real-time conditions. Of the three, Olson’s was the only study whose task was not pre-designed. Fagan commented favorably on Olson’s approach because it “allowed the researchers to control for the variables such as interest of and knowledge about the subject,” [8]. But assigning specific tasks is appropriate for larger studies that combine methods and goals, for those that measure a number of variables, and for those that produce reusable protocols.

Other than the fact that Bauer et al. combined log analysis with direct observation while Niu et al. relied on log analysis alone, the main distinction between the two was their method of organizing and/or describing the log data. Niu and Hemminger went to great lengths to describe the challenges involved in both identifying distinct “search sessions,” and in codifying the “log entries as particular individual actions that are part of the search process” [14]. By comparison, Bauer and Peterson-Hart’s description of the size, breadth, and unit of meaningful data showed a remarkably sparse lack of detail, which may be significant. It is unclear if this distinction is only a reflection the authors’ writing styles. However, in order to judge the findings on their own merit, the quality of the methods employed must be assured. Both studies clearly defined their unit of meaningful data: “visits” and “page views” for one, “search sessions” for the other [2, 14]. However, Bauer et al. did not further distinguish the units into specific areas of the interface or user activities, as did Niu et al. This would not be a problem if the former had not reported results indicative of such further classification.

Although only one of the studies reviewed here utilized this method, the findings that resulted were significant and therefore worth discussion. Eye-tracking technology is used to “determine exactly which parts of the screen people view [and] to better understand the mental process that participants are undergoing when assessing a search interface” [9]. Kules and Capra stated that the eye “fixations” recorded by the tracker “can be interpreted to provide indications of the relative importance or complexity of parts of the screen as well as the user’s cognitive activity” [11]. However, eye-tracking does have its limitations. One usability study not reviewed here but authored by Kules and Capra and others, mentioned it can “conflate gaze frequency with gaze duration” [12]. That Kules and Capra in their later study reviewed here specifically made the distinction between the two metrics showed an apparent effort to mitigate the potential conflations [11]. Other limitations of eye-tracking have led to the consideration of its use as “controversial” [17]. As reported by Sadeh, the interpretation of gaze fixation as an interface features’ appeal to users can be conflated with the users’ confusion [17]. By incorporating gaze pattern playbacks in the stimulated recall interviews which revealed episodes of confusion, Kules and Capra appeared to have alleviated this concern as well. Sadeh added that due to its technological complexity, it cannot be used with, for example, participants who wear glasses [17]. A valid point not mitigated by Kules and Capra.

Although not a “formal” method of usability testing, Fagan recommended including “benchmarks for comparison” in a study’s design [21, 8]. As employed by Niu et al., Ramdeen et al., and Bauer et al., comparisons revealed significant differences between two distinct faceted interface OPACs and between two distinct interfaces within the same OPAC. Reliable and valid findings, however, require that the bases for comparison be of equal standing. For example, Bauer and Peterson-Hart compared the log data between the Orbis and YuFind interfaces. The log data was also compared to the directly observed findings. That the log data was gathered two years after the observation sessions may not invalidate their findings, but it does call them into question. Niu and Hemminger is another example of a potential misuse of comparison. The problem lies not in the log data collected or the authors’ interpretations, but rather with the design of the study overall. UNC and PPL included some overlapping facets, and it is therefore valid to measure which of those were used most. However, the fact that PPL provided facets on its initial query page and UNC did not, and that the findings unexpectedly showed a higher use of facets in PPL, suggests that the two interfaces were not valid bases for comparison. In other words, the study’s finding only served to confirm the obvious.

4.3 Findings

Rather than reiterating the findings data from the studies in detail, following Fagan’s lead, some of the positive findings are summarized below, which are then followed by a more elaborate discussion of some of the conclusions and interpretations that the findings engendered.

- Facets improve discovery of new materials [15].
- Searching is faster with facets [16].
- Search results are more accurate with facets [16].
- Facet use is relatively high and useful for particular search tasks [11, 16].
- Facets are highly and effectively used for browsing, navigation, refinement, feedback, and confirmation of results [2, 11, 14, 15, 16].
- Facet use increases when users receive training [11, 16].
- Facets can be an effective method of exposing an OPAC’s bibliographic and holdings level metadata [2, 14, 15 16].
- User preference, confidence, and satisfaction are higher with a faceted interface [2, 11, 14, 15, 16].

As evident from the above list, the studies produced a wide variety of findings, some similar but some not. Although most of the studies discussed some of the limitations of facets, by and large the findings were positive. The fact that the following discussion excludes the former does not signify their lack of importance; some of them will be addressed in the conclusion. That Kules and Capra figure into all aspects of the following discussion is a reflection of the breadth of their scope and methods, the thoroughness of their article, and the quality of their study overall.
Of particular significance to instruction librarians, Kules and Capra found that facet use was higher for users that received prior video training. The findings also showed that the subjects using the interface with “What’s this?” help links did not make significant use of the facets [11]. Ramdeen and Hemminger, who provided their participants with prior training on both interfaces, noted that a number of their participants remarked that they would not have used facets without it. Because it has been shown that most library patrons do not make use of external information literacy instruction [16], Kules and Capra suggested that libraries should explore the incorporation of online training tools such as “just-in-time” video clips [11].

Two of the studies showed significant findings in relation to particular search task types, and they both found that facets were used often and highly effectively for the “exploratory” tasks [11, 16]. Both studies defined exploratory search tasks roughly as those wherein a broad topic of research is known but the user has not yet chosen a specific aspect and/or has uncertainty about the topic itself. Ramdeen and Hemminger, who compared three distinct task types, showed that with the faceted interface searches were faster and more accurate for exploratory tasks, a result most likely due to facets’ ability to start with an imprecise query and to comparatively quickly filter the results with some precision. They also found, as did Kules and Capra, that in exploratory tasks, ones deemed most “cognitively demanding” and with a higher potential for a dauntingly long list of results and “dead ends,” the subject and format facets were the most frequently used (in contradiction to Bauer et al.). They suggested, rightly, that this was most likely due to these two facets’ ability to facilitate not only narrowing the results, but browsing within different aspects of the search topic [11].

As the two studies above suggested, an OPAC with a faceted interface enabled it to become more than a list of a library’s holdings of benefit primarily for “known item” search types [16]. Olson suggested that the browsing capability of a faceted interface can enhance such search types that are typical of advanced searchers and scholars by improving discovery. However, much research has shown that most library patrons are both limited in their searching skills and have less pre-formulated information needs and as a result are more comfortable mitigating those needs using search engines. In order to attract library patrons back to OPACs, libraries need to furnish the same simplified and intuitive features as sites such as Google and Amazon—keyword-capable queries and results refinement tools. But they must also provide tools that mimic the information seeking activity most common in the library environment, browsing. Browsing is not to be considered a causal endeavor but rather an information seeking behavior that best mitigates the difficulties most users have defining their queries and understanding query results [14]. As Niu and Hemminger suggested, when facets are available as a browsing mechanism, they are effectively and frequently used for this purpose [14].

Ramdeen and Hemminger furthered the argument that facets “close the gap between the mental model users have of their search process and the interaction they have with the [OPAC’s] search interface” [16]. Many of their study’s participants reported using facets more than the amount recorded during the direct observations. This finding, coupled with Kules and Capra’s conclusion that their gaze metrics showed slightly higher attention to facets than Niu and Hemminger’s log analysis, suggested that facets not only facilitated results refinement and “decision-making” tasks [11], but also served as feedback to the users that they were “on the right track” [16].

5. CONCLUSION
User interfaces are an integral part of an information retrieval system. And as such, usability studies reveal vital information to those that design, develop, implement, and maintain them. Faceted interfaces that have been successfully applied in the commercial environment have been well studied. Although relatively newer in the library environment, faceted interfaces have stimulated considerable research as well, much of which has found that facets are used effectively in a variety of information seeking activities. But the studies reviewed here showed that there remains area left to explore, particularly the relationship between facet use and metadata and facets’ influence on discovery and relevance.

Both Olson and Bauer et al. concluded their respective studies with a discussion on the challenges posed by the integration of faceted classification with LCSH metadata, particularly when the trend in cataloging practices is to provide minimal coverage. Since this has the potential to severely curtail discovery and relevance, efforts towards a workable solution, such as those currently underway should continue. One such effort is OCLC’s “Faceted Application of Subject Terminology” (FAST) initiative which integrates LCSH vocabulary with Dublin Core Metadata [5].

Olson’s study revealed the potential that faceted interfaces hold for improved discovery, albeit for “domain experts” [15]. It’s fair to say the tasks given to Olson’s subjects closely resembled the definition for “partially known” tasks given by Ramdeen and Hemminger: ones in which a specific item is not known, the user has decided on a topic, and the user has some interest in their topic, the latter being one of Fagan’s recommendations [16]. Ramdeen and Hemminger, whose subjects were “novice” users, found positive results for search accuracy, an indication they were both more relevant and useful, albeit only for “exploratory” search tasks [16]. Although Olson believed they produced “empirical” results, Bauer et al., hinted at Olson’s unreliability given that the “judgments [of new discoveries] relied on participants’ memory of what they had seen in the other non-faceted catalogue” [15, 2]. Fagan considered “reusing protocols from previous studies” [for a] “point of comparison,” as a “methodological best practice,” and as such it behooves researchers to utilize reliable and repeatable methods [8]. Bauer and Peterson-Hart’s comment suggested that Olson’s methods did not qualify as such. Perhaps studies that combined elements of both Olson and Ramdeen et al.—the latter having used a variety of methods and comparison—could reveal whether facets contribute to new discoveries for a range of users and/or more relevant results for a range of search tasks. Such findings under more stringent protocols would therefore be both more valid and of more value to researchers seeking to advance the technology and to understand user behaviors.

This review suggests that much progress has been made toward the goal of providing users with a highly effective and intuitive information retrieval interface. That a variety and combination of methods were employed in the studies tends to confirm and therefore strengthen this assertion.
6. REFERENCES


