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Providing Cognitively Just Subject Access to Indigenous Knowledge through Knowledge Organization Systems

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ABSTRACT

This article explores cognitively just, reliable subject access to indigenous knowledge through knowledge organization systems (KOSs). Cognitive justice requires that indigenous people be able to access materials in a way that respects their worldview, yet dominant KOSs are based on positivist, Western approaches that are fundamentally incompatible. Alternatives to universal systems include the creation of new KOSs and the adaptation of universal ones. Going forward, emerging web technologies are presented as key to moving away from universalist schemes and toward specialized access.

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Subject access to all knowledge, including indigenous knowledge, is imperative for libraries and other knowledge institutions, and obstacles to intuitive subject access present a social justice problem. The United Nations (UN) defines *indigenous knowledge* as

The understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings. For rural and indigenous peoples, local knowledge informs decision-making about fundamental aspects of day-to-day life. This knowledge is integral to a cultural complex that also encompasses language, systems of classification, resource use practices, social interactions, ritual, and spirituality.¹

Indigenous knowledge is socially constructed knowledge based on an indigenous people's deep experience with and in a certain geographic area. Fulvio Mazzocchi explains that what we refer to as indigenous knowledge or *traditional knowledge* is not easy to categorize, as it touches on many different domains, and “many terms are used to establish what indigenous people know, including traditional knowledge or traditional ecological knowledge, local knowledge, indigenous knowledge or science, folk knowledge, farmers’ knowledge, fishers’ knowledge and tacit knowledge.”² In this article, we focus on *reliable*, or professionally mediated, access to recorded indigenous knowledge through the use of classification and controlled vocabularies.

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Who are the indigenous people at the origin of indigenous knowledge? All societies, even modern, Western societies, might in some way or another be said to have a long history of a relationship to the land, yet not all people are considered *indigenous*; despite the fact that, at present, “there is no universally accepted definition of indigenous peoples,”³ there are a number of characteristics of indigenous people that have been identified. David Gordon and Shepard Krech III explain that “Applying ‘indigenous’ to a particular people arguably has as much to do with political relationships as with any inherent characteristics shared with other so-called indigenous peoples.”⁴ The UN designates indigenous status to communities that self-identify as such, but these communities must be rooted in pre-colonial settlement, maintain a strong link to the land, and hold “distinct social, economic or political systems ... and language, culture, and beliefs” that differ from the dominant society.⁵ In total, according to the UN’s Food and Agriculture Organization (FAO), there are more than 390 million self-identified indigenous people, living in at least 5,000 groups, speaking some 4,000 languages, in 70 countries around the world.⁶

Living outside of the mainstream, indigenous people are vulnerable to exploitation because of various and continual violations of their rights, i.e., rights to land in the face of development and exploitation of natural resources; their right to autonomy or self-government; and a right to maintain their own culture or resist assimilation.⁷ Munyaradzi Mawere quotes Hegel as saying in 1828: “Let us forget Africa, for it is no part of human history.”⁸ This dismissal embodies the process of subjugation inherent in the Colonial era, as well as now in the globalized world that has discounted indigenous knowledge systems as “bounded, savage and primitive; hence unfit for global consumption.”⁹ In the cultural heritage sector, we, like Mawere, know this to be fundamentally untrue and like the UN’s Division for Social Policy and Development for Indigenous People, see the benefit in “promot [ing] full and effective participation of indigenous peoples in decisions affecting them.”¹⁰ In libraries and other cultural heritage institutions, this includes decisions about how information relevant to indigenous people is stored and made accessible.

Indigenous people and access to information in libraries

Cultural heritage and knowledge institutions, including libraries, archives, and museums (LAMs), are part of a complex information ecosystem and face related issues regarding representation of indigenous, minority, or marginalized peoples. David Carr said, “In cultural institutions, knowledge structures offer taxonomies, histories, categories, vocabularies, insights—what we might call connective illuminations of knowledge.”¹¹ He explains: those structures can be either closed, meaning that the systems serve to maintain social structure, or open—that is, they can create a place for “unpredicted, inventive thoughts...[offering] contradictions, controversies, and alternative perspectives...”¹² Access to indigenous knowledge

must look to its origins; the knowledge presents problems for entrenched systems at every step (i.e., production, storage, and retrieval). The only solution is to include the viewpoints of indigenous people at every step, and to let that organizational structure unfold organically, grounding the collection and its surrogates in a socially just and rights-based representation of indigenous knowledge.

The KOSs that most libraries rely on at present for organizing information (e.g., Dewey Decimal Classification (DDC) scheme, Library of Congress Subject Headings (LCSH), and Library of Congress Classification (LCC) scheme) are, using Carr's terminology, closed, and have the potential to limit ways of thinking.¹³ Pauline Rafferty presents the idea in this way: "All major classification schemes are built on clearly identifiable systems of knowledge, and all classification schemes, as discursive formations, regulate the ways in which knowledge is made accessible."¹⁴ One way this is apparent, and which is the focus of this article, is in the incompatibility between traditional KOSs and ways of knowing that fall outside of these systems' limitations, both for the materials and for indigenous library users. In these cases, universal KOSs alone, in traditional systems, will fail to provide access to indigenous or traditional knowledge from the point of view of the people whose ideas are being represented.

Purpose and structure of this article

This conceptual article explores how indigenous knowledge is represented, and how it can and should be represented, especially in light of initiatives undertaken to provide socially just access to content that is not mainstream, for users who are not mainstream, including through the use of promising new information technology. We began this article by considering the notions of indigenous knowledge and of indigenous people and briefly considered the role of libraries vis-à-vis these topics. Next, we present the theory of cognitive justice most recently brought into library and information science discourse by John Burgess, and apply this theory to existing, universal KOSs. If a goal of information professionals is to provide reliable subject access, then how does indigenous knowledge correspond to work currently being done in libraries? Specifically, we look to problems of organizing information outside of the mainstream, and consider how non-mainstream topics are treated in the universal systems commonly in use. In an effort to explore cognitively just solutions, we next examine a series of cognitively just alternatives to dominant KOSs, including specialized and adapted KOSs, and we reflect on the steps taken to arrive at such systems. Finally, we consider the future of reliable access as well as considerations for future research.

Cognitive justice

Cognitive justice is a concept developed by Shiv Visvanathan in 1997¹⁵ that says different conceptions of knowledge can co-exist, and that Western knowledge can and should treat non-Western knowledge equally. This approach is applied to information

ethics by John Burgess, who explained that a cognitively just approach to information science:

“tends to reject the language of universal human rights as following an unrealistic and particularly Western notion, and seeks to replace that language with autonomy, dignity, and a ‘commons’ approach to cultural authority...the object is...to promote healing and forgiveness by removing the continued burden of colonialism and legacy thinking.”¹⁶

It does not reject scientific approaches to knowledge, but seeks to maintain the cultural and social context of folk or traditional knowledge, recognizing that solutions to problems might be found by mining a wide diversity of solutions (that is, both indigenous knowledge and Western/positivist knowledge). In library and information science (LIS), cognitive justice has already successfully been applied to the study of indigenous knowledge in Africa,¹⁷ and we continue with its application in LIS in the context of organization.

Burgess further explains that librarianship has been complicit, if not responsible, for perpetuating colonial approaches to knowledge by replacing traditional knowledge with Western knowledge, especially in physical libraries established under colonial regimes, by failing to maintain the authority of the indigenous people who produced the knowledge, or by stealing or appropriating the knowledge without appropriate compensation. This criticism of librarianship certainly comes from a widely recognizable pattern across various disciplines and professions, such as education, medicine, and science. The rigidity of information systems, which was necessary in the card catalog and even in electronic surrogates for the card catalog, could be reconsidered in light of both the recognized needs for cultural autonomy for indigenous people and the flexibility that is granted by newer web technologies, such as linked data.

As part of the cognitive justice focus, we next consider what indigenous people need from libraries. Martin Nakata offers one theoretical perspective, contending that “indigenous peoples need meta-knowledge—knowledge about knowledge as the basis for their interactions with the multitudes of intersecting, often conflicting or competing discourses emerging from different systems of knowledge.”¹⁸ He contends that siloing knowledge is not good for anyone—especially indigenous peoples, and that minimizing the knowledge systems of indigenous peoples is yet another way of replicating past injustices (i.e., colonialism). There must be some way to include indigenous knowledge within a library’s current system. Oral societies, especially, present a theoretical puzzle for libraries; Brooke M. Shannon¹⁹ found that university women in Kenya differentiated between wisdom of elders and university education. Shannon and Jenny S. Bossaller²⁰ sought a way to incorporate (and thus lend scholarly legitimacy) to the wisdom of oral societies that the Kenyan students differentiated from scholarship, concluding that oral histories integrated into the stacks, and human libraries (such as including elders as scholarly sources in libraries) might provide a way to incorporate their wisdom. This is a low-tech solution that looks at the puzzle, but not the problem of categorization.

Incompatibilities of Western library systems and indigenous knowledge organization

Western KOSs are predicated on their use in Western library systems, an assumption which does not necessarily meet the needs of non-Western and non-mainstream users; it does not promote cognitive justice for anyone outside of the mainstream Western society. At present, a number of KOSs are based on *literary warrant*, the practice of deriving the “vocabulary of a subject language [...] from the literature it is intended to describe,”²¹ which was first developed as a way of deriving language for LCC.²² LCSH and DDC both rely on literary warrant,²³ and unless editors in charge of these KOSs have access to indigenous materials, there will be no literature upon which to base the warrant for the creation of concepts and terms.²⁴ The use of literary warrant as a basis for KOSs leads to the marginalization of certain cultures. Eunice Kua, writing about the situation in a rural South African high school, asks:

“What does it say to a child, when all of the categories in a system seem to accentuate what is not yours, while all the practices and wisdom of your culture are relegated to a tiny sliver of space? What is it like to grow up in a world where unfamiliar languages are revered, where your mother tongue may be good and useful for everyday life, but is not a vehicle for advancement?”²⁵

Although useful for devising a universal scheme based on Western approaches to information and a practice that has stood the test of time for organizing Western literature, literary warrant based on traditionally published materials does not provide a cognitively just access to resources for those outside of the Western mainstream.

Other kinds of warrant traditionally used in KOSs are *user warrant* and *structural warrant*. User warrant is based on the language of the end-user and was the original intention of Cutter’s statement that it should be the “supreme arbiter.”²⁶ Structural warrant provides hierarchical linkages where otherwise there is neither literary warrant nor user warrant; the example given by Elaine Svenonius is MASONRY VAULTS in the *Art and Architecture Thesaurus* from the Getty. This term is not one that otherwise exists, but it serves as a parent node to BRICK VAULTS, STONE VAULTS, and TILE VAULTS.²⁷ Ann M. Doyle, Kimberley Lawson, and Sarah Dupont identify a fourth type of warrant relevant here: *indigenous warrant*.²⁸ For them, terms and potentially classification structures are derived from the worldview of the indigenous peoples themselves, not from the dominant cultures who write about them or who search for information about them. Indeed, classification acts as a way of mapping knowledge; Brian Buchanan notes that for the Sioux, the entire nation was systematically organized, from its conception of the universe to the intricate hierarchies that were used in society.²⁹ This approach will not be replicated in universal systems based on the literary warrant in use today, though it will provide cognitively just, reliable access for indigenous users involved in the creation of the KOSs.

Classification through the use of hierarchical schemes is a primary method for organizing physical collections in libraries that have open stacks. Classification is an effective method of organizing materials since its purpose is to group similar things together,³⁰ but it begs the question: From whose perspective are things alike? In a classification scheme, at least one characteristic is shared by members of a group,³¹ but which characteristic(s) is/are chosen by the designers of the scheme as a basis for the grouping? This logically depends on who is designing the scheme. Classification schemes used across various cultural institutions—especially in libraries, but potentially also in archives and museums—can present the classes (and subsequently the selected characteristics) as somehow being innate, rising from a society's shared intellect.³² Universal bibliographic control, a tenet in modern librarianship, arose “toward the end of the [nineteenth] century”³³ with the advent of universalism. DDC, LCC, and Universal Decimal Classification (UDC) were all outcomes of this trend. Universal systems replaced the local systems that had been in use, with the intention of providing enhanced access to all kinds of knowledge.³⁴

The KOSs that information professionals use today were built based on a Western, positivist worldview, which excludes the vast universe of indigenous and traditional knowledge.³⁵ By only using established categories for classification, we are left drowning in our own discursive formations, oblivious to alternative possibilities. Diversity is not necessarily supported in these KOSs (or it is often presented as “the other”), and we, like Rick Szostak, have concerns that “existing classifications privilege certain ways of looking at the world while obscuring others.”³⁶ Unlike Szostak, however, we remain unconvinced that universal approaches to knowledge organization are adequate for providing reliable subject access in specialized circumstances such as access to indigenous knowledge. Although some of the systems (such as DDC) are flexible and extensible to an extent, they are still hierarchical and are not created by the users themselves. No body of knowledge is stagnant; new scientific discoveries, relationships between realms of knowledge within each scheme, and a lack of compatibility between various systems of knowledge are some of the many perplexing problems for classification, especially in closed³⁷ systems. These problems are amplified when attempting to provide access to already marginalized knowledge.

Another problem for libraries is that indigenous knowledge may not necessarily be recorded, but rather transmitted orally. Western, positivist traditions privilege written knowledge,³⁸ but some knowledge is inherently difficult to make explicit. Michael Polanyi describes *tacit knowledge* as a part of all human knowledge—examples include the inability to describe facial features and the ability to identify research questions that are worth exploring and that will yield compelling results when carrying out science.³⁹ Tacit knowledge is not only *not* recorded, it is fundamentally difficult to make explicit; it is difficult for the knower to explain. Ronald E. Day, in reflecting on Polanyi's conception of *tacit knowing* arrives at the conclusion that tacit knowledge is simply *knowledge*—and that explicit knowledge is

information.⁴⁰ Ilkka Virtanen, likewise, points out the differences between practical and objective epistemologies, expanding on Michael Polanyi's 1974 framework for considering tacit and explicit knowledge in regards to knowledge organization.⁴¹ Expectations of formal, Western-style recorded knowledge as a guide to assist information professionals in organizing knowledge, therefore, are not only unrealistic, they are also potentially counter to the spirit of the culture's transmission of information.

Access is only one facet of librarianship, however. Collection building is another, and inclusive collections for indigenous users cannot be built by outsiders (such as anthropologists⁴² or those collecting data⁴³) alone. Any collection should be created under the direction of, and be organized by, experts. In the case of indigenous or traditional knowledge or knowledge of other marginalized peoples, experts should also be involved in production to encourage dissemination, with a potential for collection development to take place organically and possibly also informally.⁴⁴ Therefore, the challenge is to involve indigenous people, on their own terms, in the production, dissemination, storage, and organization of their own knowledge so that everyone benefits from a greater understanding of their knowledge and knowledge systems. This article recognizes that collection building predicates organization, but given this article's interest in KOSs, focuses on the latter.

Organizing information outside of the Western mainstream

Why are there different knowledge organization systems, and why do they matter? As many people have discussed, a KOS reflects a particular view of the world. Librarians have largely chosen to use universal KOSs that reflect a particular worldview—one that we, in the field, see as logical—and these KOSs representing it are maintained by subject area specialists and experts in classification. Knowledge and perceptions change regularly, however, and classification schemes do as well.⁴⁵ Each decision about what to include and what not to include in a KOS is based on an assessment of the relationships between entities: Where does this thing belong in the universe of knowledge? How should it be represented? Why is this thing an entity in its own right in the first place?

The way that Westerners have generally described knowledge of the world (and the proper way to categorize many parts of it) since the Enlightenment is largely based in the scientific method. There are other, valid ways of thinking about, interpreting, and interacting with the world, however. One example is the seven epitomes used in China's first documented library catalog created for the Han imperial library collection.⁴⁶ Trying to find how to incorporate other knowledge systems into current ones is a post-positivist undertaking that requires flexibility; it has room for knowledge born from differing world views, such as folk, local, or indigenous traditions and beliefs or religion or other potentially marginalized ways of thinking. As an example, Doyle et al. point out that the *Xwi7xwa* library at the University of British Columbia brought the concept of *wholism* (as distinct from

the standardly spelled *holism*), meaning “Indigenous understandings of the interconnectedness of everything in the universe” into the organization of the library.⁴⁷ Bringing such alternative views under the umbrella of accepted knowledge extends possibilities of enriching everyone’s worldview and increasing tolerance.⁴⁸

Recognizing the value of non-Western knowledge, how best should information professionals organize indigenous knowledge? We believe, like Doyle et al., that “Indigenous classification and metadata are fundamental to Indigenous user-centered information and instruction services.”⁴⁹ Does this run counter to J  r  mie Gilbert’s assertion that indigenous people should have institutional autonomy, though?⁵⁰ We believe that the flexibility offered by developing knowledge systems, especially ones that adhere to emerging technology standards, might be the key to multiple systems, empowering all contributors with authority.

For users to find recorded knowledge in information agencies, the KOS must be adapted to the users. Social justice tenets require that non-dominant users of a system have the same reliable access as users from dominant groups. Beyond the moral imperative to supply reliable access to users for their own information, we also identify the desirability of making indigenous knowledge, knowledge that may not exist in dominant cultures and therefore may not be describable by universal KOSs, available to all potential users. By reliably organizing non-dominant knowledge for retrieval in a way that is cognitively just, information professionals have the potential to facilitate the discovery of new knowledge and the creation of new connections, with potential benefits to all of humanity through scientific discoveries.

If universal KOSs such as DDC do not support cognitive justice for indigenous people, what can? Doyle et al. “view KOSs as socially constructed, shaped by purpose and cultural context, as well as by location in place and time. They are intrinsic to broader institutional, social, and political processes.”⁵¹ Designed to serve the dominant cultures, standard, universal KOSs alone are not well-suited to provide access to indigenous resources. Indeed, the nature of universal classification schemes makes them ill-suited to provide access to non-dominant subjects even if they are widely developed and used. Such approaches are also ill-suited to provide access for members of non-dominant social groups, such as indigenous peoples. In other words, dominant KOSs can be irrelevant at best in specialized contexts, and potentially harmful in their offensiveness.

Dominant KOS treatment of indigenous topics

Dominant KOSs commonly used in libraries are not adept at organizing information about indigenous people in a meaningful way. In the Library of Congress Classification (LCC) scheme, indigenous people of North America have been subject to the phenomenon of ghettoization and, problematically, have seen themselves included in numbers devoted to history. Within those classes, they have seen alphabetical scattering of tribes by name as opposed to a meaningful method of

organization.⁵² Specifically, at E99 – History of the Americas – Indian Tribes & Cultures, indigenous peoples from throughout North America are grouped under the E99 number and are further organized beyond that based on the spelling of their name. In their example, Doyle et al. show the potential for the Tsimshian of British Columbia to be next to the Tubatulaba of California, who are in turn next to the Tukkuth Kutchin of Yukon, who are followed by the Tzotzil of Mexico.⁵³ Marisa Elena Duarte and Miranda Belarde-Lewis, in summarizing some of the problems with classification of Native American content over the past 50 years, point also to the choice of the name of the tribe: should the name used by the people themselves or the name given in English be the basis for the term used in the KOS?⁵⁴ Either way, the use of the alphabet to organize these groups within their classificatory ghetto is deeply flawed.⁵⁵ DDC has also been the subject of complaints about its treatment of indigenous topics. In summarizing complaints about indigenous people's treatment in DDC, Rebecca Green lists the following.

- Classing materials on indigenous groups in the U.S. in the 970s reinforces a stereotype that indigenous peoples are a “vanishing race.”
- Many topics specific to indigenous groups in the U.S. are missing.
- The DDC doesn't group materials on indigenous peoples in the U.S. in ways typically used by them; for example, the structure of Table 5. Ethnic and national groups is based on linguistic relationships, while for indigenous peoples, cultural relationships are more important.
- The use of Table 5 notation (T5—97 North American native peoples) is not sufficient for collocating materials on indigenous groups in the U.S.
- The use of Table 5 notation for indigenous groups in the U.S. fails to communicate their unique status as sovereign nations.⁵⁶

In her subsequent analysis, Green, as an editor of DDC, refutes claims of DDC's ghettoization and historicization of indigenous peoples in the U.S. as unfounded; in addition, she proposes changes to DDC that she feels need to be explored in consultation with indigenous peoples before being implemented.⁵⁷

For other marginalized groups, DDC does not necessarily provide equitable treatment, nor is it meant to, as a universal classification scheme.⁵⁸ Rafferty similarly criticizes DDC for privileging and imposing a particular (Christian) worldview, and presenting society as “fixed, ordered and regulated...[the] classification scheme is both dominating and enabling. It enables users to access documents without mediation but it imposes on users the necessity of understanding and searching for knowledge in documents from within its particular viewpoint.”⁵⁹ Widely acknowledged examples of ghettoization of non-dominant religions in DDC include placing all of Judaica into 296⁶⁰ and Islamic literature into 297.⁶¹

Library of Congress Subject Headings (LCSH) also demonstrate how dominant KOSs are not suited to organize indigenous knowledge. An example in the article by Doyle et al. shows the LCSH terms for indigenous peoples of Canada: LCSH uses Lillooet, whereas *indigenous warrant* prefers Stl'at'imx.⁶² Christina B. Villanueva likewise demonstrates the insufficiency of LCSH terms when providing

verbal subject access to materials relating to the Cordillera people of the Philippines and concepts relevant to them such as “headhunting, agricultural rituals, ancestral domain, legal pluralism, [and] small scale mining.”⁶³ For example:

The peace pact process called *bodong* and its underlying provisions called *pagta* is an offshoot of the headhunting practice of the Kalingas. *Bodong*, a binding agreement between two warring villages ensures peace and order (Lawless 1981). The *pagta* enumerates the different rules and regulations the members of the village should uphold and respect. This indigenous political system unique to the people of the Cordillera cannot thoroughly be given an American translation under the LCSH thus, the terms ‘peace treaties’, ‘customary law’, or ‘dispute resolution’ are used. The substitute terms are in fact too broad that the true essence of the *bodong* and *pagta* are lost in translation.⁶⁴

Sanford Berman assisted in the analysis of LCSH terms for the *American Indian Libraries Newsletter*. He likewise gives examples of how the Hennepin County Library where he was employed was responding to the need for using indigenous warrant for naming tribes by employing the names they preferred for themselves in the catalog. He also advocates for the use of the term HOLOCAUST to describe the systematic killing of Native Americans during the period of Western colonization, as a replacement to the “feeble” INDIANS, TREATMENT OF heading in use. Berman also proposes the restoration of the previously used LCSH subheading –REMOVAL as a more accurate term than the “essentially misleading and inaccurate” –RELOCATION.⁶⁵

Alternatives to dominant KOSs

Examples of successful specialized KOSs do exist that are in line with the Australian approach that acknowledges the “emergence of a new kind of public, one that includes Indigenous people rather than posits them as subjects which the Eurocentric gaze makes meaning about (although this still occurs).”⁶⁶ Classification schemes that will be most useful to members of the community are both specific and highly philosophically acceptable to members of the community.⁶⁷ In the case of Judaica schemes, Weinberg notes that highly philosophically acceptable and highly specific schemes are also the least compatible with general systems,⁶⁸ an observation that is likely generalizable to other specialized schemes and systems. This is because specialized KOSs are designed to meet the needs of non-dominant communities at a variety of levels in response to the problem of reliable subject access, and must be acceptable to the communities they are describing.

Cognitively just KOSs for indigenous and specialized, non-mainstream communities

Classification schemes adapted to meet the needs of specialized knowledge and indigenous groups have emerged in LAM environments as the result of collaborations between information professionals and the indigenous communities they serve. The most interesting to this discussion is the Brian Deer Classification

(BDC) scheme, first developed in Canada in the 1970s as a way of providing access to indigenous resources. The BDC has recently received attention in the scholarly literature⁶⁹ and in the professional literature⁷⁰ as classification scholars and practitioners reflect on its use and usefulness in providing access to indigenous knowledge in Canada. BDC has been adapted and subsequently adopted as a mechanism for providing reliable subject access to resources by and for indigenous peoples throughout Canada. Offering a basic core of relevant categories, the BDC can be adapted by institutions outside of the original place of creation, permitting locations and names for local areas to be classed first.⁷¹ Although BDC, like any other classification scheme used in libraries, is an artificial ordering of concepts and topics, designed to encourage browsability, it nonetheless is a system designed within the tenets of cognitive justice.

Traditional knowledge might also be said to surface around religion, another marginalized area for non-dominant cultures. Examples can be drawn through the examination of classification schemes for religious communities, such as the numerous published and unpublished Judaica classifications,⁷² especially the quintessential *Classification System for Libraries of Judaica*, now in its third edition.⁷³ To provide intuitive and cognitively just access to its primary user base, Daniel Elazar's *Classification System for Libraries of Judaica* based the terminology of its first and second editions on *The Standard Jewish Encyclopedia* and its third edition on the *Encyclopaedia Judaica*, i.e., on formalized and respected published references designed by and for the Jewish community.⁷⁴ Furthermore, a classification scheme created uniquely for a particular community, the unpublished classification system of the Central Catholic Library in Ireland reports to include 33 sections on Catholic culture and the Bible.⁷⁵

Specialized and formally published controlled vocabularies contribute to reliable verbal subject access to resources for non-dominant and specialized groups. As Doyle et al. point out, "The misrepresentation of Aboriginal names and concepts engenders mistrust and damages librarians' credibility with knowledgeable library users,"⁷⁶ a problem that is alleviated by such initiatives. For example, the Xwi7xwa library's First Nations House of Learning (FNHL) Subject Headings provides verbal subject access in a way that is consistent with *indigenous warrant*.⁷⁷ So that these terms could be adequately included in the library's MARC records, Xwi7xwa librarians petitioned the Library of Congress (LC) MARC Standards Office in 2004 to make FNHL an official thesaurus; that status was accorded in 2005.⁷⁸

Additional controlled vocabularies have been developed to support cognitively just subject access to resources for and about non-dominant and specialized groups. Using a slightly different approach from those mentioned above, Mustapha Allouh's *Ibn Rushd: Thésaurus arabe-français relatif au Maghreb et à son environnement historico-culturel andalou et africain* provides reliable, Arabic-French bilingual access to resources relating to the modern and historical Muslim West for the Ibn Rushd collection at the Fondation du Roi Abdul-Aziz Saoud in Casablanca, Morocco. This published thesaurus, although not widely available, conceptualizes

time and place in a way that is fundamentally different from DDC.⁷⁹ Furthermore, in keeping with the notion of cognitively just access for a specific non-dominant user group, Juhana Salim, Siti Farhana Mohamad Hashim, and Shahrul Azman Mohamad Noah developed an ontology for providing multilingual access to a set of authoritative websites devoted to Islamic topics.⁸⁰ In this sense, *ontology* can be defined as “a kind of taxonomy with structure and specific types of relationships between terms.... [in which] relationships are greater in number and more specific in their function. ... Ontological relationships are used in more complex information systems, such as the Semantic Web.”⁸¹ Basing their ontology first on the terms used on these websites and enhancing the ontology through terms found in the generalist KOSs LCSH and LCC, along with the *Index Islamicus*, the resulting ontology is rich and inclusive of dominant and non-dominant approaches to organization, but did not require the labor-intensive step-by-step participation of domain experts. Finally, the American Library Association (ALA)’s Gay, Lesbian, Bisexual, and Transgender Round Table (GLBTRT) compiled resources in 2007, enumerating a number of relevant controlled vocabularies and classification schemes, many of which, unfortunately, are unpublished.⁸² Others are out of date, but not all. One of the institutions mentioned, the Lesbian Herstory Archives, celebrated its 30th anniversary in 2014;⁸³ this growing institution actively maintains a classification system for materials and currently makes its classification available online (<http://lesbianherstoryarchives.org/tourcoll2.html>).⁸⁴

Ambitions for redesigning access are not limited to the KOSs, and can include, for example, a ground-up approach where an entire metadata framework is conceptualized and designed. Information professionals working with the Inuvialuit community in Canada have embarked on a funded, three-year project to provide access to digital cultural heritage resources relative to the Inuvialuit people.⁸⁵

Adapted universal KOSs as cognitively just solutions

Other systems opt to modify one section of a universal scheme such as DDC to create a local system that is both workable and relevant. A number of extensions to DDC’s 297 for Islamic topics and areas exist, fleshing out the number more completely. Another somewhat modular approach to providing adequate access to Muslim knowledge involves the complete reworking of DDC numbers devoted to Christianity as a way of better accommodating topics relating to Islam.⁸⁶ These apparently unpublished solutions, although helpful in the individual libraries where they are created and maintained, are not widely tested or shared, thereby limiting their overall usefulness. Although individual efforts to provide access are laudable, preference is still to adopt a published scheme that can be tested and modified by a large number of community members, such as the published and widely used *Classification System for Libraries of Judaica*.⁸⁷

Adaptations of standard controlled vocabularies, as with the adaptations of universal classification schemes, can also be a solution to the problem of cognitively

just access. Christine Bone describes the experience in Manitoba where, after concern was expressed by indigenous users, information professionals at the Association for Manitoba Archives explored ways to replace inaccurate terms and to add necessary ones that did not exist. After having identified questionable LCSH terms, “The Group spent months analyzing, discussing, debating, and consulting with Indigenous experts, both local and from around the world, and eventually came up with a list of recommended changes. These recommendations were then sent to Indigenous leaders and communities around the province for their opinions, along with specific questions, such as what names they use for their own people.”⁸⁸ After surveying indigenous peoples, a list of replacement and new terms was formalized and published.⁸⁹

Steps for providing cognitively just subject access

What do successful projects that produce KOSs to provide access to indigenous materials have in common? From the analysis of the literature presented here, a series of broad steps emerge. As anticipated, the groups working to provide specialized subject access have included resources, especially individuals, who are members of the indigenous or specialized community. These projects begin by identifying a problem and a need, and by securing funding, support, and partners. Next, KOSs and other products to provide access emerge and are tested in collaboration with indigenous and specialized group members. Finally, these resources are implemented and re-tested over time, and are ideally published and tested with the community at large, being re-adjusted as necessary. Moving forward, however, we acknowledge that not all information agencies will have the ability to carry out this very labor-intensive three-step process. Exploring options other than new KOS creation or adaptation should, in these cases, be the next priority, using technology as a point of shared convergence in the LAM community.

Cognitively just subject access: Moving forward

Access to indigenous knowledge is a moral imperative that can and should be addressed through library organization. We have, at present, several systems and models that we could draw from going forward. The Internet and online access has made it possible to reinvent reliable subject access. Authoritative ontologies such as the resource by Salim et al. described above can combine a variety of approaches to classification, making them machine actionable and adapted to modern web technology in the process.⁹⁰ This should permit search across multiple KOSs as long as the KOSs are applied consistently. Nonhierarchical web-based folksonomies also provide organization, although this subject access might not be considered *reliable* in the same way; they do involve non-professionals in the organization process, potentially opening⁹¹ the organizational structures. In this way, new technologies offer non-traditional options for subject access that can be

explored. We will examine both of these in this section, followed by concluding thoughts and recommendations.

The creation of ontologies by linking concepts from a number of KOSs, as suggested by Salim et al., can provide a solution. Although merging two or more KOSs is not going to produce a structure traditionally called a classification scheme, it will allow robust access where context and terminology based on indigenous warrant can be supplied for the marginalized areas. Like Green, we feel that universal KOSs are best applied to the materials they were designed to organize, and that “a mainstream bias may be appropriate in a classification scheme used for a general collection, while a special classification scheme may be more appropriate for a collection of materials for, or about, a specific group of people”⁹² and if both can be applied, all the better. Given the limitations on creating and testing specialized KOSs for the vast and unique numbers of indigenous communities, merging and combining access through available systems seems to be the next logical solution to problems of access for institutions with budgetary constraints or other limitations that do not allow for the creation or large-scale adaptation of an existing universal KOS.

Professional competencies and LIS education in KOS creation

An additional limitation to building a new KOS is that their creation does not seem to be widely addressed in LIS classes devoted to cataloging and classification in the U.S./North America. As early as 1983, Bella Hass Weinberg noted that librarians are not trained in classification theory in library school.⁹³ Despite the increase in the attention to subject cataloging from the 1990s onward, due potentially to the “importance of subject searching in databases and on the WWW...”⁹⁴ the application of pre-existing schemes seems to be the focus of library school classes on the topic of classification. Michèle Hudon explains that “Classification calls for the application of distinct types of skills. On the *cognitive level*, students learn how to analyze the contents of the document, to identify topics, concepts, and facets, and to discriminate between core and peripheral topics in relation to specific contexts, systems, and needs.”⁹⁵ There is also a *technical level* that requires the use of classification structures as well as the understanding of a “technological dimension” stemming from the use of Web-based tools.

LIS students are generally required to take classes that focus on either cataloging or on organization of information more generally. In the most recent installment of a longitudinal survey of cataloging courses in American Library Association (ALA)-accredited library schools in North America, Daniel N. Joudrey and Ryan McGinnis find that in 2012–2013, only 7% of schools required a cataloging course at all. The courses that are required in 93% of schools are ones in either basic cataloging or organization, or some combination of those topics.⁹⁶ Overall, we can infer that library school students are learning about organization. Yet, according to Hudon’s *survey of the literature*,

between 1990 and 2010, “The time devoted to theory in introductory and even advanced classification courses remains in fact limited; whatever time is left over from getting the students to explore DDC and LCC is often given to introducing special classification schemes in the Music, Health and Medicine, or Law domains for example.”⁹⁷ Even if they learn about applying KOSs, students of LIS seem not to be trained in building them through the exposure they get in the required or widely available, non-specialized coursework.

A knowledge of KOS construction is nonetheless desirable, even if LIS programs do not necessarily support it in their required coursework. In his interpretation of the Association for Library Collections and Technical Services (ALCTS) 1995 Educational Policy Statement, Joudrey identifies 26 core competencies required for bibliographic control. Although thesaurus construction is identified as a core competency, the creation of classification schemes is not.⁹⁸ More recently, the ALCTS Cataloging Competencies Task Force asserts in their publication entitled *Core Competencies for Cataloging and Metadata Professional Librarians* that knowledge of foundational cataloging and metadata principles requires understanding, among others, “principles behind controlled vocabularies” and “various classification structures” with the implication that practitioner must also know how to apply them.⁹⁹ To that end, the ALCTS document begins by declaring that “Metadata creators must possess awareness of their own historical, cultural, racial, gendered, and religious worldviews, and work at identifying where those views exclude other human experiences. Understanding inherent bias in metadata standards is considered a core competency for all metadata work.”¹⁰⁰ Unfortunately, it is unclear that all programs support this level of awareness or depth of understanding. According to Joudrey, most library schools do not offer courses in classification theory, with only seven offering courses in classification theory in 2002 and seven offering courses in classification in 2008.¹⁰¹ The difference between courses in classification theory and classification is unclear; Joudrey does not report on the exact nature of the topics covered (e.g., analysis of classification, application of classification, or creation of classification schemes, etc.), but does note that these courses are electives. Additionally, in 2005, only seven LIS schools offered electives in thesaurus creation.¹⁰²

Not all LIS education curricula include the kinds of theory and skills for information professionals and librarians to move beyond KOS application to KOS creation, although certainly some do. In situations where librarians have not been adequately trained in KOS creation, they have the option of pursuing continuing education in this area if they can find access to such opportunities. The other option identified in the literature was adapting published and reliable specialized schemes created by, and in conjunction with, the indigenous and marginalized peoples, work that might be more aligned with the foundational theory and training or on the job experience that their education and work has imparted. Raegan Swanson, for example, describes the process of adapting the BDC scheme for use

in Quebec,¹⁰³ a process that seems less like classification scheme construction and more like a creative application in an adapted context.

Considerations and options moving forward

There is no reason to limit classification to a single scheme—either universal or specialized. Having a single classification number allows libraries to satisfy the need to place books on shelves, which clearly is important for browsing in an open stacks environment.¹⁰⁴ John M. Budd, however, suggests providing additional access to library materials through the inclusion of multiple classification numbers in the surrogate, with one being identified as the actual shelf location. This approach could easily be taken in specialized collections as well, especially if these collections are part of a larger, generalized collection, and allow librarians to permit access based on the adapted scheme they have implemented locally and the universal scheme that is applied internationally.

Villanueva also reminds us that having an appropriate KOS available is not the only requirement for access: having knowledgeable catalogers able to carry out the subject analysis accurately and apply the terms correctly is another factor that libraries and cultural heritage institutions must consider.¹⁰⁵ Once the specialized KOS(s) are identified or created in conjunction with the indigenous people themselves, they must be applied by knowledgeable information professionals for the access to be reliable.

Additionally, participatory knowledge construction through the use of user-generated content (UGC) can supplement subject access in online environments. UGC can include terms such as tags to support subject access or provide other user-supplied metadata that will promote future access to non-dominant content such as geographic information.¹⁰⁶ When information professionals are unable to provide verbal subject access through controlled vocabularies, either because the information professionals lack the knowledge or the time, or because the vocabulary lacks specificity or appropriate terminology, UGC can provide supplemental access while involving users, permitting the direct application of *user warrant* as a kind of *indigenous warrant*. If UGC is structured and vetted, there is no reason to think access would not be reliable on a basic level. When UGC is included in LAM metadata records, de-siloing content becomes increasingly feasible, especially if systems can be made interoperable and shared. One possible example is providing UGC for location-based retrieval. Geographic Information Systems (GIS), semantic searching, and creation of ontologies of non-textual information, hold promise in moving forward in our efforts to make explicit indigenous knowledge accessible.¹⁰⁷

Emerging web technologies and processes making use of knowledge management practices have the potential to allow computers to interpret large datasets of semantically encoded content.¹⁰⁸ The move from hierarchical taxonomies to property-based, domain-specific ontologies has the potential to revolutionize access to specialized collections drawn from different sources, or those using multiple

vocabularies.¹⁰⁹ New technologies are effectively permitting the realization of Marcia Bates's 1980s notions of the superthesaurus, where valid terms in multiple thesauri assist with retrieval.¹¹⁰ Examples of projects in the life sciences include the Cell Cycle Ontology (CCO) project which "integrates data from existent ontologies (such as GO) and offers their application ontologies in diverse formats (such as RDF, OWL)" permitting "complex queries over the integrated data."¹¹¹ BioGateway, CardioSHARE, and KNO.E.SIS also use semantic web technology to permit complex queries of multiple data sources.¹¹² Semantic Web technologies can allow UGC to be converted to Semantic Web-friendly RDF and, subsequently, added to resources.¹¹³ Once available, future digital library systems should better be able to address questions of flat relationships between digital objects, with RDF encoding enabling any number of relationships to be encoded and expressed.

Much of the focus in supporting cognitive justice is on the use of technology to supplement the vision librarians have for providing access. Physical collections, however, have the potential to create additional problems. If the low-tech solution of adding two classification notations to a record¹¹⁴ is chosen (one from the indigenous scheme and one from the universal scheme), where then should the item be shelved? Shelving items according to subject matter is advantageous for browsing and discovery. Is it right for collections to segregate items physically, essentially continuing to marginalize indigenous knowledge in the library's collection? Or, does the opportunity to provide the most robust context possible enable an autonomy that the ghettoization of the universal schemes does not? What is best for the indigenous user? We believe that the answer is to let indigenous people decide where the information should ultimately reside both physically and organizationally. Although a number of problems and potential solutions have been presented in this article, challenges to providing cognitively just access will undoubtedly persist.

Future research

The present conceptual analysis of indigenous KOSs in libraries identifies a way forward in the effort to provide cognitively just access to organized indigenous knowledge. Much remains, however, to be studied and analyzed. For example, can an imposed hierarchical structure such as a classification scheme truly represent an indigenous people's worldview? Or is there a more appropriate structure that should be adopted? If so, what? Because of the variety of perspectives brought by each indigenous people, specialized KOSs need to be adapted. This is fundamentally dissimilar to the situations in which the other specialized KOSs presented in this article are used: within religious communities or other large but non-dominant, like-minded communities. Questions pertaining to the standardization of the schemes like BDC should be investigated. Finally, are mainstream KOSs reasonably able to accommodate indigenous perspectives? The work carried out in DDC, for example, is laudable, but can it be sufficient? Can adaptations of existing systems

provide cognitively just access? Answering these questions, unfortunately, is not a one-and-done proposition that can be addressed by the work of a few individuals or research teams. Instead, working through these incredibly complex and nuanced questions will require the sustained intellectual efforts of LIS professionals and researchers alike.

Concluding thoughts

Cognitive justice can and should be a focus of librarianship, especially when indigenous collections are concerned, and can be seen as a way to alleviate the “tunnel vision and blind spots” against which Wayne A. Wiegand warns us as a profession, allowing us to move beyond being a “profession trapped in its own discursive formations, where members speak mostly to each other and where connections between power and knowledge that affect issues of race, class, age, and gender, among others, are either invisible or ignored.”¹¹⁵ Librarians have envisioned creative ways to improve access to materials for a number of years. Merged and complementary published KOSs serve as examples of Bates’s superthesauri¹¹⁶ and Budd’s application of multiple classification notations.¹¹⁷ Today, emerging web technologies have the potential to permit these methods to be applied through the use of web-friendly ontologies and linked data systems. UGC emerges as an adaptable mechanism to supplement the work of the information intermediary, potentially supplying description from members of indigenous communities. This is the essence of cognitive justice for organization—it is infinitely accommodating. Nothing is left in the margins, and indigenous topics are organized in a way indigenous users expect.

Ultimately, the cognitively just integration of indigenous resources must be found through a collaboration between information professionals and indigenous peoples, followed by systematic application of the KOSs by the information agency.¹¹⁸ As Joseph T. Tennis makes clear, we are the guardians of the world’s cultural heritage.¹¹⁹ At the same time, we cannot simply, as Duarte and Belarde-Lewis explain, “fit more vanishing “Indians of North America” into the boxes we made for them;” rather, we should, as a profession, focus on “creat[ing] new spaces for Indigenous ontologies to emerge.”¹²⁰ What is the most respectful way to store and best provide equal access to the knowledge? How might cultural heritage institutions uphold and advance principles of cognitive justice? In the case of indigenous knowledge, we argue that published, non-universal approaches harkening back to the “simpler times”¹²¹ of local organization are key in providing access, and that these methods should be combined with universal approaches and web-based technologies to provide reliable, cognitively just access to indigenous resources. Although not all information professionals in cultural heritage intuitions will have the resources to build KOSs from scratch or to modify existing universal ones, specialized KOSs should be built as resources permit. Institutions with

responsibility for indigenous collections have the obligation to do their best to ensure cognitively just access. Perhaps one of the best ways to ensure access is to recruit indigenous people into the profession.

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