Domain Analysis Versus Facet Analysis

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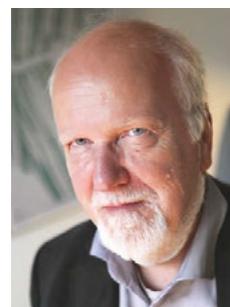
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Abstract: This paper delves into the complexities and theoretical underpinnings of knowledge organization systems (KOS), focusing on domain analysis and facet analysis as methodologies, such as improving the *Library of Congress Subject Headings* (LCSH). The study repeats a former critique of the LCSH and argues for the incorporation of facet and domain analysis to enhance its utility and academic rigor. Facet analysis, although well-established, is critiqued for its rationalist philosophy and lack of empirical grounding. Domain analysis is presented as a complementary approach that addresses these gaps by considering empirical, historical, philosophical, and pragmatic issues. To any given system, the paper emphasizes that KO systems are not neutral; they reflect underlying theoretical paradigms that must be understood for effective classification. The study concludes by advocating for interdisciplinary research and broader cooperation among knowledge organization professionals, philosophers, and subject specialists to develop more robust and academically rigorous KOS.

1.0 Introduction: What should you learn to qualify as an information professional?

What should you learn to qualify to work as a professional information specialist? When we think about this question, we think of issues such as retrieving information, describing, classifying, indexing documents, and helping students and researchers find the proper literature for their papers. You need to know many things, including foreign language, how to search systems like Google and "classical databases" (i.e., the

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basics of online searching). However, we will focus on some deeper theoretical issues related to domain analysis (DA).

The Library of Congress has enormous prestige, and Library of Congress Subject Headings (LCSH) is used in many countries. There are also many textbooks about it used in courses on library and information science (LIS) worldwide. It seems almost impossible to claim that this system is terrible, but Furner and Hjørland (2023) did this when they examined it in the domain of LIS. This system is meant to help users find books. However, it may be worse than no knowledge organizing system (KOS), with users relying on free text searching in titles.

Furner and Hjørland (2023) suggested that two methodologies might be fruitfully applied to improving LCSH: facet analysis (FA) and DA. The poor quality of LCSH indicates that building a system neglecting such methodological issues is not a good idea. To claim academic status, the field of KO cannot avoid these theoretical and philosophical issues, as they are the basis for any given system.

2.0 Facet analysis

Facet analysis is older than domain analysis and better established. *The Bliss Bibliographic Classification*, 2nd ed. (BC2) is the most professional and valuable classification designed according to the facet-analytic methodology and probably the best general bibliographic classification available (although unfortunately not yet completed). A general volume describes the methodology of facet analysis (Mills and Broughton 1977) and methodology descriptions in each volume about a specific domain (e.g., Class C, chemistry and Class W: The arts) (Mills et al. 2012; Ball and Mills 2011). The logical principles of the system are essential, and as said, the LCSH would be improved tremendously if it had applied them.

That is not to say we have no problems in BC2. One thing is that the system is designed for the physical shelving of documents, which demands a one-dimensional ordering of all classes. This demand puts too much restriction on the system and makes it less usable in digital contexts. At the more profound level, Hjørland (2013) has claimed that facet analysis represents a rationalist philosophy, i.e., a methodology emphasizing logic, intuition, and armchair reasoning.[1] This is both a strong side and a weakness. For example, in the following medical case:

> 'Medicine' may be defined as the technology concerned with the actions taken by the human person to maintain their health and treat their sickness. The definition of the subject leads directly to the primary category (the defining entity, the person), and all the other categories are realized in their relation to this. The categories disclosed are:

> – Kinds of human persons (females, males, young, old).
> – Parts of the person (anatomical, regional, and physiologically functional subsystems – trunk, circulatory, neurological).
> – Processes in the person (normal physiology, pathology).
> – Operations acting on the person (health maintaining or preventative, diagnostic, therapeutic).
> – Agents of operations (medical personnel, instruments, institutions – hospitals, health services).

> So, a particular document entitled 'Rehabilitation Following Fracture of the Femoral Neck [in old persons]' would get the index description: Old persons (geriatrics) – Bone – Femur – Neck of femur – Fracture – Therapy – Rehabilitation (Mills 2004, 552–3).

Remark that this example is based on something other than studies of the medical domain of empirical (including bibliometric), historical, sociological, or philosophical kinds. The example is based on logic, pure reason, or common sense. It is about what medicine necessarily must be or what its *essence* is. A whole medical bibliographical classification system is based on the conclusions in this example (Mills et al. 1980.) Of course, such a classification system must be based on empirical data (the terms to be represented) in one way or another; this is not, however, a developed part of the methodology of facet analysis.

We shall come back to both this medical example in Section 3, but first, we shall look further into the issue of the empirical basis of FA.

2.1 Empirical issues in facet analysis

According to Mills (2004, 551), "the first step [developing a facet-analytic classification] is to assign all the terms constituting the vocabulary of the subject into a limited number of broad categories". Thus, a list of terms is a presumption in facet analysis. However, the FA tradition needs to discuss how to establish such a list, which means that a discussion of the empirical procedure is lacking. (It is well known that all empirical studies depend on the empirical data on which they are based and that their interpretation and quality depend on their representativeness). Mills (2004) did not discuss this issue, and it is superficially treated in the rather detailed methodological descriptions of each volume of the Bliss Bibliographical Classification (BC2). [2] The medical volume (Mills et al. 1980, §12.12, p. xx) wrote:

> The vocabulary of BC2 is determined by literary warrant supplementing the evidence of each subject's current dictionaries, treatises, and bibliographies. For Class H, a major 'standard' has been available in the

form of MESH – the medical subject headings used by the National Library of Medicine in Washington. Although in a few areas (notably, the enumeration of particular chemical compounds and drugs) Class H stops short of the detail in MESH (but notational synthesis provides for their specification if required), in many classes, it is more detailed.

In the same source, §15.2 (p. xxviii), it is mentioned that BC1 had 3000-3200 terms, whereas a draft of BC2 had between 15,000 and 20,000 terms (not including synonyms).

In this case, only one of the sources used for the classification was mentioned by name: MESH (and that it is mentioned is an exception in BC2). Although it is impressive that the BC2 covers medicine as comprehensively as MESH, there are no reflections about the "bias" and coverage of the different sources. In addition, questions of different medical philosophies [3] are absent (indicating a non-theoretical or "positivist" approach to classification.)

Description of the source used and reflections on how the empirical base for a classification influences it is important, and this shows the clear difference between a rationalist and an empiricist approach. Vickery (1960, 20) did suggest some vague empirical procedures, which, however, are more about identifying structures in a field of knowledge rather than a set of terms to classify:

> This can be achieved only by a detailed examination of the literature of the field to be classified. It is useful to study systematically organized textbooks in which the general structure of the field is apparent. Glossaries aid in the more refined formulation of categories employing definitions concerning their parent class. The examination of a collection of specific subjects—e.g., an abstract journal in the field—brings to light the more detailed structure of the subject.

It should be evident that such a list of terms to be classified may be biased or not sufficiently comprehensive. Vickery does not consider that different textbooks often reveal different structures, perhaps even conflicting structures of a domain (the less consensus in a field, the greater the problem.)

Another example is the classification of animals. On the homepage of BC2, a draft version of class G/GY Zoology is shown. On p. 207, Rothschild (1965) is mentioned as a source of the classification of animals. In an informal communication, Vanda Broughton wrote (November 7, 2021):

> It is a revision of BC1 Class G, but there are some reasons not to give it too much credence. It was primarily based on Rothschild's Classification of Living Animals [1961], which was the only comprehensive treatment of the animal kingdom at the time. However,

there were, and are still, many classifications for smaller divisions. Looking at it in 2020, the then-recent developments influenced it in thinking about animal taxonomy, which 60 years later is seen as too extreme; many of the groupings proposed by Rothschild are now rejected. Trying to reconcile the differences (and make allowance for the fact that, bibliographically, there may be literature on these concepts) proved very taxing.

This example shows that BC2 tried to base its classification of animals on a single work (or a few works) without argument. These works may later be considered problematic. To select Rothschild because it was one handy classification of all living animals, rather than to base the classification of a set of specific classifications of, for example, birds, fish, and mammals, seems also problematic because such more specialized schemes are better founded (an ornithologist can better classify birds compared to a general zoologist or biologist). The sources used for making BC2 should be listed, and their selection issues should be discussed. The example also raises the question of the stability of given classifications and, thereby, the need to revise them.

3.0 Domain analysis

DA addresses some of the missing issues of facet analysis (empirical, historical, philosophical, and pragmatic issues). From the domain analytic perspective, a classification cannot be neutral. Any classification tends to favor some interests and perspectives at the expense of others. (In the case of medicine, the quote by Mills 2004, a working hypothesis is that Mill's example is based on a traditional (reductionist) biomedical model to which alternatives have been suggested, for example, the biopsychosocial model of illness. [4] However, this paper will focus on better-established and recognized examples.

The medical example from BC2 seems to reflect the view that a logical organization of terms representing "atoms" of reality can be organized objectively and neutrally without engagement in the theoretical issues and conflicts in the domain.

If we look at the field of psychology, dictionaries, thesauri, and encyclopedias may be kinds of information sources on which to base a classification. It would be natural to base a classification of psychology on, among many others, the following sources: Auchincloss and Samberg (2012), Gallagher (2007), Kazdin (2000), Teo (2014), and VandenBos (2015). However, there are many works of this kind (see Guha 2007) and need for more consensus on psychology concepts. Psychology seems more of a collection of separate fields than one coherent whole. Officially, psychology became "independent" of philosophy in the late nine-

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teenth century, but as Bruner (1990, x-xi) wrote, the different schools or "paradigms" of psychology are deeply dependent on different philosophical systems.

Therefore, attempts to classify psychology, disregarding its theoretical orientations, seem problematic. The general dictionaries and encyclopedias seem random and need more theoretical perspectives. On the other hand, the psychoanalytic and the critical psychological reference works, for example, seem better to fulfill their tasks. It should not be a suggestion of giving up the design of general classifications but just the realization that the making of such a system must be based on understanding and taking a stand on the fundamental problems of the field. This is because a fruitful classification should follow the field's theoretical foundations. When there is a "paradigm shift," the classification must change with the paradigm [5].

In art studies, Ørom (2003) showed how the classification of art (in art exhibitions, in knowledge recorded in comprehensive works on art, as well as in LIS classification) is derived from fundamental paradigms, demonstrating that classification systems are not neutral concerning the fields underlying theories (summarized in Hjørland 2017, Section 3). For now, this is the best example of a concrete DA.

The examples provided in the present article are only indicative. In each case, of course, a deeper analysis is needed.

This section concludes that the question of selecting the empirical materials for classifying a field cannot be ignored (as it is in the methodology of facet analysis). A fundamental assumption in domain analysis is that there are competing paradigms in all fields of knowledge. Knowledge of these is essential for selecting sources, defining concepts, and deciding criteria for their classification. Also, classifications need to be updated.

> At present, many, perhaps most, current bibliographic classifications for mammals reflect quite outdated science. The latest edition of DDC, for example, arranges mammals in essentially the same way as the second edition of 1885 (Blake 2011, 469).

Domain analysis is thus an alternative to a view that static, discrete meaning comes from the combination of words that can faithfully correspond to the world, in a specular view and not of reproduction and transformation of social relations. In a way, one can find an idea of logical empiricism and abstract realism in the imagination of the language (Barros, 2023). Perhaps this is because of how scientific discourse is constructed. In other words, traditional classification seeks to imitate science, bringing to itself values defended by it: competence, truth, neutrality. As if both this and that were not subject to history, bias, or ideology for that matter. No classification can be neutral because no form of knowledge can. As we see it from this perspective,

science can be positivist or critical, and classification cannot ignore the internal conflicts/paradigms within scientific knowledge.

In order to see practical examples of how the domain analytic view can be applied to improve an existing KOS, we can again refer to Furner and Hjørland's (2023) criticism of the LCSH. [7]

4.0 Q&A Section: answering questions from the audience

This section reports the questions and answers presented during the lecture.

Q1. Dewey segmented information with a dogmatic, sexist view from the Global North. Justifying that he was a man of his time does not diminish the segregation and invisibilities that the DDC [Dewey Decimal Classification] still generates. What do you think about this?

A1. Much relevant research has been conducted to remove various forms of bias, such as sexist, racist, colonial, and class bias. Fortunately, ethical issues have come to the forefront in the field of knowledge organization. However, I think there are even graver problems with dominating systems such as the DDC, LCSH, and LCC (Library of Congress Classification). Concerning the LCSH, I mentioned the criticism by Furner and Hjørland (2023) in a lecture; now, a condensed and open version has been edited by Hjørland and Gnoli (2023). Therefore, my point is that removing forms of bias, such as a "dogmatic, sexist view from the Global North," is only relevant if the system is fundamentally sound, which we found is not the case with LCSH. I believe other harsh criticisms should be raised in relation to, among others, the DDC.

Q2. How do we deal with specialized classifications? How do we handle neutrality in the way general classifications are written?

A2. I see two questions: (1) about the relations between specialized classifications and general (or "universal") classifications, and (2) the issues of neutrality in relation to both categories. Concerning the first: Any general classification must also classify specialties. For example, the DDC has a rather comprehensive classification of fish and, therefore, needs to base these specialties on some principles. Furthermore, general classification depends heavily on specialized classifications made by experts in those domains. Unfortunately, the sources used are mostly undocumented, making it difficult to examine and evaluate how specific domains have been established. Therefore, my first answer is that general classifications must consider how to classify all the domains they cover. Concerning the second: Some epistemologies posit that a given set of elements can be classified in a neutral way. These include rationalism, which aims at classifying based on essential characteristics, and empiri-

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cism, which aims at classifying based on statistical patterns of properties not selected based on importance. I consider these epistemologies flawed and, therefore, argue in favor of pragmatic/critical epistemologies, which focus on the goals and values the classifications serve.

Q3. How do we deal with systems of classification that are only based on the relevance of words (the frequency of a given subject)?

A3. The English librarian E. Wyndham Hulme was the first to use the term "literary warrant" and to introduce "statistical bibliography" (now called bibliometrics) (see Barité 2018). This question seems to me to refer to views closely related to his. However, I have argued against this empiricist approach in many writings because the dominant association of words in literature is determined by the most dominant paradigms, not by an evaluation of those paradigms for our classifications.

Q4. You've already talked about neutrality, but do you really think it exists, or is it just a 'concept'—like a "utopia," a horizon that reminds us where to go?

A4. Let me first invert your question. Many claims are considered "objective" by their authors and by many others. I contend that the view that a claim is objective is a hypothesis that may be falsified but can never be fully verified. Some feminist researchers have correctly claimed that some research is not objective but is biased by a male perspective. This does not make feminist alternatives objective or neutral, but the point is that the more we consider such biases, the better we are equipped to deal with them. Neutrality is probably seldom reached, but it may be approached.

Q5. Regarding the pragmatic perspective on knowledge organization systems, is it possible for the methodology of socioterminology to ensure literary warrant for the discovery and thematic representation of social contexts of the use of terms in any domain to try to overcome non-neutrality?

A5. You refer to "socioterminology." This is one of the many terms used to describe approaches in the field of terminology (see Hjørland 2023, socioterminology discussed in Section 3.3.2). As I have found "socioterminology" unclear, I have suggested that the domain-analytic perspective is best suited for what you are asking (in a complex sentence): to ensure literary warrant for the discovery and thematic representation of social contexts of use of terms in any domain to try to overcome non-neutrality.

4.0 Conclusion

In areas outside LIS, the adoption of classification systems like BC2 is limited, unlike the more prevalent use of ontologies (Broughton 2020). This aligns with Dewey's view, as cited by Csiszar (2013, 445), that classifications serve primarily as organizational tools, akin to "pigeon-holes" for filing documents or books. This perspective, however, dimin-

ishes the scholarly relevance of knowledge organization. The perspective shifts when considering Bliss's proposition that classifications should mirror the "scientific and educational consensus" (Broughton 2020, 3.3.1.1), though Bliss may have overestimated the uniformity of this consensus and his own ability to discern it. According to Bliss's viewpoint, classification systems could be seen as educational tools, engaging both the LIS community and a broader audience, thus highlighting the need for interdisciplinary research in their development.

Collaboration between the fields of knowledge organization, classification philosophy, and subject matter experts in various domains is crucial for creating accurate knowledge organization systems (KOS). In biology, for instance, contemporary knowledge on the classification of birds, fish, mammals, bacteria, and overall classifications of living organisms, including theoretical approaches like genealogical classification and numerical taxonomy, is vital. This updated knowledge, expected to be featured in the *ISKO Encyclopedia of Knowledge Organization* by Hjørland and Gnoli (2016-), could lay the groundwork for new KOS and further the development of knowledge organization as a primary research area.

Returning to the introductory question, "What should you learn to qualify as an information professional?" the paper implicitly suggests several key competencies. These include an interdisciplinary approach to the development of knowledge organization systems and familiarity with diverse knowledge organization approaches and paradigms, among other aspects. The core message is that professional decisions in this field should consistently be grounded in theoretical understanding.

The exploration of classification systems in the broader context of Library and Information Science (LIS) reveals the necessity for a multifaceted and interdisciplinary approach in developing knowledge organization systems (KOS). This includes a deep understanding of both historical perspectives and contemporary practices in various academic disciplines. The significant role of theoretical knowledge in guiding professional decisions in information science is underscored, emphasizing that an information professional's education should extend beyond practical skills to encompass diverse theoretical paradigms and methodologies. This holistic approach ensures that the evolving landscape of information science is navigated with a balanced perspective, combining historical insights with innovative practices for the effective organization and dissemination of knowledge.

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Endnotes

1. Hjørland's characterization of facet analysis as rationalism has been examined and, to some degree, opposed by some other researchers, including Dousa and Ibekwe-Sanjuan (2014) and Gnoli (2017). A reply to many of these, including to Dousa and Ibekwe-Sanjuan (2014) was given by Hjørland (2014). In this place, just a few statements will be given: (1) Labels such as "rationalism," "empiricism," "historicism," and "pragmatism" are ambiguous. These are not simple concepts to be applied in a simple way. Using them should be based on an interpretation of how they have been used in the literature, but also on an attempt to construe a meaningful classification of approaches to both inquiry in general and to classification in particular. (2) Researchers may claim that they are empiricists, rationalists, historicists, pragmatists, or eclectics, but what counts, is what they actually do, which demand a reading and an interpretation of their works. As researchers are seldom consistent and without contradiction, diverse methodological and epistemological tendencies are often uncovered. However, it would not be useful to classify all researcher as eclectics, because then we cannot compare different approaches and identify their relative strengths and weaknesses. (3) In the present article, the facet analytic approach (exemplified by the BC2 classification) and the domain analytic approach have been compared and, hopefully, contributed to clarify how the term "rationalism" has been used.
2. See Mills and Broughton (1977) and all following volumes.
3. See Reiss, Julian and Rachel A. Ankeny. 2022. "Philosophy of Medicine." *The Stanford Encyclopedia of Philosophy* (Spring 2022 Edition), ed. Edward N. Zalta. https://plato.stanford.edu/archives/spr2022/entries/medicine/
4. See Day and Montoya 2019, Engel 1977, Wade and Halligan 2017 and World Health Organization 2002.
5. For an overview of the development of significant paradigms in psychology, see Hjørland 2002, p. 262, fig. 1; another example is how the classification of biological organisms shifted with an evolutionary paradigm in biology (cf., Ereshefsky 2001).
6. An enormous reviewer wrote: "The article does not illustrate how the results of DA should be reflected in an actual classification. This is a major difference with FA, which application has produced many actual schemes. Authors often refer to Furner and Hjørland (2023), but that article does not provide any practical suggestion either." Answer: Yes, there are differences between DA and FA. FA, as described, for example, by Mills (2004) is a much more concrete, "how to do it" methodology, whereas DA is more about subject knowledge and analyzing domains from philosophical perspectives. This article mentions Ørom (2003) as the best example of a concrete DA. Admittedly, Ørom is stronger in analyzing how existing paradigms in art studies have influenced library classification than in suggesting how art studies should be developed according to "the 'new' art history" paradigm, which he considers important, although important hints were given. The peer-reviewer found that Furner and Hjørland (2023) "does not provide any practical suggestion either." However, this article is full of examples of how LCSH misrepresents the domain of library and information science and, thus, how the DA approach can produce an improved system simply by replacing these misrepresentations following the suggestions given.

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