



INFORMATION  
STUDIES IN  
INFORMATION  
SCIENCE  
AND ETHICS  
WITH REGARD  
TO USERS  
WITH VISUAL  
IMPAIRMENT

*Jivi Stodola*

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Each study has two anonymous reviewers.

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# Introduction

This publication places itself at an interdisciplinary intersection between philosophy (especially epistemology) and information science. Traditional methodologists of science claim that science does not provide itself with its subject and its method – both are borrowed from a discipline that is more general than science itself. The fundamental theme of this work is the question: How can we define the subject of information science to which the notion of information is central? At the same time, the publication deals with certain methodological questions of information science, especially its most general foundations. It follows that we often (not always) deal with a more general discipline than information science, specifically with philosophy. However, as we are interested in questions related to information and information science, we can say that we are concerned with “philosophy of information”, which seeks to define the concept of information and focuses on information science research. Nevertheless, we do not intend to set an unbreakable boundary between the philosophy of information and information science; there is a smooth transition between these disciplines in our work.

The publication is comprised of seven studies. Each study forms a closed system presenting arguments in support of particular conclusions, and it is therefore possible to read individual studies separately. Together, however, the studies form a unified whole that represents a certain concept of information science. All the arguments for this concept draw on a specific understanding of the key concept of information science – the concept of information that is confronted with several related concepts, with a certain methodological approach and various problematic issues. By reading the publication, we get answers to specific questions that are dealt with in individual studies, but also to questions that go beyond the narrow framework of individual studies and gain their significance only when we think of the publication as a whole. We can say that the publication presents a relatively comprehensive exposition of very general issues of philosophy and information science related to the phenomenon of information.

The aim of the work is to relate the following notions:

- 1) information – information science (information ecology);
- 2) information (document) – visual impairment;
- 3) information (artificial abortion, disinformation) – information ethics.



In the first relationship, the concept of information ecology, which can serve as a certain methodological basis or meta-theory of information science, is added to the main concepts. The second relationship adds the concept of a document, which represents a certain alternative to the concept of information. We add other terms to the third relationship, namely artificial abortion (as opposed to information within information macroethics) and disinformation (as opposed to information within information microethics). The above relationships form the structure of the whole publication which is divided into three parts: I. Information, Information Science and Information Ecology, II. Information, Document and Visually Impaired Users, and III. Information, Entropy and Information Ethics.

The phenomenon of information that is being examined has a special status. Although information science is a relatively well-established discipline, there is no agreement amongst information scientists on what information in fact is. In the first study, we conclude that this is so because the concept of information goes beyond all general categories (the term is transcendental) and falls more within the domain of philosophy (epistemology and metaphysics), which has certain implications for information science and its nature. The big question that remains is in what sense the term information is used in information science and other fields. There are three answers suggested – as a univocal, equivocal or analogical term. The second study explores the notion of information from this point of view, especially in relation to the discipline called information ecology.

The three studies that follow are concerned with the relationship of the concept of information to the issues of visually impaired users. It may seem that this is a marginal topic, but the author is convinced (partly based on his experience at The Support Centre for Students with Special Needs at Masaryk University) that the way we perceive the phenomenon of sensory impairment can bring valuable insights relevant to epistemology and information science. All studies of this section confront the concept of information with issues related to visual impairment. The first one notes the relationship between addressing epistemological questions (specifically in connection with the phenomenon of information) and the approach of library and information science to users with visual impairments. It shows that individual epistemological schools take different perspectives on these issues and suggests the most appropriate epistemological approach. The second study deals with the issue of visualization of information. Visualization is understood as a way of transforming raw data into information (data obtain a specific structure). It notes how the tendency to visualize causes troubles to the users with visual impairment and assumes that in some cases we can convert data to information in an opposite manner, which is here called “de-visualization”. The question of whether the visualization effort is always necessary and desirable is raised. The third study of the second part argues in favour of the thesis that information is conceived as an

intangible content in information science and that it may lead to the fact that a component of the information flow that can be perceived by senses is overlooked, again leading to a certain overlooking of visually impaired users. This opens the question, also raised by the first study of the first part of the publication, of the future of the concept of information in information science.

The third part of the publication is devoted to the relationship between information and information ethics. Based on two different concepts of information, information macroethics and information microethics are distinguished. The first study addresses the issue of the relationship between information ethics and the problem of artificial abortion, which is considered by Luciano Floridi one of the fundamental issues of information macroethics. The second study addresses the phenomenon of disinformation, which we can identify as the main issue of information microethics.

Methodologically, we draw on critical realism, which posits that human cognition can be objective (unconstructed by the subject in the process of cognition, although the role of the subject is not entirely passive), true (a correspondence can be reached between knowledge and reality; knowledge is defined by this correspondence, what does not agree with reality is not knowledge, but a fallacy), and certain (there are findings about which we can claim with certainty that they are true). The objectivity of knowledge is connected with the assumption that there is a reality independent of knowledge, that this reality is itself structured (knowledge does not bring structure into reality but abstracts it from it). Truthfulness is connected with the assumption that we can learn about the reality directly, our cognitive structures are in touch with reality itself (otherwise we would not be able to identify a correspondence), and that we can distinguish what reality itself brings to our knowledge and what is “added” by our cognitive structures (generality is concerned here). The aforementioned foundations of robust critical realism are not arbitrarily selected; we do not adhere to them because they are likeable, but because indirect evidence can be obtained for them by transforming opposing propositions to a contradiction.

The methodological tool applied in the work is conceptual analysis, the traditional method of philosophy adopted by information science. Within the framework of conceptual analysis, we define terms by means of essential properties, classify them, and search for relationships between concepts.

Studies were originally published under different title in journals, but some of them have been revised. It can also be said that their inclusion in the publication as a whole transcends their value as separate contributions (as we have mentioned above). Information about the first publication is given in a note for each study.



**I. INFORMATION,  
INFORMATION SCIENCE  
AND INFORMATION ECOLOGY**



# Information as a Transcendental Concept: the Future of Information Science<sup>1</sup>

## 1 Introduction

There are many definitions of the term information, without any of them being accepted in general, and each definition, the number of which continues to grow, fundamentally differ from one another (Goguen, 1997, p. 27). This situation can be described as a paradox, considering the fact that information is often understood as a reduction of uncertainty (Buckland, 1991, p. 351).

Because of this problem, some authors stop asking what the information is, but rather ask what kind of concept is it, that it is accompanied by such difficulties (Capurro, Fleissner and Hofkirchner, 1999). It seems, therefore, that it is necessary to proceed to a more radical revision of this term. Such a revision, however, cannot be done without a thorough epistemological and logical analysis of the concept of information.

The aim of this study therefore isn't to extend the range of definitions of information, but rather to contribute to the epistemological and logical debate over the nature of this term.

The study will attempt to respond to two central questions, namely:

- What sort of concept does information represent in view of scope?
- How does such classification affect information science as a discipline?

In order to find appropriate responses, we need to clarify the following problems:

- What do concepts mean for the related scholarly or scientific theory?
- What criteria can be used to classify concepts and to analyze the concept of information?

Responding to these fundamental issues constitutes the input methodological basis of the study.

First, we briefly deal with the concept of information in various domains, with literature considering the substance of the concept of information and its definitions, with the concept as such and with the scope of the concept of information. Then we provide the analysis of several important definitions of

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<sup>1</sup> First published: *Journal of Information and Organizational Sciences*, 2019, Vol. 43 No. 1, pp. 73–98.

the concept of information, which were created within information science and related fields. From the collected data, some conclusions about the nature of the concept of information are deduced and an attempt is made to outline its future destiny in information science. The basic method consists in the conceptual analysis of definitions.

## 2 A brief overview of the concept of information

Information is a concept that is very used nowadays, namely in many areas (Wilson, 2010). It is not surprising that the experts struggle with its definition, and that its definitions are often quite different from each other. It is often shown in various knowledge contests, that it is difficult to explain particularly those words with which we meet today and every day. This is because these words become commonplace for us so much that we no longer even think about what they mean. At the same time, to know the meaning of the words that we use is absolutely necessary and it is the first step to eliminate many misunderstandings.

The concept of information is mainly connected with the Aristotelian and Scholastic philosophy (Capurro and Hjørland, 2003). According to this philosophical direction, the essence of each material existence is composed of two metaphysical parts – form and materia. The substance (materia) is a passive principle which is able to receive the shapes. The form (shape) is an active principle which makes the thing what it is; it determinates the matter or informs it.

The concept of information has been revived with the advent of cybernetics (Wiener, 1961), a science on control and communication in the systems. In the cybernetic concept, the information is a degree of the removal of uncertainty in the system, the degree of its orderliness. The analogy with the previous concept is obvious – but it is a mathematical theory.

From the cybernetics, which is considered a theory permeating all scientific disciplines, the concept of information is spreading into many other disciplines. For example, cognitive psychology and science adopt it, and they understand the information as a psycho-physiological phenomenon and process under way in human consciousness. Information determines (informs) the knowing subject.

With the arrival of the first universal machine – computer – a field arises which has the concept of information in its name, in Czech – informatics. Within the concept of this field, the information is data circulating in computers.

Recently, it has also been a revival of this concept in the field of philosophy. Brno philosopher Josef Šmajš (2000) sees the information as a constitutive factor of evolution. His philosophical reflection of information is based on cybernetic and genetic concept, however as it is a philosophical concept, it continues also (probably partly unconsciously) in the hylemorphic traditional approach.

Last but not least, the concept of information also reaches into everyday language, which contributes to its unclarity. On the words that are used commonly, different meanings are gradually applied, which makes them seem understandable, but an attempt on their exact definition, however, usually ends in failure.

The concept of information plays the key role in information science. There have been several paradigmatic turns (Cronin, 2009) within the field, which have brought a new light into this term. During the first of them, the peripheral concept of information became a basic term, which replaced the former concept of document (because of this, the documentation has changed into information science) (Capurro and Hjørland, 2003, p. 379). In the context of the first turn, the information is perceived as something related to the information system, that means to the system, which is used for retrieving, sorting, storage, searching and dissemination of information (examples of such systems may be a library or an electronic database). The second turn, the so called cognitive turn, meant a deflection from the information system and shift of the focus to the user of information. Within its scope, the concept of information began to be considered in relation to the mental representation of the world, which creates a cognitive subject (Belkin, 1990). The third turn, social, focused its attention on the information creator and it began to describe the information as a social construct (Hjørland and Albrechtsen, 1995).

### **3 Overview of literature dealing with the definition and nature of the concept of information**

The definition of the concept of information differs between paradigms, but also within a single paradigm. That is why – as has been said above – attempts are being made to raise questions about the very possibility of providing a definition of concepts and the nature of the concept of information rather than merely to add another definition.

Capurro and Hjørland (2003) refer to Wittgenstein's claim that rather than attempting a classical definition using the proximate genus and a specific difference, it is better to look at how people use the terms. Etymological investigations of the given term are also important. Both authors consider each definition relative to the theory in whose framework it is created; one could say that a universal definition cannot be created – only a definition that works within a certain theoretical framework. They also deal with the concept of information as an interdisciplinary context, exploring the concept of information in the natural and social sciences and the humanities, and also in information science. They emphasize the differentiation of information as an object or thing and information as a subjective notion or sign that requires interpretation.



Case (2006) explores the concept of information using the concept of explication – a systematic attempt to determine the meaning of concepts. Explication, at the start of which we have only a general understanding of the meaning of the word, begins with examining the etymology of the term and continues through dictionary definitions to the definitions given by individual authors in the field. Thus, it is found that different authors define the given term differently, but also that some authors speak of the given term, but under a different name. Explication is achieved by extracting a common core from different definitions (top-down method) or by finding out what is common to subordinate concepts (bottom-up method). Case further deals with individual definitions of information and their problems, such as utility, physicality, structure/process, intentionality, truth. In conclusion, he asks whether we need a universal definition of the concept of information and whether information is not possibly a primitive concept that does not need to be defined but that is intuitively comprehensible.

Day (2001) deals with the concept of information from the perspective of the critical theory. He does not ask what information is, or whether it is good or bad, but he is interested in the connotations of this term. He demonstrates that authoritative texts on the concept of information use language to construct the social, utopian value of information as something factual and given that promotes privileged, totalitarian discourse. Similarly, Bernd Frohmann (2004) stays away from the question of what information is – he considers it a superfluous concept. He shows that the concept of document is much more useful. Jonathan Furner (2004) also considers the concept of information to be redundant, arguing that the notion of information is fully replaceable with concepts of philosophy of language.

Our goal is to reflect on the concept of information and its influence on information science from the position of a classical theory of concepts and theory of definition and to explore what these assumptions, which most modern authors consider to be overcome, can bring us.

## 4 Concept of concepts

Concepts embody the foundation stones of every scholarly or scientific discipline. A particular field of science is markedly pre-determined by its own object; that is, its character emulates the properties of the investigated problem. Thus, a discipline arises from the conceptual definition of the object to be examined, proceeding towards the subsequent derivation and classification of other concepts.

Within logic and other disciplines, there are many approaches to concepts. Kavouras and Kokla (2007) distinguish five basic theories of concepts (classical, probabilistic, theory-based, neoclassical, and conceptual atomism).

Birger Hjørland (2009) divides the approaches to concepts by epistemological schools (empiricism, rationalism, historicism, pragmatism), within which the concepts is discussed. W. G. Stock (2010) assumes the Hjørland's division (with the difference of calling the historicism a hermeneutics and adding the critical theory) and he displays it using the following scheme:

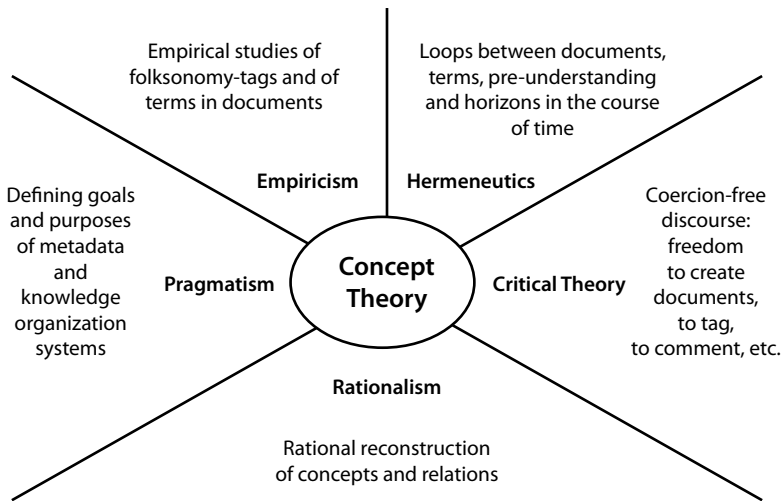


Figure 1. Theory of concepts and the epistemology schools (Stock, 2010, p. 1953)

We assume that the scientists who are trying to define and use certain concept, usually do not come out explicitly from a particular epistemological direction (in most texts defining the concept of information, the epistemological statement of the nature of concepts is missing) (for example Bates, 2006). It is clear that every effort to define scientific concepts must be based on certain epistemological assumptions; however, it is common, that these assumptions are only implied and the experts understand them rather intuitively, even if they try to change their angle of view on the given term. The works which analyze the epistemological bases, usually have no ambitions to define the concepts (for example Capurro and Hjørland, 2003).

We dare to say that the intuitive understanding of the terms, which is present in most of the works dealing with their definition, is closest to what Kavouras and Kokla (2007) call the classical theory (see also Sousedík, 2006). How does such intuitive conception of concepts usually look like? Scientists usually consider concepts as a tool, which is used to recognize the reality and which is not identical with that reality (the concept means to them a representation of the reality in knowledge). They also recognize that the concept is abstract, therefore, that the concept does not cover all aspects of reality, but only those that are essential and not dependent of specific material conditions.

They usually think, that the concept is general (not everyone, but at least the one that is considered to be scientific), so that one concept describes a certain property that occurs in reality many times in different contexts. It is usually clear to them, that there is a difference between the concept and the word which labels the concept (it is evidenced by the simple fact that the same concept is described in different languages using different words). They also believe that the concept has a content, that is created by just that aspect of reality, expressed by that concept, and the extent which covers all objects, properties and relationships to which the aspect can be assigned.

We can therefore assume, that the majority of scientists working with concepts, at least implicitly accept the definition of the concept, which can be formulated as follows: The concept is an abstract (and usually general) actualization of a part of the reality in knowledge that is for the purpose of human communication expressed through linguistic expressions (compare with Novák and Dvořák, 2007, p. 38). This classic concept of concepts can be illustrated on the reference triangle, which W.G. Stock presents in this form:

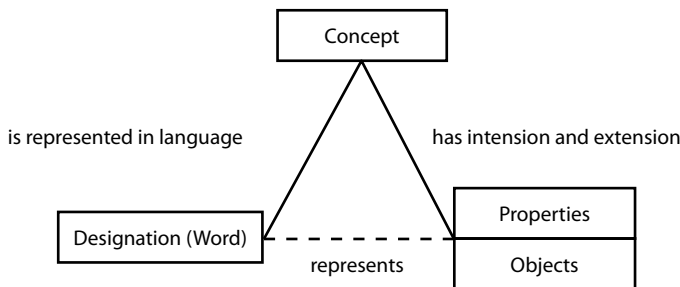


Figure 2. The reference triangle (Stock, 2010, p. 1952)

## 5 Scope of the concept

Concepts can be classified using different criteria in many ways. One of them is the aspect of the content (it concerns one of the content aspects, not the content aspect as such), according to which the concepts are divided into univocal, analogical and equivocal (Novák and Dvořák, 2007, pp. 74–79). In information science, these questions focused on the concept of information are known as the Capurro's trilemma (Capurro, Fleissner and Hofkirchner, 1999). For several reasons, we consider this trilemma in information science difficult to solve. (Strictly speaking, these issues cannot be solved within the framework of information science simply because they are ontological and epistemological issues that can be solved only in philosophy. But that is not the problem, because the special discipline always accepts, at least implicitly, some philosophical basis. Problem of these issues rests in the fact that they stand

outside the scope of interest of the recent philosophy and therefore they become incomprehensible even for philosophically oriented information scientist.) These reasons include especially:

- these questions require relatively subtle metaphysical analysis, which is not only incomprehensible to the information scientist, but even to the majority of contemporary philosophers (only a handful of classically oriented researchers deal with them) (for example Sousedík, 2006);
- various philosophical schools offer different solutions that are well reasoned, and it is not within the competence of the information scientists to evaluate them and decide for one of them (compare with Novák and Dvořák, 2007, pp. 72–79).

As much more feasible, we consider exploring the concepts, and the concept of information separately, in terms of aspect of the scope, which says the number of objects in reality to which the concept is assigned (i.e. number of objects the concept has within its scope). According to this criterion, we recognize individual, general and transcendental concepts (Novák and Dvořák, 2007, p. 66). The individual concept has in its scope only one object, the general concept is assigned to two or more objects, and the transcendental concept belongs to all that exists or can exist. An example of the individual concept may be a concept of a particular human, which we describe by his name (Socrates). The general concepts are all the species concepts (dog, horse, human), and generic concepts (animal, plant). Transcendental notions contact reality as a whole (something, being, and so on) (Cardal, 2007).

The nature of special science implies that the general concepts are in the center of its interest (Ochrana, 2009, p. 28). Through the individual concept is not possible to cover general issues of the reality, the transcendental concepts cannot be part of a special science for its thematic narrowness (Anzenbacher, 1991, p. 35) that is because the special science is interested only in a certain part of the reality, which is being framed by concepts (the transcendental concepts include the entire reality, and therefore they are the domain of metaphysics, which deals with being as being) (Cardal, 2007a).

Our dilemma is: Is the concept of information general or transcendental? Let's think about it, before we analyze the definitions of the concept of information. Kenneth E. Boulding (1961) talks about three basic models of the world, which fundamentally affected the scientific methodology. The first model is static, associated with the medieval view of the world, the second one is dynamic, which came to life with the development of Newtonian physics, and the third one is based on the principle of a feedback, in which the information plays a critical role. Ilya Prigogine and Isabelle Stengers (1984) also distinguish three phases of science. They associate the first one with a focus on mass, the second one with energy research and the third one with the discovery of information.