This article contrasts Bates’ understanding of information as an observer–independent phenomenon with an understanding of information as situational, put forward by, among others, Bateson, Yovits, Spang-Hanssen, Brier, Buckland, Goguen, and Hjørland. The conflict between objective and subjective ways of understanding information corresponds to the conflict between an understanding of information as a thing or a substance versus an understanding of it as a sign. It is a fundamental distinction that involves a whole theory of knowledge, and it has roots back to different metaphors applied in Shannon’s information theory. It is argued that a subject-dependent/situation specific understanding of information is best suited to fulfill the needs in information science and that it is urgent for us to base Information Science (IS; or Library and Information Science, LIS) on this alternative theoretical frame.

In the process of defending a particular view, one has to find out what other views are consequently rejected, implying that one has to consider other suggestions and the arguments put forward. In this respect, Bates’ two articles are weak. They do not consider the accumulated arguments for a subjective/situational or domain specific understanding of information. They are also weak in another respect: The pragmatic philosophers suggest that all theories—in addition to issues of completeness, internal consistency, and efficiency—are provisional and justified or not justified by their utility. What can they do for us? How well do they do it? Do they meet our needs? So, different theories could be useful for different purposes. Thus, in order to make our thoughts clear, we should ask: What practical consequence does it make whether one or another theory is taken as true? (Or whether one or another definition is used?) If no practical implications follow, our theory (or definition) is of no consequence and thus not important. What are the implications of different definitions and understandings of information for the work of information professionals?

Bates does consider the concept of information in relation to information seeking as well as to “The Information and Curatorial Sciences”; however, in these examples, the two different definitions are not kept clearly separate. She defines information (sometimes termed “information 1”) as an objective phenomenon and “information 2” as a subjective phenomenon, thus trying to have it both ways; but, in the practical examples, the defense of the objective definition is not maintained.

This article only focuses on only one point in Bates’ work. Bates has made important contributions to information science and, in important ways, seems to be theoretically in agreement with me. Bates (2005a) is, for example, the best overview of approaches to information science available today. However, her theory of information appears inadequate and inappropriate for Library and Information Science. In order to clarify this concept, the arguments should be put forward as clearly as possible, i.e., why we focus on only one conflicting issue: the objectivity/subjectivity of the concept of information. Arguments will be put forward that Bates’ understanding of information as an objective phenomenon is not fruitful for our field and that it is urgent for us to base...
Information Science (IS; or Library and Information Science, LIS) on an alternative theoretical frame.

**Bates’ Understanding of Information**


Information is the pattern of organization of the *matter* of rocks, of the earth, of plants, of animal bodies, or of brain matter. Information is also the pattern of organization of the *energy* of my speech as it moves the air, or of the earth as it moves in an earthquake. Indeed, the only thing in the universe that does not contain information is total entropy; that alone is pattern-free. (p. 1033; emphasis in original)

And: “We can talk about information as an objectively existing phenomenon in the universe” (p. 1034).

An alternative understanding of information is presented in short and rejected by Bates: “One approach to information (Brier, 1996) draws on Bateson’s definition of information “as a difference that makes a difference” (Bateson, 1972, p. 453). A difference to whom or what? Here, I argue that we must begin prior to that understanding, begin even before a sensing animal detects or assigns meaning to an experienced difference. As we shall see, humans and other animals can usefully identify a number of distinct types of information even prior to meaning assignment. Later, we will relate this definition of information to a more familiar understanding of the term, addressing what happens when we become informed.” (Bates, 2006).

Although Bates (2005b and 2006) cites Hjørland (2002) and many other viewpoints, she does not describe them, neither positively nor negatively. They are just mentioned and Bates continues with the point of view introduced by Parker (1974), ignoring the arguments, which have been put forward by many authors. The implication of Bates’ view (which she does not consider) is that any difference is information, whether or not it makes a difference to anybody or anything.

**Two basic views of information**

1. **The objective understanding** (Observer independent, situation independent). Versions of this view have been put forward by, for example, Parker, Dretske, Stonier, and Bates. Bates’ version implies: *Any difference is information.*

2. **The subjective/situational understanding**. Versions have been put forward by, for example, Bateson, Yovits, Spang-Hanssen, Brier, Buckland, Goguen, and Hjørland. This position implies: *Information is a difference that makes a difference* (for somebody or for something or from a point of view). What is information for one person in one situation needs not be information for another person or in another situation. This view of information as a noun is related to becoming informed (informing as a verb). Something is information if it is informative—or rather, something is information when it is informative. (This view is also considered by Bates but is termed “information 2.”)

Bates (2006) relates information to scientific observations: “In the end, the fundamental stance taken here is one of scientific observation. The phenomenon being observed is information, the pattern of organization of matter and energy as it exists in the universe and in living beings.” However, Bates does not say how information is observed, what kinds of scientific observations counts as observations of information. This may be taken as evidence that her view is problematic: If it is not possible to differentiate between observations of information and observations of other physical characteristics, the concept is meaningless. It is of course possible for scientists—as for anybody—to observe a lot of differences, but why should any difference observed count as information?

Bates has an example of a frosted window representing information. Before considering that example, let us review an example put forward by Hjørland (1997):

A stone on a field could contain different information for different people (or from one situation to another). It is not possible for information systems to map *all* the stone’s possible information for every individual. Nor is any one mapping the one “true” mapping. But people have different educational backgrounds and play different roles in the division of labor in society. A stone in a field represents typical one kind of information for the geologist, another for the archaeologist. The information from the stone can be mapped into different collective knowledge structures produced by e.g. geology and archaeology. Information can be identified, described, represented in information systems for different domains of knowledge. Of course, there are much uncertainty and many difficult problems in determining whether a thing is informative or not for a domain. Some domains have high degree of consensus and rather explicit criteria of relevance. Other domains have different, conflicting paradigms, each containing its own more or less implicit view of the informativeness of different kinds of information sources. (p. 111, emphasis in original) ³

In a similar way, it should be possible to say that a frosted window might be regarded as answers to different kinds of questions and thus represent different kinds of information (e.g., for the artist, the physicist, and the meteorologist). The problem with understanding frosted windows as objective information is: What should the purpose be in representing this information in an information system? How does the concept of information serve us in relation to this example?

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³Bowker (2006) also discusses stones in fields. He says that stones had dual existences: “As objects they function in the world, and as archives they maintain traces of their own past. Thus a rock can be read as an object that constitutes part of the lithosphere, and equally as a document that contains its own history written into it: striations on the surface indicate past glaciation, strata indicate complex stories of deposition over time” (p. 36). Note the phrase “can be read as”.

1See, for example, Dretske (1981).
2See, for example, Stonier (1997), reviewed by Hjørland (1999).
These examples demonstrate, in my opinion, that the domain-specific understanding is the way of understanding most in correspondence with ordinary views of science and knowledge: Researchers in each domain look at the world from a specific perspective and define and process information accordingly. Scientists do not just describe or collect differences mechanically. On the contrary, they usually describe differences from a theoretical point of view or from a stated purpose. Randomly collected descriptions of differences are not as fruitful as are differences described in relation to carefully planned observations as a part of scientific work and influenced by a “paradigm” in the field.

While I do agree with Bates that, for example, genetic information is encoded in the DNA, I do not consider this information to be independent of the biological theories. It may be “objective” in the way that different observers describe it the same way (although I prefer to use the term intersubjective in this connection). But this objectivity (or intersubjectivity) is dependent on a scientific consensus in biology. It is only within this theoretical framework that DNA may be understood as information in an “objective” way.

Bates (2006) also discusses the concept of information in relation to semiotics. She writes:

In the language used here, information can be seen as the raw material, the fodder, that goes into the process of semiosis, as well as into individual acts of interpretation. For example, in various cultures over the years, waving a hand toward oneself has come to mean, “come here.” Thus, a long-term semiotic process has resulted in that association being present in many human beings’ minds. My culture shares that association. When, at a party, I interpret that hand motion from a friend across the room as a sign to come join him, I am selecting out a certain subset of all the information around me. From all the patterns of organization of sound, sight, smell, and touch that I experience in the room, I separate out the hand motion and read it as “come here, and then heed the call.”

Again, for Bates, the physical pattern of a moving hand is information as an objective phenomena. In semiotics, on the other hand, the physical pattern of a moving hand is a sign if interpreted as such, and thus a subjective phenomenon. An objective understanding of information, like Bates’, consider the hand motion a kind of information independent of whether it is observed or not and independent of how it is interpreted. In this way, there is a conflict between whether somebody is being informed about that hand waving or not: The hand waving is information for Bates whether anybody is informed or not. Information as a noun is not linked by Bates to the verb to inform because hand motion is considered information whether or not somebody is being informed (cf. Spang-Hanssen, 2001).

In order to cope with this problem, Bates has to establish another concept, “information 2,” which is defined in this way: “Information 2: Some pattern of organization of matter and energy given meaning by a living being (or its constituent parts).”

Blair (2006) interprets at length for Information Science Wittgenstein’s later philosophy. The position is rigorously sustained that the meanings ascribed to words do not arise from the words themselves, but arise from the ways in which words are used. The position that words have meanings only temporarily and situationally given to them, may be compatible with Bates’ Information 2 but not with Information 1.

We shall not dwell much with the new concept “information 2,” which may be seen as an indication of a problematic understanding of information, possibly a way of admitting that an objective conception of information cannot do the work we need it to do. Bates suggests that we understand “information” to be objective while “information 2” is subjective. By introducing two definitions, “information” and “information 2,” one may say that Bates is trying to have it both ways. Thus, Bates and I agree that we need the subjective concept of information, but we disagree on how is should be labeled because we disagree about the need for an objective understanding of information. In analyzing the practical implications, Bates does not maintain a clear argument for the usefulness of an objective understanding. By introducing “information 2” Bates uses the concept of meaning which is almost as difficult a concept as information itself, i.e., why it should not be used without a careful analysis and explication of its meaning.

There is at least one serious problem with Bates’ definition of “Information 2”: It is not just living beings for which such a concept is needed, it is also needed for computers. A string of 0s and 1s is a “pattern of organization of matter and energy,” but it is not this pattern in itself, which is considered information in computers. It is considered information in relation to a specific way it is coded and used by computer programs. “Information” in computers is thus not objective but depending on what the string is programmed to represent (by the programmers). The same string of characters may, for example, represent a phone number or a fax number depending on context or situation.

“Information theory” (Shannon & Weaver, 1949) is also important to consider in this perspective. Although briefly discussed by Bates, the problem of whether this theory is subjective or objective is not addressed. According to Qvortrup (1993), Shannon and Weaver were unclear as to whether they conceive information as a substance or as a sign:

4The problem of subjectivity/objectivity is repeated in the concept of meaning as illustrated by this quote from a researcher in computational linguistics: “There are three distinct views on exactly where the meaning of a text can be found: 1) Meaning is in the text 2) Meaning is in the writer 3) Meaning is in the reader. These different views of text-meaning often lead to heated debates in semiotics, literary theory, the philosophy of language, and semantics. In computational linguistics, however, all three views are found in the research literature, with different degrees of prominence at different times in the field’s history, and researchers are rarely explicit as to which view they are taking—often they don’t distinguish the views at all or they slide back and forth between them.” (Hirst, in press).

5One of the anonymous referees suggested the term “reification” about information as a physical pattern or a thing and wrote: “The reification of “information” as physical patterns is maintained ... Maintaining the reification is problematic because it requires either mentalist assumptions and/or a departure from contemporary semiotic theory which (I believe) rejects natural signs in favor of privileging the construction of meanings.”
Thus, actually two conflicting metaphors are being used: The well-known metaphor of information as a quantity, like water in the water-pipe, is at work, but so is a second metaphor, that of information as a choice, a choice made by an information provider, and a forced choice made by an information receiver. Actually, the second metaphor implies that the information sent isn’t necessarily equal to the information received, because any choice implies a comparison with a list of possibilities, i.e., a list of possible meanings. Here, meaning is involved, thus spoiling the idea of information as a pure “Ding an sich.” Thus, much of the confusion regarding the concept of information seems to be related to the basic confusion of metaphors in Shannon’s theory: is information an autonomous quantity, or is information always *per se* information to an observer? Actually, I don’t think that Shannon himself chose one of the two definitions. Logically speaking, his theory implied information as a subjective phenomenon. But this had so wide-ranging epistemological impacts that Shannon didn’t seem to fully realize this logical fact. Consequently, he continued to use metaphors about information as if it were an objective substance. This is the basic, inherent contradiction in Shannon’s information theory. (p. 5)

Qvortrup has thus demonstrated that the distinction between an objective and a subjective understanding of information is a built-in conflict in theories of information at least back to Shannon. As Qvortrup states, this question “seems to be innocent, because everybody talks about information, information technology and an information society. It is however significant, because its definition implies a whole theory of knowledge.” This problem is important in general as well as in relation to information science.

**An Alternative to Bates: The Situated Understanding of Information**

Karpatschof (2000, p. 128ff) provides an understanding of information. In order to define this concept, he introduces the concept of release mechanisms, being systems or organisms having at their disposal a store of potential energy; the systems being “designed” to let this energy out in specific ways, whenever triggered by a signal fulfilling the specifications of the release mechanism. The signal that triggers a certain release mechanism is a low energy phenomenon fulfilling some release specifications. The signal is thus the *indirect cause*, and the process of the release mechanism the *direct cause* of the resulting reaction, which is a high-energy reaction compared to the energy in the signal. *Information is thus defined as a quality by a given signal relative to a certain mechanism.* The release mechanism has a double function: (1) it reinforces the weak signal and (2) it directs the reaction by defining the functional value of a signal in the predesigned system of the release mechanism.

Karpatschof writes that there has been a tendency to consider information to be an obscure category in addition to the classical categories of physics. Information is indeed a new category, but it cannot be placed, eclectically, beside the prior physical categories. Information is a category, not *beside*, but indeed *above* the classical categories of physics. Therefore, information is neither directly reducible to these classical categories nor is it a radically different category of another nature than mass and energy. Information is, in fact, the causal result of existing physical components and processes. Moreover, it is an *emergent* result of such physical entities. This is revealed in the systemic definition of information. It is a relational concept that includes the *source*, the *signal*, the *release mechanism*, and the *reaction* as its relatants. The release mechanism is a signal processing system and an information processing system.

Karpatschof’s understanding of information has many merits. Among them is that it explains the basic mechanism in computers as well as in living beings. It is also possible, as done by Hjørland (2002), to use it to explain basic principles in information systems and services, including in what Bates terms “the curatorial sciences.” Karpatschof’s understanding is also, in important ways, in accordance with views held by prominent contributors to information science such as Michael Buckland.

Buckland (1991) analyses the concept of information. In his analysis the word information can be used about things, about processes and about knowledge:

According to Buckland (1991), things can be informative. A stump of a tree contains information about its age on its rings as well as information about the climate during the lifetime of the tree. In similar ways, everything can be informative: “We conclude that we are unable to say confidently of anything that it could not be information” (p. 50, emphasis in original).

But if everything is information, then the concept of information is all embracive. If the concept of information has no limits, it becomes too vague and useless. What kind of advice can that concept provide with regard to what to represent in information systems?

To say about something that it is informative means that this thing may answer a question for somebody. The informativeness is thus a *relation* between the question and the thing. No thing is inherently informative. *To consider something information is thus always to consider it as informative in relation to some possible questions.* We do not always realize this because it is mostly implied. It is implied, for example, that an article about a disease may help answer questions about that disease. It is less obvious, however, that a meteorite from outer space may answer questions about the origin of life. A good deal of scientific knowledge is needed to understand why this is the case (and a claim about the informativeness of something is theory-dependent and may turn out to be wrong). In the wider sense, background knowledge is *always* important to establish the informativeness of any object (including documents and texts).

Buckland (1991) finds, that “It follows from this that the capability of being informative, the essential characteristic
of information-as-thing, must also be situational” (p. 50). This view was also formulated in this journal (then named American Documentation) already in 1969: “It is very important to note that information is a relative quantity and cannot be defined except in terms of a specific situation with a specific set of observable actions. Then, and only then, can we define a quantitative measure for information” (Yovits, 1969, p. 374).

Hjørland (1997) used this view as point of departure:

The domain analytic view develops this view further: users should be seen as individuals in concrete situations in social organizations and domains of knowledge. A stone on a field could contain different information for different people (or from one situation to another). It is not possible for information systems to map all the stone’s possible information for every individual. But people have different educational backgrounds and play different roles in the division of labor in society. A stone in a field typically represents one kind of information for the geologist, another for the archeologist. The information from the stone can be mapped into different collective knowledge structures produced by e.g., geology and archaeology. Information can be identified, described, represented in information systems for different domains of knowledge. Of course, there is much uncertainty and many and difficult problems in determining whether a thing is informative or not for a domain. Some domains have high degree of consensus and rather explicit criteria of relevance. Other domains have different, conflicting paradigms, each containing its own more or less implicit view of the informativeness of different kinds of information sources.

Conclusion: The analysis of the concept of information made above implies that informational objects should not only be analyzed and described according to an objectivistic epistemology. It is not sufficient to describe information according to universalistic principles, as permanent, inherent characteristics of knowledge. Instead, information must be analyzed, described and represented in information systems according to situational, pragmatic and domain-specific criteria. (p. 111)

A similar theoretical position was independently developed by Goguen (1997), who defines information in this way: “An item of information is an interpretation of a configuration of signs for which members of some social group are accountable.” This definition is narrower than Karpatschof’s because it is only about human beings but it has the same implications. Goguen continues:

That information is tied to a particular, concrete situation and a particular social group has some important consequences, summarized in the following list of qualities of information:

1. Situated. Information can only be fully understood in relation to the particular, concrete situation in which it actually occurs.
2. Local. Interpretations are constructed in some particular context, including a particular time, place and group.
3. Emergent. Information cannot be understood at the level of the individual, that is, at the cognitive level of individual psychology, because it arises through ongoing interactions among members of a group.
4. Contingent. The interpretation of information depends on the current situation, which may include the current interpretation of prior events [note: Of course, an “event” is what some group counts as an event]. In particular, interpretations are subject to negotiation, and relevant rules are interpreted locally, and can even be modified locally.
5. Embodied. Information is tied to bodies in particular physical situations, so that the particular way that bodies are embedded in a situation may be essential to some interpretations.
6. Vague. In practice, information is only elaborated to the degree that it is useful to do so; the rest is left grounded in tacit knowledge.
7. Open. Information (for both participants and analysts) cannot in general be given a final and complete form, but must remain open to revision in the light of further analyses and further events. (At the analyst level, one may say “all theories leak.”)

The theoretical connection between information science and semiotics has recently been emphasized by Raber & Budd (2003): “The affinity between the informative object and the sign, and between information and language as theoretical objects, is based on the fact that all informative objects are necessarily signs, ultimately expressive of a relationship between a signifier and a signified. The sign, although a material object, is always much more than this. It is also a psychological and cultural entity” (p. 515).

The understanding of information as subjective, observer-dependent, and situated has thus been well argued in the literature by a number of researchers. It is embarrassing that its impact has not been greater and that the opposite view can be suggested in a leading journal without considering the arguments which have been put forward.

The Evolutionary and Cultural Point of View

Bates (2005b) suggests an evolutionary framework for information science. Her evolutionary point of view is based on philosophical realism: “The first assumption is that there is a real universe out there, that we are not solipsists, that is, what we see as being outside ourselves is not a movie we are running in our minds, but an actual universe independent of ourselves.” I, as well as Karpatschof (2000), for example, share these views. Both Bates’ objective understanding and the “the situationists’ subjective understanding of information are thus in agreement about the importance of an evolutionary point of view based on an understanding of organisms adaptation to their environment. The difference is that Bates regards information as the object to which organisms adapt during evolution, whereas Karpatschof (2000), Hjørland (2002), and others regard signals as the objects to which organisms adapt. Physical signals are selected and the information processing mechanism selecting the signal is an emergent phenomenon in
nature. What is regarded information by one biological species need not be regarded as information by other species.

One advantage of the activity–theoretical point of view as developed by the Russian psychologist Leontyev (1940/1981) is that the biological development is specified in levels, which may be interpreted as more advanced kinds of information processing mechanisms. He described the development of psychological functions as a set of functions developed by higher animals in order to improve their adaptation to the changing conditions of life, and he distinguished five stages or levels from primitive organisms to Homo sapiens:

1. **The stage of irritability** is characteristic of the absorption of food particles through the surface of the body of one–celled animals. Leontyev does not see such behavior as evidence of something psychical. (It is a preform of psychological behavior).

2. **The stage of sensory psyche** can be exemplified by insects, birds, and fish. It is characterized by the ability of the organism to sense influences, but the animal cannot integrate different influences into a whole. Animals at this stage of development show stiff or rigid patterns of reactions, i.e., instinctive forms of behavior. Leontyev sees this stage as psychical in its most primitive form.

3. **The stage of perceptual psyche** is first and foremost characterized by the perception of objects. The organism is now not just limited to sensing and responding to sound, light, simple forms, etc., but perceives specific objects (e.g., flies). This allows much more flexible forms of behavior directed towards that object.

4. **The stage of intellect** is associated with actions, which presuppose the use of tools. The organism is no longer solely dependent on its own body. This stage is found in man and chimpanzees.

5. **The stage of consciousness** is specifically human. According to the theory of Leontyev, it is associated with language and societal production.

What is described here can be interpreted as a theory of the development of biological stages of information utilization behavior from more primitive, specific, and passive forms of sensing information towards more advanced, complex, flexible, and active forms of information utilization.

Leontyev’s theory is materialistic in the sense that its stages are motivated by the view of the psychical as being something secondary compared to its environment. The subjective, consciousness, concepts, psychological processes, and states are all seen as phenomena developed from the material world in order to improve higher animals’ adaptation to their environment. Psychological phenomena cannot be understood without considering the environment and the challenges that face the organism. Subject and object are two interwoven parts, which can be understood as a historically developed relationship. From Leontyev’s perspective, psychical and subjective phenomena are naturalistic; they developed with birds, fish and insects, and further through evolution. Activity theory is in fact a *semiotic* theory (a biological-social semiotic theory). Organisms are seen as reacting to informative objects as signs. Information is not a thing or substance but a sign.

Most evolutionary theories of cognition and information processing suffer from neglect of human cultural development (i.e., anthropogenesis). These theories tend to regard human information processing in a biological perspective assuming species-general ways of processing information. In other words: They tend to regard different human beings as having similar mechanisms and capacities for information processing. These theories consider phylogenesis but do not consider anthropogenesis. They do not realize, for example, that the development of human languages changes the way human beings process information.

This is also the case with Bates (2005b). There is no discussion of how information processing in individuals is different by, for example, people in oral cultures compared to people in literate cultures. The most important theory that does consider anthropogenetic aspects of cognition and information processing is “activity theory,” which originated in Russia, and has recently been outlined by, for example, Karpatschhof (2000) and Hjørland (2002). The biological-evolutionary perspective is here supplemented with a developmental view of information processing in the perspective of cultural history.

Compared to other species, human beings depend far less on their biological cognitive systems and depend much more on their cultural heritage. This is something strongly neglected by mainstream behavioral and cognitive theories from the 20th century. A person’s capacity to process and store information is not just dependent upon his/her biological make-up but also upon the language and symbolic systems that the person masters. This is empirically shown by cultural anthropologists like Goody (1987) and, theoretically, mostly developed in activity theory. Jack Goody is probably the most important researcher on the cognitive implications of writing, literacy, and the alphabet. His research has immense relevance for cognitive science and information science.

The line of theory developed by Vygotsky … maintains that when an individual comes to master writing, the basic system underlying the nature of his mental processes is changed fundamentally as the external symbol system comes to mediate the organization of all his basic intellectual operations. Thus, for example, knowledge of a writing system would alter the very structure of memory, classification and problem-solving by altering the way in which these elementary processes are organized to include an external (written) symbol system. (Goody, 1987, p. 205)

Important cultural developments include the development of oral languages, the development of written languages, and the development of mathematical symbols, music scores, and other symbolic systems. Also, the development of institutions of learning, of different media and genres, and different

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4For Charles Sanders Peirce, a sign is a triadic unity of something (the sign vehicle, e.g., a footprint), which stands to somebody (the interpretant) for something else (the object, e.g., that a person has passed by).
kinds of quality management (including peer reviewed scientific journals, historical criticism or source criticism, and research methodologies such as experimental methods) are important. All such kinds of developments alter the ways in which information is being processed both in an individual and in a social perspective.

How, for example, our concepts are influenced by our languages is shown in Table 1. It shows that there is no one-to-one relation between meanings in different languages. Languages affect the way we conceptualize the world. According to Hjelmslev (1943), each language puts arbitrary borders on reality, while activity theory finds that our symbolic systems tend to capture functional aspects or affordances in the things we perceive.

For human informative activities, the proper perspective of the meaning of “meaning” is very important. This is a difficult concept for which activity theory provides a fruitful understanding. The production of books, texts, and other documents is a special development in literate cultures. Documents are tools having specific kinds of functional values in those cultures. The view of social semiotic theories is that meanings, signs, and documents are developed to function in relation to standardized practices in communities. We use, e.g., the Bible and the Hymn Book in our standardized religious practices. We use textbooks in our standardized teaching practices, law books in standardized legal practices etc. Concepts and documents have more or less stable functional values in relation to such standardized practices. There are of course always different views of whether such standardized practices should be changed or remain unchanged, and there are always different kinds of possible changes of those practices. Often scientific and technological development changes standardized practices in a rather uncontroversial way. In other cases, however, changes in practices are related to different political interests, to different theories or “paradigms.” Different paradigms tend to influence given practices in different ways, and by doing so they also tend to change our symbolic systems as well as our production of documents and the form, content, and use of those documents. The proper study of symbols and documents is thus based on the study of the functions and interests those documents are serving.

It is very naive and reductionistic to disregard such kinds of cultural intermediating factors in people’s relationship with information. The dominant traditions in both information science and in behavioral and cognitive sciences have, however, neglected such cultural aspects and just tried to study generalized persons’ relation to something termed “information.” This dominant approach may broadly be termed “behavioral” in spite of different attitudes to versions of behaviorism. In this tradition, people are expected to react to something in a specific, mechanical way without considering the culturally determined meanings and without considering the different goals and values in the meanings and in the documents. This has, in my opinion, brought about a situation in which we have inherited very little useful knowledge from these areas on which to advance our field and practice.

### Information as a Concept in Information Science

The last section before the summary in Bates (2006) is termed “The Information and Curatorial Sciences.” In this section, the reader expects to get some ideas on why Bates find her objective conception of information fruitful for, among others, library and information professionals. However, this expectation is not fulfilled because this section is not formed as a defense for the objective definition proposed earlier.

Information is a concept that is used in many sciences, social sciences, and humanistic fields. We have to consider both the general meaning of information and the role and the meaning of the term in our own field. What is today termed “information science” was formerly termed “documentation” and the term “library and information science” is often used synonymously. Bates (2006) uses the term “The Information and Curatorial Sciences.” The Dewey Decimal Classification uses the plural: “information sciences,” indicating that we are dealing with more than one field. What we are dealing with is thus both the possible meanings of the term information, and with a proper theoretical basis for our field, which have consequences for what label seems adequate for that field. It is not given that the concept of information is the key concept even if the field is termed information science.

7Buckland (1991), Hjørland (2000), Lund (2004), Ørom (2007), and others have for years been arguing that the concept of document is the most fruitful one to consider as the core concept in LIS. The concept of document is understood as “any concrete or symbolic indication, preserved or recorded, for reconstructing or for proving a phenomenon, whether physical or mental (Briet, 1951/2006, 7; here quoted from Buckland, 1991). Recently additions to that view are Frohmann (2004) and Furner (2004). Frohmann (2004) discusses how the idea of information as the abstract object sought, processed, communicated and synthesized sets the stage for a paradox of the scientific literature by simultaneously supporting and undermining its significance for research front work. Furner argues that all the problems we need to consider in information studies can be dealt with without any need for a concept of information. He suggests that to understand information as relevance is currently the most productive for theoretical information studies. All these authors assume that the concept of document is a more precise description of the objects that information science is about, but they see documents as part of a larger universe of informative objects. Unfortunately, Bates (2006) does not relate to this point of view and she does not try to argue what her conception of information may contribute in relation to this view.
However, whatever the label we prefer—“documentation,” “information science,” “curatorial sciences,” or LIS etc.—it is also important to have a proper theoretical understanding of the concept of information.

It is outside of the scope of the present article to discuss the history and theory of information science in relation to the information concept (this has partly been done in, for example, Hjørland, 2000, and Werzig, 2003). It is important, however, to establish a fruitful theoretical and conceptual foundation for the field. When theoretical concepts (e.g., information, document, relevance or subject) are discussed, it is important to consider the question: What practical implications follow from understanding the concept in one way as contrasted to other ways? You can also say that arguments should be put forward and concepts should be developed to support the arguments of a scholarly article (and, in the end, the justification of the field).

Epistemological questions are important in the process of clarifying and constructing concepts in information science:

- Is information in the author/sender of the information?
- Is information in the texts/symbols/messages?
- Is information in the receiver understood as a biological being?
- Is information in the receiver understood as a social/cultural/specialized being?

Let us consider, for example, the indexing of a document or the description of an informative object. Should such indexing or description be based on a theory intended to inform the users and on a kind of semiotic understanding that signs (and document descriptors) have different meaning for different target groups? These are the kinds of questions at stake when discussing the objectivity/subjectivity of informative objects or documents.

Capurro & Hjørland (2003, p. 377ff.) argue that information scientists have to specify what kind of information belongs to sciences like astronomy and biology, and what kind of information belongs to information science. What is the social division of labor in relation to studies of information phenomena? A concrete proposal is provided in this article and elsewhere. Information science is seen as a metascience based on the findings and documents of other fields. An astronomer processes information about stars and produces documents on his/her observations and conclusions. Information science studies, for example, documents and genres of scientific communication, citation patterns in astronomy, i.e., how to optimize knowledge organizing systems to serve astronomers. Both astronomers and information scientists may thus be said to deal professionally with information. Capurro & Hjørland (2003, p.377ff.) and Hjørland (1997, 2002) offer a view of the respective jobs of ordinary professionals and LIS professionals in relation to dealing with information. And we offer an information concept that makes this view coherent. Other information scientists theorizing information, like Marcia Bates, should relate to this important problem, which involves the professional identity of all of us.

Bates fails to provide any arguments for how her conception of information as an objective phenomenon can be useful in relation to practical work in computer science, information science, library science, or any related fields. This is regrettable so much more because the alternative, substantive understanding of information has been presented in the literature, including a concrete examination of its implications for information science.

The problem is also about whether problems in information science are best served with theories like Shannon & Weaver’s information theory or with theories more related to semiotics. In the history of information science, the tendency has been a development from information theory toward more semiotic theories. (See also Werzig, 2003.)

Conclusion

Why has the theoretical point of view concerning information as a situational concept had serious difficulties gaining ground both in Library and Information Science (LIS) and in interdisciplinary contexts? It may be because it is a frustrating way of understanding for many people, and that other ways of using the term “information,” for example, as BITs derived from information theory has a much stronger appeal. However, while the concept of BITs may allow us to measure the capacity of a floppy disc or a hard-disk, it is useless in relation to tasks such as indexing, collection management, bibliometrics, and so on. For such purposes, the meaning of the signs must be involved, i.e., why a kind of semiotic theory is a much better theoretical frame of reference compared to “information theory.” An objectivist and universalist theory of “information” has a much stronger appeal than theoretical views that make information, meaning, and decisions context-dependent. However, the costs of searching in the wrong places for the understanding of a fundamental concept have been high because the superficial considering of the nature of information has left us without a proper theoretical foundation.

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8"In Shannon’s theory, these interpretations were not incompatible: Due to the known probabilities of the signs and the assumption that source and receiver used the same system of signs, the amount of information in the sign and the impacted information were more or less the same. This was not so in human contexts, where neither the assumption of coherent sets of signs nor the assumption of the identity of the original message, signs and reconstructed messages were applicable. The very notion of SEMIOTICS, which in fact, became one of the most important critiques of too simple an application of information theory to human communication led to the insight that Shannon’s mathematical theory was a theory on the syntactical level (relation of signs to signs), but with no reference to the semantic only (relation of signs to meanings) and pragmatic (relation of signs to humans) levels. In consequence, some attempts were made to develop out of Shannon’s theory a semantic (e.g. Bar-Hillel and Carnap, 1953) or pragmatic (e.g. Yovits, 1975) information theory, but these remained in the literature with no great success.” (Werzig, 2003, p. 312)
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