The Epistemological Dimension of Knowledge Organization

Richard P. Smiraglia
University of Wisconsin, Milwaukee
smiragli@uwm.edu

What is epistemology? Epistemology is the study of that which is known. What is a dimension? A dimension is an expression of the extent of a space.What is knowledge organization? Knowledge organization is the science of the order of knowledge. The domain of knowledge organization is a discourse community in which rigorous, self-conscious inquiry takes place concerning that which is known, and its various orderings or sequences, both those that are natural or heuristic, and those that are imposed. The products of the domain, then, are ordered segments of that which is known, and the rules either for discovering their natural orders, or the rules for imposing a useful sequence. All applied knowledge organization then is a form of discourse, in which the structures and rules are objects of communication, and which takes place in a cultural milieu or among actors in various cultural milieus. Thus a very important component of the science of knowledge organization must be epistemology, which is the science of knowledge itself. So my task is to answer these three questions, and to describe how it is that epistemology *is* one dimension of the domain of knowledge organization.

Epistemology is the division of philosophy that investigates the nature and origin of knowledge. Epistemology is therefore the science of knowledge, and the self-conscious inquiry of knowledge. If knowledge organization is the science of the order of knowledge, then we—its scientists—must be concerned first and foremost with the question of what, exactly, knowledge is. Epistemology, through rigorous inquiry, tells us where knowledge comes from. The central problems for epistemology are the definition of knowledge, and the means of its acquisition. Historically there are just two main schools of epistemological thought: rationalism and empiricism, which arise from mathematics and logic, and the natural sciences, respectively. In other words, knowledge can encompass that which we can logically discern, and knowledge can encompass that which we can observe.

Although philosophers have identified many approaches to epistemology, in knowledge organization we have come to rely on a framework set forth by Birger

Hjørland. (Together with Jeppe Nicolaisen, Hjørland has constructed a web tool called a "lifeboat"— http://www.iva.dk/jni/lifeboat/.) Hjørland lists four basic epistemological stances (or positions) (Hjørland 1998, 608):

- Empiricism: derived from observation, perception, and experience;
- Rationalism: derived from the employment of reason over sensory experience;
- Historicism: derived from cultural hermeneutics; and,
- Pragmatism: derived from the consideration of goals and their consequences.

That which we know from our own experience of it, and in particular that which is known through the positivist sciences, is what we call empirical. We have solid evidence for the empirical, and we can point to the evidence as a means of prediction. That which we know from reasoning about it, and in particular that which is known through humanistic scholarship, is based in rationalism. There is no evidence, per se, for the rational; rather there are explanatory statements that seem to be logical when taken together. Historicist epistemology interprets evidence through a cultural lens, relying in particular on past experience. Pragmatism is knowledge derived from assumptions about the best means to an end. Pragmatic solutions work in the moment but do not necessarily rely on empirical evidence, and therefore do not necessarily pass the test of time. Rational solutions also often ignore empirical evidence and thus frequently yield unworkable schemas.

Epistemology is an essential tool of knowledge organization and a dimension is an expression of the extent of a space. Therefore, in knowledge organization, epistemology represents one dimension, because it is how we can measure or express the space within our domain ranging from the empirical to the rational, the two primary epistemological stances. The diagram in Figure 1 shows the three dimensions of a sphere. Each dimension travels along one of those arrows that bisect the space. They define height, width, and depth (in colloquial language) or colatitude, φ, longitude, θ, and radius, ρ, (in mathematical terms).

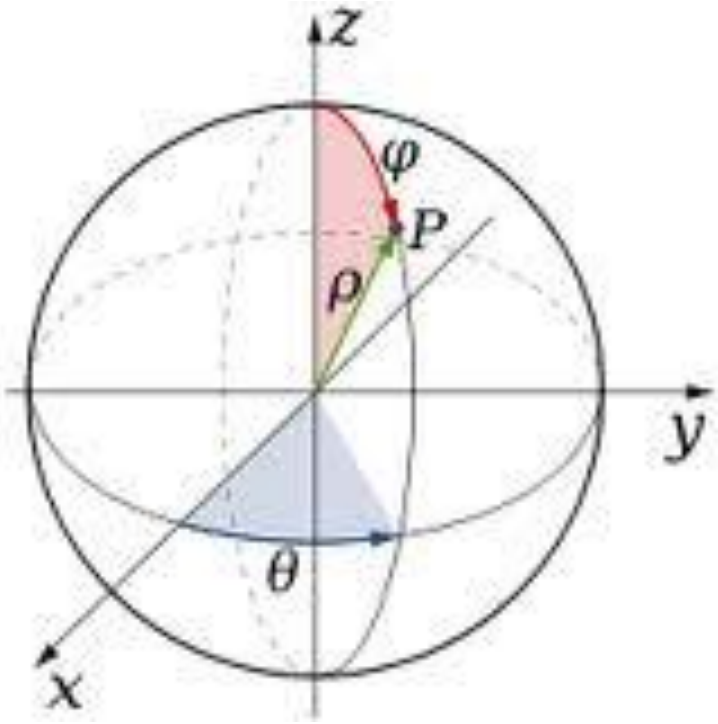

Figure 1. Three dimensions of a sphere (*Wikipedia*, "Dimension (Mathematics and Physics)."

If we consider the intellectual space of the domain of knowledge organization to be something like this sphere, then we can see that each dimension both bisects the space and provides a trajectory to transit through or across it. In other words, the dimensions of our domain define what we call its intension (its depth) and its extension (its external parameters). An hypothesis is that in knowledge organization there always is tension along the epistemological dimension stretching from the empirical to the rational. We will see this demonstrated in the modes of thought used by knowledge organization researchers.

But first, a few fundamentals about knowledge organization as a science. In one way of thinking, there is a fundamental theoretical dimension in our domain represented by our chief research questions. Our main concern is with the identification of concepts that represent the totality of what is known. A second critical concern is with the order of these concepts. Therefore our main research questions always must be "what is knowledge?" and "what is its order?"

Meta-analysis of KO domain analyses demonstrates the evolution of the domain from its original goal of creating a universally-applicable knowledge organization system, to its current post-modern embrace of multiple goals. Among this multiplicity of goals we find first and foremost an embrace of domain-specific ontologies that can be combined as necessary using faceted techniques, leading to the perception of multiple,

but representable, universes of knowledge. In KO there always is work to solidify concept theory, which is at the core of the discipline. KO as a domain demonstrates coherence across time and across geo-political boundaries, particularly as it concerns its theoretical foundations. There are consistently marked dimensions within the domain—theoretical versus applied on one continuum, humanistic versus scientific on another, which is another way of stating the epistemological dimension. All of these dimensions serve to maintain constructive and dynamic tension within the domain, which in turn keeps the research front constantly in a state of renewal, constantly stretching the intension and the extension (the boundaries) of the domain.

Figure 2 shows internal author-cocitation from the Rome 2010 International ISKO Conference.

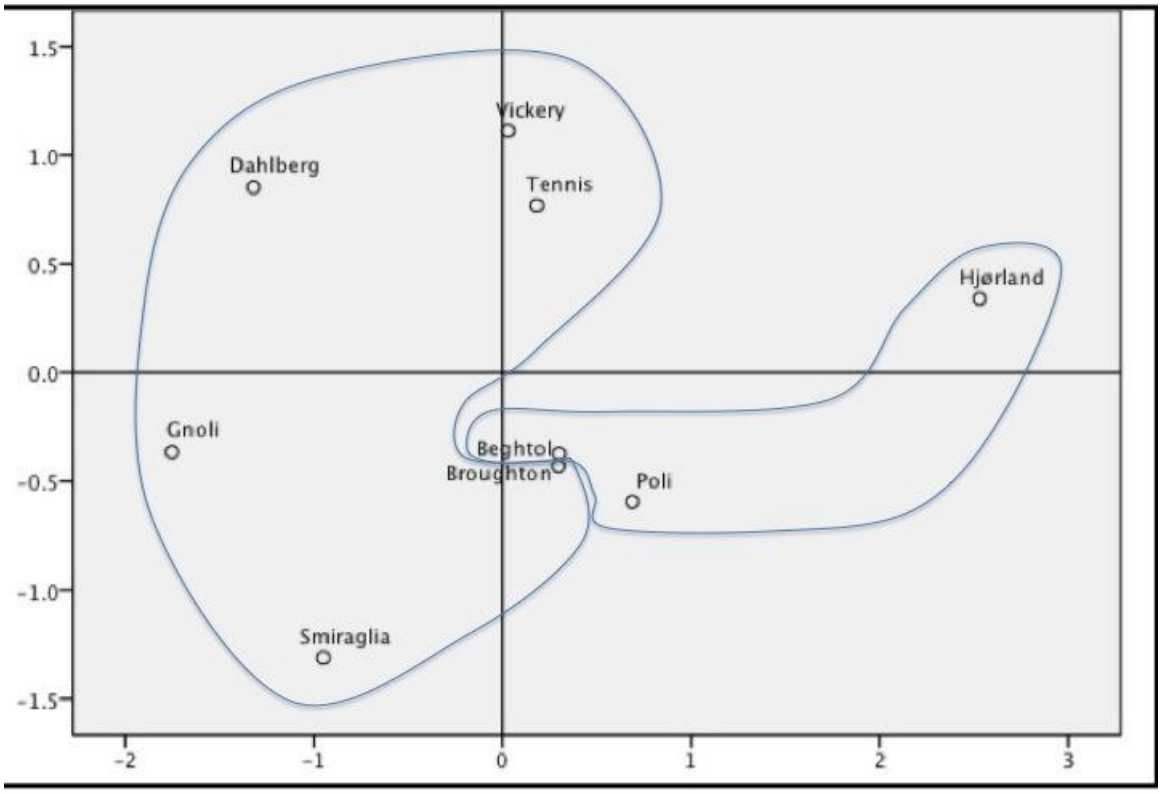

Figure 2. Internal Author Cocitation from ISKO 2010 Rome.

Like the illustration of the sphere, this map shows us some of the dimensions of knowledge organization as a domain. As it happens, although it is a map of only one conference, it is also a pretty good representation of the whole domain. The parameters, or dimensions, are given by domain analysis, which is the representation of a discourse community as can be determined from the formal products, or published research emanating from the community. From domain analytical studies emerge means for

visualizing interaction within the scholarly community, as well as points of shifting emphasis as theoretical paradigms are tested and hypotheses are generated.

According to Tennis (2003) the extension of a domain is the breadth of its topical universe, and the intension is the depth of the paradigms that comprise it. Bibliometric tools and meta-analysis can be used to visualize the extension and intension of KO as a domain. Analysis of the domain of knowledge organization is relatively easily generated from the formal publications in biennial ISKO conference proceedings, articles in our journal *Knowledge Organization*, and proceedings of biennial regional chapters, whose meeting years alternate with the ISKO international conferences.

Knowledge Organization is devoted to the conceptual order of knowledge. In the broadest sense KO is the arena in which the heuristics of ordering knowledge are studied. Specifically, KO is the research community devoted to classification and ontology, thesauri and controlled vocabulary, epistemology and warrant, as well as the development of applied systems for all of the preceding (often, especially in North America, resource description is also considered to be a part of KO). There is a long tradition of the activities and tools of KO; classification, taxonomy, and typology, for example, have always been key to the development of scholarship. Specific applications for information storage and retrieval, such as indexes, bibliographic classifications, etc., have been part of the practice of librarianship and the research agenda of information science since the late 19th century. The formal KO domain, represented by the International Society for Knowledge Organization (ISKO) and its chapters, councils and publications, dates from 1989 (Dahlberg, 2010).

The classical geopolitics of KO as a domain traditionally has consisted of anchors in six countries. Dr. Dahlberg, founder of the modern form of the domain is from Germany. Much of the scholarship in the first decades of the domain came from North America and the UK, especially with regard to the classification research group. Essential theoretical grounding found its base in the Royal School in Copenhagen, and the beginnings of epistemological and ontological thought in the domain came from Italy. New-ISKO chapters holding regional conferences or universities generating KO research are shifting the emphasis away from Northern hemispheric dominance to a more global perspective. To the classical mix, we now have added Slovenia, Morocco, Tunisia, Belgium, India, Brazil, France, and Spain. This is based on the formal publications of regional chapters. There also is a recent influx of papers from Singapore,

Taiwan, and China, the countries of affiliation of authors at the 2012 Mysore ISKO International Conference. The geopolitics of knowledge organization are shifting. Brazil now accounts for almost a third of the research at the most recent international conference. Is there a geopolitical dimension to KO? If all KO authors are working on the same set of problems are they doing so from different cultural perspectives.

A meta-analysis of knowledge organization based on 17 studies of KO literature incorporated 3494 source papers, of which 1100 appeared in journals such as *CCQ*, *LRTS*, or *LQ*, 444 appeared in KO, but 600 appeared in ISKO conference proceedings, and 1350 were papers in ISKO regional conference proceedings. The importance of conference proceedings as a venue for communication in the domain is clear. 56% of the research over time has been presented in conference papers. Only 13% of the total over time has appeared in the domain's formal journal.

The extension of the domain is consistently represented as including theoretical foundations, such as classification and ontology, and epistemology, which lies at the heart of both. The intension is represented by development and testing of applications. The international nature of the domain means that there are occasional overlapping emphases on multicultural and multilingual issues. Geographical diversity does not preclude domain coherence. In the co-citation map in Figurer 2 there were two poles on the extension dimension: semantics and KO systems, or if you will, concepts and order. All of the rest is intension.

Figure 3 shows author-cocitation maps from ISKO Montréal 2008 and IKSO Mysore 2012 respectively.

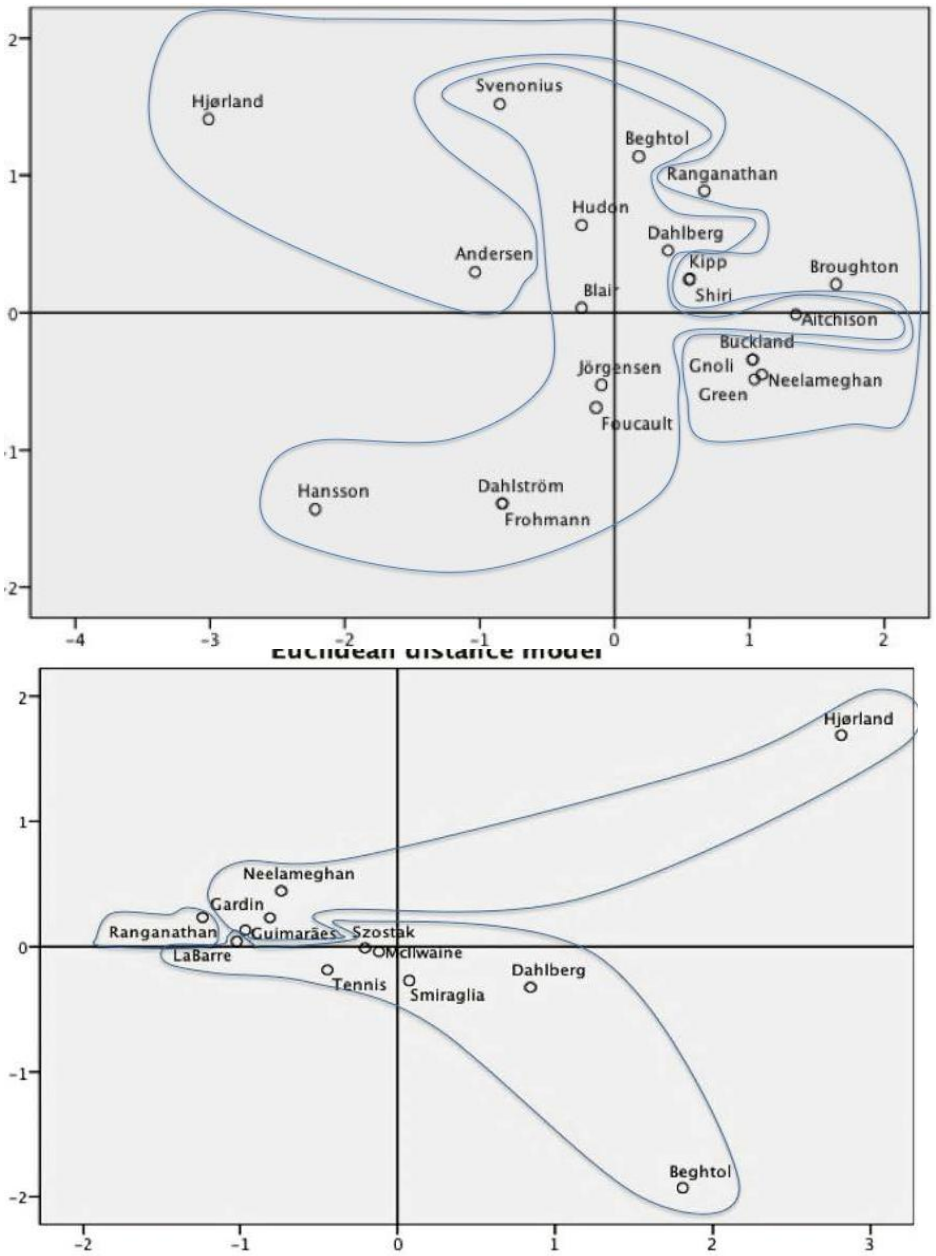

Figure 3. Author co-citation maps from ISKO Montréal 2008 and IKSO Mysore 2012.

ISKO 2008 in Montréal shows that "information retrieval" and "models and methods" represent the KO systems portion (interestingly enough associated this time with Hjørland and Andersen), or 36% of the conference, while "epistemology" and "multilingual multicultural" and "discourse communities" for good measure represent the semantics portion (Ranganathan, Broughton, Neelamegha), or 31% of the conference. The remaining roughly 33% is intension, largely applied research (led by Kipp and Shiri). ISKO 2012 in Mysore has "Ontology" "Categories" "Relationships" "Domain of KO" and "Domain specificity" or 47% of the conference as roughly constituting conceptology (the cluster with La Barre, Tennis, Dahlberg and Beghtol). "General classifications" and "Design and Development" give us 16% clearly in the KO

systems category (with Guimaraes, and Hjørland). That leaves 38% as intension, applied research, stretching the boundaries. It also shows how there is tension along the "concept – KO systems" dimension, as the weight of each shifts back and forth from conference to conference. We note the centrality of Ranganathan. We have to ask ourselves whether some of this is regional. We also can ask whether any of it is geopolitical.

Here is an epistemological map of the Mysore conference, in which we see themes arrayed by methodology. The dark blue is informetric, or domain analytical, the green is quantitative, which we see in ontology navigation relationships and information mining, the qualitative is found in user studies. This is the empirical part of the domain, or as I will show in a moment about half. The rest is rational, covering most of the KO systems and applied research.

Knowledge organization clearly is a coherent domain. It has an ontological base, its extension, which is a dimension stretching from concept theory (or semantics) to KO systems. It has an underlying teleology, which is the attempt to grasp the order of knowledge. It has, therefore, a set of common hypotheses, and epistemological consensus, although as we have seen the epistemological consensus forms another dimension bisecting the domain, stretching from empiricism to rationalism. And it has social semantics, which is a way of saying we have formal venues for our research, and the knowledge published there is clearly cumulative. There also is a geopolitical form of social semantics, which means we work globally and we bring our cultural characteristics with us.

Finally, we see that knowledge organization as a domain demonstrates coherence across time and across geopolitical boundaries, particularly as it concerns its theoretical foundations. Knowledge organization has robust and continuous formal publication venues that help to maintain domain coherence. Theoretical poles that anchor bisecting dimensions are both conceptual and methodological. The domain is scientific, but also has deep roots in humanistic rational methods and modes of thought. Differences that emerge in intension reflect shifting cultural approaches across regions and across time. There has been a shift over time in intension as the domain moved from emphasis on universal classifications to interoperability. But there are consistently marked dimensions within the domain:

-theoretical versus applied on a conceptual continuum,

-empirical versus rational on an epistemological continuum.

These dimensions serve to maintain constructive and dynamic tension within the domain, which in turn keeps the research front constantly in a state of renewal. Faced with different universes of knowledge, KO as a domain approaches the problems of analysis and concept designation from within the dynamic tension demonstrated here. Collins (1998) suggests no school of thought can comprise more than six points of view without either concretizing or splitting. KO itself has concretized, maintaining its status as a domain but using this tension constructively to evolve.

References

Smiraglia, Richard P. and Hur-Li Lee, eds. 2012. *Cultural frames of knowledge.* Würzburg: Ergon Verlag.

Smiraglia, Richard P. 2012. Universes, dimensions, domains, intensions and extensions: knowledge organization for the 21st Century. In A. Neelameghan and K.S. Raghavan eds. *Categories, contexts, and relations in knowledge organization: Proceedings of the Twelfth International ISKO Conference, 6-9 August 2012, Mysore, India.* Advances in knowledge organization 13. Würzburg: Ergon Verlag, pp. 1-7.

Hjørland, Birger and Jeppe Nicolaisen, EDS. 2005. Epistemological lifeboat. http://www.iva.dk/jni/lifeboat/

Hjørland, Birger. 1998. Theory and metatheory of information science: a new interpretation. *Journal of documentation* 54: 606-21.

Dimensions (mathematics and physics). 2012. *Wikipedia* http://en.wikipedia.org/wiki/Dimension_(mathematics_and_physics).

Tennis, Joseph T. 2003. Two axes of domains for domain analysis. *Knowledge organization* 30: 191-95.

Smiraglia, Richard P. 2012. Epistemology of domain analysis. In Smiraglia, Richard P. and Hur-Li Lee, eds. *Cultual frames of knowledge*. Würzburg: Ergon-Verlag, p. 114.