Knowledge Organization:
An Epistemological Perspective

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ABSTRACT: This philosophical essay explores the epistemological foundations of knowledge organization and discusses implications for classification research. The study defines the concept of "knowledge," distinguishes between subjective knowledge (i.e., knowledge as a thought in the individual's mind) and objective knowledge (i.e., knowledge as an independent object), establishes the necessity of knowledge organization in the construction of knowledge and its key role in the creation, learning, and dissemination of knowledge, and concludes with implications for the development of classification schemes and knowledge maps.

Overview

Scholars and practitioners in the field of knowledge organization rarely stop to reflect and ponder upon the philosophical foundations of their field of expertise. Nevertheless, as Budd (2001) argues, epistemology is important for Library and Information Science (LIS). This philosophical essay aims to explore the epistemological foundations of knowledge organization, and to discuss implications for the development of classification schemes and knowledge maps. Epistemology is the branch of philosophy that is focused on the theory of knowledge. It explores the possibility of knowledge. The study delves into the construction of knowledge. It exposes the key role of knowledge organization in shaping the way we perceive the knowledge domain, and thus establishes its indispensable contribution to the creation, learning, and dissemination of knowledge.

The philosophical argumentation is composed of six stages. First, I will differentiate between the two approaches to defining "knowledge," namely, knowledge as a thought and knowledge as an object. In the second stage, I will discuss the relationship between subjective knowledge and objective knowledge. (Note that "subjective knowledge" is equivalent here to the knowledge of the subject or the individual knower, and "objective knowledge" is equivalent here to knowledge as an object or a thing. They are not related here to truthfulness and arbitrariness, which are usually attached to the concepts of "objective knowledge" and "subjective knowledge"). The two modes of knowledge – as a thought and as an object – are interrelated. In fact, objective knowledge is an external subjective knowledge. Furthermore, the realization of objective knowledge necessitates subjective knowledge; meaning, that objective knowledge becomes real and meaningful only to the individual who is aware of it by his or her own subjective mind.

The third stage will focus on the argument that subjective knowledge is a product of a synthesis. Based on this argument I will argue, in the fourth stage, that subjective knowledge requires two types of pre-experiential intellectual elements, in addition to the substantial, sensory or intellectual data, which comprise its content. These are the pre-experiential rele-

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vant constitutive concepts and a pre-experiential structure, which represents logical, linguistic, explanatory or probabilistic relationships among them. These two elements shape the way we perceive the world and construct knowledge. (Note that I use the term "pre-experiential," rather than "a priori" in order to stress that these two intellectual elements do not depend on the specific experience. Yet it is based, but rather, are based on previous experiences. The term "a priori," usually refers to intellectual elements, which are not dependent on any sensory experience, while the term "pre-experiential" refers here to intellectual elements, which are not based on the present experience; still they are based on previous experiences).

In the fifth stage I will claim that objective knowledge classification schemes, such as the Library of Congress Classification scheme (LCC), affect our cognitive maps. Note, however, that this claim is still subject to empirical scientific verification.

Finally, in the sixth stage, I will claim that the epistemological analysis helps us to distinguish between two kinds of structures: conceptual cognitive pre-experiential structures and external recorded or documented structures. Consequently, there are two major structuring approaches: rationalistic (i.e., phenomenological or conceptually based) structuring methods, and empirical structuring methods. Identifying and formulating these methods set an agenda for classification research.

This is the outline of the philosophical argumentation. Now, let us study it in details.

Meanings of "knowledge"

Types of knowledge. The concept of "knowledge" is used in various meanings and contexts. In traditional epistemology there are three main kinds of knowledge: Practical knowledge, knowledge by acquaintance, and propositional knowledge (Bernecker and Dretske, 2000). Practical knowledge, which is usually known as 'knowing how', refers to skills. Skills are functional abilities (e.g., riding a bike, and driving a car). The distinction between knowledge by acquaintance and propositional knowledge, which is also known also as descriptive knowledge, was initially offered by Russell (1912). Knowledge by acquaintance is direct non-mediated knowledge of objects. This is the knowledge that a person has of external physical objects, by means of direct sense data, or direct knowledge about his or her own self. Propositional knowledge comes in the form of 'knowing that';; S

(subject) knows that P (proposition). It is the reflective and/or the expressed content of what a person thinks that he or she knows. (Note that the contents of our reflective and/or expressed thoughts are in the form of propositions). Propositional knowledge is divided into inferential and non-inferential knowledge. Non-inferential propositional knowledge refers to direct intuitive knowledge. For example, very we often we use general abstract terms, such as "love", "justice", "soul", and "god". Usually which we intuitively understand them. When we draw some conclusions based on these terms, our non-inferential knowledge turns into inferential knowledge. Inferential knowledge is a product of inferences. The field of knowledge organization, which is a branch of information science, as well as any academic field, is composed of inferential propositional knowledge. In fact, this paper, as well as any scientific paper, is composed of inferential propositional knowledge. It starts with a proposition, and then it develops it layer upon layer until its final conclusions.

Two definitions of knowledge. Still, what is knowledge? There are two basic approaches to define the concept of "knowledge," knowledge as a thought in the individual's (or subject's) mind, and knowledge as an object or a thing. The first approach conditions the knowledge in the individual's mind. Knowledge is a thought that can be characterized as a justified true belief. According to Bernecker and Dretske, (2000), in traditional epistemology there are three individually necessary and jointly sufficient conditions for propositional knowledge: justification, truth, and belief. The epistemological literature has thoroughly debated these conditions (e.g., Gettier, 1963, Lehrer (1997), and Audi, 2003). One of the most influential papers was written by Edmund Gettier (Gettier, 1963). Gettier posited a hypothetical situation intended to call into question the definition of knowledge as completely justified true belief, and to argue for a softened position. Without delving into the epistemological literature, it seems sufficient for our purposes to characterize subjective propositional knowledge by the justifiable certainty that the individual's own thoughts are true.

The second approach ascribes an independent objective existence to knowledge. Knowledge is a collection of concepts, arguments, argumentations, and rules of inference. They are true and exist independently, not depending on the subjective knowledge of the knowing individual. The implications of this approach to LIS were recently discussed by Hjorland (2004).

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Karl Popper's "Worlds". The reader who is familiar with the philosophy of Karl Popper probably finds a resemblance between the two approaches to defining "knowledge" and the concepts "World 2" and "World 3.". Popper (1967, 1972, 1977) differentiates among three types of objects, or "Worlds," according to his terminology. "World 1" is composed of all of the physical entities. "World 2" is composed of all of the subjective entities, including knowledge as a subjective state of mind. "World 3" is composed of all of the products of the human mind, including knowledge as an independent object. Following Popper, one can say that objective knowledge (namely "World 3") is documented, saved, and transmitted by means of physical objects, such as books, paper, and CDs (namely "World 1"), and becomes real to each one of us only as each one of us gets to know it through his or her own mind (namely "World 2").

Complementary approaches. The subjective and the objective diverse approaches are paradoxically complementary, since knowledge of that which no one knows is meaningless.

Mr. and Mrs. Johns. Let's examine two imaginary examples, taken from the realm of poetry and the realm of science. Mr. Johns is a poet. Every day he composes a poem. His poems reflect his feelings, memories, vivid imagination, and rich inner world. Mr. Johns customarily articulates his poems in his "head," memorizing them word by word. Yet Mr. Johns never writes his poems. Actually, he once did. He wrote a poem on a piece of paper (a napkin, to be precise), and then he realized that his written poem was no more than a concise version of his original inner poem, and only insinuated – but did not really reflect – his rich inner world. He discovered that each time he read his own poem he understood it differently. Suddenly, he realized that words are codes that represent thoughts. He knew that people who read his poem would never be able to understand it the way he did. Nevertheless, he happily went to sleep, but not before giving his wife, the scientist Mrs. Johns, a goodnight kiss. In the morning he was horrified to discover that he had forgotten the poem. He looked for the napkin, but he had misplaced it. Unfortunately, he never found it. When Mr. Johns told his wife, the scientist Mrs. Johns, what happened to him, she remembered that a few days earlier she had mislaid a napkin with her greatest scientific discovery written on it, and she too could not recall it. Does Mr. Johns' mislaid poem really exist? Does Mrs. Johns' mislaid scientific discovery really exist?

One can answer these questions assuming metaphysical assumptions on the ontological status of different types of entities (like Karl Popper, for instance). I prefer to remain on the practical level. There is no meaning to knowledge that no one knows. To the concept of objective knowledge is ascribed independent validity, which is binding on every person who becomes aware of it. In this sense, the concept "objective knowledge" is equivalent here to "universal knowledge". It is ascribed universal validity, or inter-subjective validity, common to all people who are aware of its existence. However, it is essential to emphasize that ascribing objective or universal validity to knowledge does not mean that it is true, since the knowing person – the one who ascribes universal validity to knowledge – might be wrong. To summarize this point: paraphrasing the French philosopher Rene Descartes we can say that each person should validate universal knowledge using his or her own subjective mind.

Furthermore, if one sticks to a practical approach, rather than to a religious or metaphysical approach, one must admit that objective knowledge is a product of the externalization of subjective knowledge. In fact, objective knowledge can be characterized as recorded or documented subjective knowledge.

Knowledge as a product of a synthesis

Knowledge as a state of mind is a product of a synthesis. This assertion is based on the philosophical literature that followed Immanuel Kant's "Critique of Pure Reason" (1781). Kant argued that any empirical perception is the product of the synthesis of a multiplicity of sensory data. He identified in any perception a priori components, which gives meaning to the diversified sensory raw material and constructs it into one unit. To demonstrate this key assertion that any empirical perception is a product of a synthesis, let us return to Mr. Johns.

Mr. Johns is sitting in his room composing one of his poems. Suddenly, he hears a series of noises that come through the closed window, and he concludes that his wife, Mrs. Johns, has just started her car, though he cannot see her. He continues to listen and hears his wife start the car and drive off.

Now, let's see what actually happened. Mr. Johns' ears perceived a series of sensory data. In his mind he associated each noise with a specific object – his wife's car. Once the noises were identified as associated with the same object, they were composed to form a unified perception, which represents the con-

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dition of the car in a time sequence: engine off – engine on – car moving.

The same happens with visual impressions. The pictures that we see are a synthesis of the visual impressions that we have. I am looking at my computer monitor. I am closing my eyes, and instantly open them. I am seeing a computer monitor in front of me. Is it the same computer monitor that I saw a minute before? In fact, I had two different images of monitors, one before I closed my eyes and one after I opened them. In my mind the two images assembled to form one picture of the same monitor.

This analysis follows the analysis done by the British philosopher David Hume, who preceded Kant. Hume identified the problem: the limitation of empirical perception. He showed that we cannot actually see that it is the same object. Hume questioned the two basic concepts of "identity" and "causality", and shook the foundations of science. Kant formulated the solution: every empirical perception is a product of a synthesis of the diversified sensory data (or impressions) into one unit in the subject's mind. Every empirical perception is composed of two basic components: the empirical sensory impressions, namely what we perceive through our senses, and the a priori concepts, by which these impressions acquire meaning and are composed into one unified thematic unit. For the reader who is not familiar with the vast epistemological vast literature, I find it important to clarify that in this paper I follow Kant's principle of a priori knowledge, without adopting his suggested a priori categories.

Constitutive concepts

At this point we can conclude that any subjective knowledge is the product of a synthesis. This is true for empirical, as well as for theoretical knowledge, simple or complex. The differences lie in the level of abstraction and the content of the body of knowledge. Empirical knowledge is a product of a synthesis of empirical impressions by a priori or pre-experiential concepts. Theoretical knowledge is the product of a synthesis of intellectual material by higher-level concepts.

Knowledge is composed of a collection of items – concepts, and arguments – that have a common thematic basis. This basis is an essential constitutive element, which turns the aggregate into knowledge. Constitutive concepts are, intuitively or reflectively, implemented in any construction, learning, or implementation of knowledge.

Mutual dependence. The pre-experiential constitutive concept and the items that compose the content of the given body of knowledge are mutually dependent. On the one hand, the constitutive concept establishes the content of the specific knowledge, by determining what items are relevant. On the other hand, the relevant items, which are constantly changing, reshape the constitutive concept. As noted above, I use the term "pre-experiential", rather than "a priori," in order to stress that the constitutive concept does not depend on the present experience. Yet it is based on previous experiences.

Let's look at two examples, which exemplify this argument, the concept of "family" and the concepts of "sports",. which exemplify this argument. The concept of "family" demonstrates the mutual dependence of reality and our concepts. The concept has dramatically changed in the last decades. In the past, the concept was associated with heterosexual married couples, with or without offspring. Nowadays, the concept is applied to unmarried couples, single-parent families, homosexual couples, and communal families, as well as married couples. The concept of "sports" exemplifies the flexibility of our concepts. In ancient Greece it referred mainly to athletics. Nowadays, it refers to car racing (i.e., motor sports) and skydiving (i.e., extreme sports) as well.

Concepts enable us to understand the changing reality. We encounter cognitive dissonance when our concepts cease to represent the changing reality. This is the essence of the intellectual crisis that we commonly call "Post-modernism."

A pre-experiential structure

The pre-experiential constitutive concept sets the boundaries of the knowledge domain. Yet there is another essential pre-experiential element necessary for the construction of knowledge – a pre-experiential cognitive structure. The pre-experiential structure represents logical, linguistic, explanatory or probabilistic relationships among relevant related concepts and their sub-concepts. These two pre-experiential elements shape the way we perceive the world and construct knowledge.

The following examples demonstrate the key role of pre-experiential structures in facilitating knowledge construction. The first example refers to specific objects, the skyline of New York City, the second example refers to a visualized symbol, the Star of David, and the third example refers to an abstract concept, the concept of "knowledge".

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The Skyline of New York City . The following picture shows a skyline of a modern city at night.
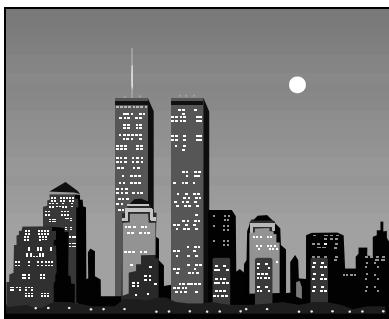
Yet, it seems that most readers will identify the "Twins," the two towers of the World Trade Center, and locate the picture in New York City. When I first saw this picture I intuitively connected it with New York City, United States, "Ground Zero," terrorism, heroism, O'sama Bin Laden, and September eleventh. None of these terms appear in the picture itself. They exist in my mind prior to seeing the picture. The relationships among these terms, which also existed in my mind prior to seeing the picture, provide the context that turns the images of unspecific "illuminated buildings" into the images of specific buildings in New York City.

The Star of David. The following graphical design shows two crossing triangles.
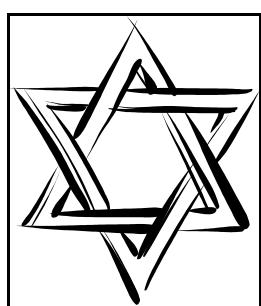
Yet, it seems that many readers will recognize the Star of David. Furthermore, when I saw this image I intuitively connected it with the Jewish religion. It symbolizes the Star of David, Judaism, synagogue, and Israel. Note that none of these terms appears in the graphical design itself. They exist in my mind prior to seeing the images. The relationships among these terms, which also existed in my mind too prior to seeing the picture, provide the context and turn the images of two crossing triangles into the image of the Star of David.

The concept of "knowledge". The last example relates to an abstract concept, the concept of "knowled-

ge". The concept of "knowledge" embodies other concepts, which establish its meaning. These are "content," "meaning, "truth," "validity," "justification," "verification," and the like. The concept of "knowledge" gains its meaning by relating to these other embodied terms.

The cognitive map represents the thematic relations among the various concepts. Each term is related to various concepts. This notion is not new. It was suggested by linguistics and anthropologists (e.g.see Structuralism), and by philosophers (e.g.see Ludwig Wittgenstein, Tractatus Logico-Philosophicus). The related terms might belong to the same hierarchical order.; For example,: "epistemology," "aesthetics," and "ethics" are all branches of philosophy. The concepts might belong to a higher order (i.e., broader terms), as in the case of "philosophy" and "epistemology". And they might belong to a lower order (i.e., narrow terms), as in the case of "knowledge," "practical knowledge," "knowledge by acquaintance," and "propositional knowledge". Practical knowledge, knowledge by acquaintance, and propositional knowledge are sub-classes of knowledge.

In most cases the pre-experiential structure of related concepts might be partial, inconsistent, and biased. Nevertheless, it is essential for perceiving the thematic context. Usually, the cognitive concept map is used intuitively. Occasionally it is the product of reflective thinking. A comprehensive and systematic cognitive concept map enables the individual learner to grasp the knowledge domain in its entirety, and gain insight into its logical structure, and into the hidden or known thematic relations among its various constituents.

Objective structures

When a concept map is recorded or documented it becomes an object or a thing. As such, it becomes part of objective, or rather universal, knowledge. In our daily life we come across numerous knowledge maps. They are published in textbooks and curricula, encyclopedia articles, and Web portals, as well as bibliographic resources.

It is assumed that universal knowledge maps and schemes, such as the Library of Congress Classification scheme (LCC), help to shape our cognitive maps, and thus influence the way we perceive the knowledge domain and act in the real world. Note, however, that this claim is subject to empirical scientific verification.

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Since a knowledge classification scheme or a map is a model for knowledge representation, it is expected to be exhaustive and exclusive, namely, to include all of the relevant knowledge, while excluding the irrelevant. It is also expected to be systematic and to adequately represent the knowledge domain. Very often it is expected to be scientifically valid, too.

Research agenda

Are these maps, which shape the way we perceive the world, comprehensive, systematic, updated and scientifically valid? This question sets an agenda for knowledge-organization research: to establish scientific methodologies aimed at designing scientific knowledge maps applicable to all fields of knowledge.

The epistemological analysis helps us to distinguish between two kinds of structures: subjective or cognitive structures and objective or externally recorded structures. Consequently, as mentioned earlier, there are two major structuring approaches: rationalistic (i.e., phenomenological or conceptual) based structuring methods, which are based on rational analysis of the knowledge domain, and empirical structuring methods, which are based on empirical study of the knowledge domain. In other words, the developer of a knowledge map can base the structuring on a reflective conceptualization of the knowledge domain (i.e., rationalistic structuring), or s/he can base the structuring on the empirical study of the knowledge domain (i.e., empirical structuring). The rationalistic structuring methods produce typologies. The empirical structuring methods produce taxonomies. Identifying and formulating these structuring methods set an agenda for classification research.

Conclusion

In this philosophical essay I explored the epistemological foundations of knowledge organization and established its necessity in the construction of knowledge and its key role in the creation, learning, and dissemination of knowledge.

I envisage that in the next decade knowledge-organization research will focus on exploring the epistemological foundations of knowledge organization,

establishing scientific methodologies for designing scientific knowledge maps, and expanding the applicability of knowledge organization to other areas of human activity, e.g., education, medicine, social policy, beside the development of information systems and reference resources. I foresee that scholars and practitioners will make a joint effort to explore and practice what I call "scientific knowledge mapping," namely the development of knowledge maps based on scientific as well as critical rationalistic methodologies.

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