



THE STRUCTURE OF CONCEPT AND ITS CONNECTION TO SCIENCES

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ABSTRACT:

This paper aims to explore the possibilities of Interdisciplinarity in knowledge organization field as *approaches of epistemology*. My purpose is to find some examples what give some new advances of the Concept.

In the first part I am exploring Interdisciplinarity and its necessary connection to the theory of Knowledge Organization. I am attempting to survey the problem of concept-building and extension, as well as the determination in different interdisciplinary aspects.

I will survey controversies about Interdisciplinarity, Concepts in their historical context, the representational theory of mind, conceptual representations; epistemological approximations etc., then sketch the structure of Concept, make a comparison between content and the dimension of Concept and semantic elements. I will draw up unknown possibility when I point new correlation between Heisenberg Uncertainty Principle and the components of the Concept – studying content and the dimension of the Concept is impossible same depth and accuracy in the same time.

The next part I would like to present some cases for universality of scientific laws, particularly relations in linguistics.

My results attained are new approaches of the Concept - new correlation between Heisenberg Uncertainty Principle and the components of the Concept - and case studies of scientific laws.

KEYWORDS:

Interdisciplinarity, Theory of Information Retrieval Language, Concept-building, Structure of Concept, Heisenberg



1. PREFACE

“The biggest challenge in Information Retrieval is Concept identification in a specific domain of interest!” (Soergel et al., 2004). Therefore this article focuses on the Definition of Concept, the Structure of Concept and its Approaches of Epistemology. If we study connection of Concept to the different sciences our approximation should be interdisciplinary and try to adopt different tools in the field of Knowledge Organization. There are two viewpoints according to the Interdisciplinarity:

- how can we use rules, laws, definitions, knowledge, Concepts, from different sciences in the knowledge organization – I am focusing in this field;
- how does concept of Interdisciplinary appear in Knowledge Organization, classifying interdisciplinary knowledge.

My paper is dividing three main parts. My purpose is to find criteria for Interdisciplinarity and give some new approaches of the Concept.

In the first part I am exploring Interdisciplinarity and its necessary connection to the theory of Knowledge Organization. I am attempting to survey the problem of concept-building and extension, as well as the determination in different interdisciplinary aspects.

I will point the connection of Concept to the different sciences in second part of my work. This paper examines some traditional approaches of the Concept (Carnap, Church, Wittgenstein, Horwich, Dahlberg, etc.) and its circumstances on the basis of different sciences (Philosophy, Epistemology, Psychology, Physics, Semantics, etc.). I would like to conclude at the first step: one of the fundamental conceptions of Knowledge Organization, the Concept itself is cross-science, a multidisciplinary and interdisciplinary phenomenon.

Introduction of the next part I would like to present some cases for universality of scientific laws, particularly physics ones. I will concentrate physics, because the Heisenberg Uncertainty Principle is only one possibility of universal laws.

I conclude at this step: one of the fundamental Conceptions of Knowledge Organization, the Concept itself is cross-science, a multidisciplinary and interdisciplinary phenomenon.

2. INTERDISCIPLINARITY AND KNOWLEDGE ORGANIZATION – Heisenberg, Boltzman and Shannon Principle

General recognition is: the boundaries between scientific disciplines disappear gradually. There is not unequivocal that these properties how change the

epistemological comprehensions. This approaches influence the conceptual nets, learning outcomes, assessment strategies.

I have studied Concept of Interdisciplinary and Interdisciplinarity in Google at 2007. The first examination was made by Sperber. (Hajdu Barát, 2007) I have repeated this examination in this year. Generally the main number of hits reduced, but these results also show the Interdisciplinarity is a huge part of scientific publications.

Table 1.- Hits of Interdisciplinarity in Google (2006, 2008)

Concept	Hits 2006	%	Hits 2008	%
Interdisciplinarity	751.000		363.000	
... and Library Science (LIS)	10.700	0,69	409.000	2%
... and Knowledge Organization (KO)	47.000	3,04	333.000	1,63%
... and Epistemology (EP)	62.800	4,06	314.000	1,54%
... and Cognition (CO)	85.300	5,51	959.000	4,71%
... and Linguistics (LI)	103.000	6,65	1.510.000	7,41%
... and Physics (PH)	139.000	8,98	412.000	2,02%
... and Anthropology (AN)	144.000	9,3	2.230.000	10,95%
... and Biology (BI)	151.000	9,76	3.950.000	19,4%
... and Psychology (PS)	187.000	12,08	3.690.000	18,12%
... and Philosophy (PH)	251.000	16,22	3.740.000	18,37%
... and Economy (EC)	367.000	23,71	2.810.000	13,8%
Total hits	1.547.800		20.357.000	

Table 2.- Hits of Interdisciplinary in Google (2006, 2008)

Concept	Hits 2006	%	Hits 2008	%
Interdisciplinary	23.300.000		19.100.000	
... and Library Science (LIS)	309.000	0,72	124.000	0,61
... and Knowledge Organization (KO)	44.300	0,10	14.100	0,006
... and Epistemology (EP)	564.000	1,31	243.000	1,19
... and Cognition (CO)	899.000	2,08	767.000	3,78
... and Linguistics (LI)	945.000	2,19	1.480.000	7,29
... and Physics (PH)	11.700.000	27,12	1.480.000	7,29
... and Anthropology (AN)	1.270.000	2,94	2.230.000	10,99
... and Biology (BI)	10.900.000	25,27	3.930.000	19,36
... and Psychology (PS)	6.120.000	14,19	3.610.000	17,78
... and Philosophy (PH)	7.760.000	17,99	3.660.000	18,03



... and Economy (EC)	2.630.000	6,1	2.760.000	13,60
Total hits	43.141.300		20.298.100	

Interdisciplinarity had become a hot topic in Economy, Philosophy and Psychology earlier, and Interdisciplinary had combined with Physics, Biology and Philosophy prominently. Now these topics are determined, but decrease of Economy and Physics is remarkable.

The first table represents theory a little bit more than the second one. The second pillar seems more empiric and applied. The role of Knowledge Organization is conspicuous in theoretical relationships of Interdisciplinarity.

My opinion is the following: this establishment is right especially in Knowledge Organization. Several Physical Principles, axioms can describe many relationships of Information Retrieval Languages, like Entropy, Heisenberg Uncertainty Principle ... One of the well known parallelisms between physics and LIS studies is Boltzman and Shannon Principle.

$$I_{(A)} = - \log P_{(A)}$$

This decision hasn't brought a lot of new solutions, but it means a special viewpoint to see scientific and daily life. One of the well known parallelisms between physics and LIS studies is Boltzman and Shannon Principle.

“In the complex world of the late twentieth century, however, organizing information from an interdisciplinary perspective may be more useful and closer to the way things really are. Domains often cross boundaries, and to view knowledge as an organic whole rather than as disembodied individual specializations seems more genuine, than placing knowledge in unnatural or artificial divisions. Scholarly disciplines often consist of interdisciplinary ways of thinking.” (Mcinerney, 1997)

Do isolated sciences exist at all? Do sciences have identifiable borders? Are there characteristics, elements of the Concept and can we see them from the different viewpoints, research fields and study them with several methods?

3. THE CONCEPT

There are many philosophical, linguistic, psychological, epistemological approaches, definitions of what Concept and concept-building are. "We might summarize the present situation with regard to candidates for “Concepts” that have been discussed here as follows: there is the *token representation* in the mind or brain of an agent, *types* of which are shared by different agents. These representations could be *words, images,*

definitions, or “*prototypes*” that play specific inferential roles in an agent’s cognitive system and stand in certain *causal* and *covariant* relations to phenomena in the world.” [REY 1995, p. 192.]

Carnap introduced the Concepts of Classificatory, Comparative, and Quantitative Concepts in *The Logical Structure of the World* (1928). Classificatory and Quantitative features are similar to intension and extension.

Frege's directive between sense and reference of a singular term, and the traditional distinction between the intension and the extension of a general term, apply also to Concepts. Frege's criterion of distinctness for modes of presentation (in terms of potential informativeness of an identity statement) can be adapted for distinguishing general Concepts that have the same extension. Sameness of topic (referent) is not sufficient for sameness of Fregean cognitive content. Frege showed that two singular terms with the same reference may have different senses, and we know that two general terms can have the same extension yet can differ in their intensions. Similarly with Concepts: their contents must be sufficiently fine-grained so that thinkable differences correspond to distinct Concepts. [<http://www.bris.ac.uk/philosophy>]

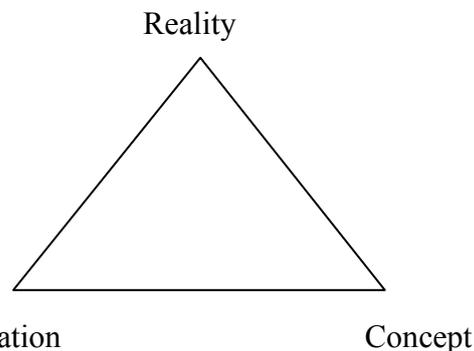


Figure 1.- Triangle for correlation among Reality, Information and Concept

I have surveyed controversies about Concepts in their historical context, the representational theory of mind, conceptual representations; epistemological approximations etc., then sketched the Structure of Concept, make a comparison between Content and Dimension of Concept and Semantic Elements. I drew up unknown possibility when I pointed new correlation between Heisenberg Uncertainty Principle and Components of Concept.

- “The more precisely the position is determined, the less precisely the momentum is known in this instant, and vice versa.” - Heisenberg, uncertainty paper, 1927 (Heisenberg, 2006)
- *Studying content and dimension of Concept is impossible same depth and accuracy in the same time.* (Hajdu Barát, 2007)

Dahlberg points up knowledge fields are interact and cross-boundaries. In addition to Multidisciplinarity and Pluridisciplinarity, she describes a form of Cross-disciplinarity



where experts from varying disciplines come together, use their talents, methodologies, and knowledge to conduct research or develop a new product. The experts not only contribute; their collaboration actually produces something that reflects all the contributing disciplines in some way. [Dahlberg, 1994]

I have adopted Heisenberg Uncertainty Principle to KO field, focus on Concept. If we can account the semantic elements we can concentrate the meaning, visualize the mind picture ... with the same quality. And inversely.

3.1 Individual concept-building and societal category

The concept-building of each person's entity is the variability. "We should find those favoured semantic characteristics which constitute the similar conceptual image in the mind of the librarians and of each user, too." [Hajdu Barát, 2003] Categories are fundamental Concept of Knowledge Organization and epistemological approaches, too.

I will point to the fractal model is structure of social networks. According to the fractals of social networks I will show the characteristic of collaborative knowledge and knowledge sharing.

4. CONCEPT AND ITS CONNECTION TO SCIENCES

As I have written there are several definitions what Concept and concept-building are from the different sciences. They define and tone meaning of Concept. With helping of Heisenberg we see much better the elements of Concept (meaning, usage).

How can we combine the knowledge of Physics and Knowledge Organization? According to the Heisenberg Principle the adaptation was very simply, but there are much more relations what can we suit concepts of Knowledge Organization.

Why is Physics suitable to describe all manifestations? There would be so many answers for this question, one of them: because the Physics and its laws are universal.

Now I am flashing some occurrence without any equations and formula.

4.1 Newton Principles

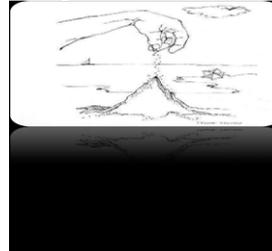
Case study

Building sand-castle

image



image



explanation

There is a point when the sand-castle fall-down. Where this point is usually is surprise for builders.

Sand “knows” the Newton I. Principle

Potential parallelism to Knowledge Organization:

- classifying all collection for a long time,
- controlled relations in thesauri,
- build OPACs.

4.2 Fractal theory

Case study

Norwegian coastal sector, fjords

image



image



explanation

We can interpret with fractal theory based on theory of Mandelbrot

Manifestation can explain by fractal theory.

There are many possibilities where we can use and adopt theory of Benoit Mandelbrot in nature and the intellectual fields, too.

“Our common experience is with dimensions of one, two and three. A line has one dimension, a plane has two dimensions and space has three dimensions. It is hard to imagine fractional dimensions but they do, in fact exist. Fractals can be created mathematically but also seem to occur in nature in places like coastlines, trees, leaves, snowflakes, mountains, etc. (These are called stochastic fractals.) For example, if you look at accurate maps of, say, the Atlantic coastline of the United States you will find that the length of the coastline depends of the length of the measuring stick you use to measure the length. As you look closer and closer you see more detail. The other thing to note in the figures is that each level of detail is *self-similar*, that is, it looks looking the same as you zoom in. This self-similarity is the key feature of fractals. There are



many examples of naturally occurring fractals” (Crowley, 2002), for example: brain, lungs, kidney, distribution of galaxies, broccoli, river system or solidification, artistic works etc.

Potential parallelism to Knowledge Organization:

- Chaos Theory in Knowledge Organization, controlling possibilities,
- relations between Concepts,
- Visualization of Information, Relations, Concepts.

And so many other possibilities for using the Physical laws: Word Frequency in Languages; Inconstant Brightness of Quasars; Frequency and Intensity of Earthquake; Distribution for Financial Balance in our account; Evolutionary Model of Microbe etc.

5. CONCLUSION

There are so many contact points and interactions that we have not considered in the research of Knowledge Organization yet, for example Knowledge Engineering, Economics, Philosophy, Psychology, Linguistics etc. I have given some definitions from Philosophy and Linguistics. The Physical Viewpoint is only one of the various possibilities, but it can help to understand better at least a small part of Knowledge Organization Theory.

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