"Isms" in information science: constructivism, collectivism and constructionism

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Abstract

Purpose – Describes the basic premises of three metatheories that represent important or emerging perspectives on information seeking, retrieval and knowledge formation in information science: constructivism, collectivism, and constructionism.

Design/methodology/approach – Presents a literature-based conceptual analysis. Pinpoints the differences between the positions in their conceptions of language and the nature and origin of knowledge.

Findings – Each of the three metatheories addresses and solves specific types of research questions and design problems. The metatheories thus complement one another. Each of the three metatheories encourages and constitutes a distinctive type of research and learning.

Originality/value – Outlines each metatheory's specific fields of application.

Keywords Philosophy, Information science, Libraries

Paper type Conceptual paper

Introduction

Why bother with metatheories[1]? Gorman (2001, p. 24), for instance, takes the view that "we cannot spend a great deal of time and effort on speculative enquiry" but should seek to resolve the very serious practical problems that confront libraries, librarians, and library users today. Solutions to practical questions are, however, always developed on the basis of theoretical and epistemological assumptions. As stated by Hjørland (2003a, p. 805), researchers and practitioners "cannot choose between using a specific philosophical framework and not using any philosophical framework". Even the most rudimentary metadata solutions and information retrieval algorithms are based on metatheoretical assumptions (Hjørland, 1998, p. 606).

Gorman (2001) discusses issues such as preserving and cataloguing documents, creating and maintaining bibliographic control on the web, using and disseminating scholarly articles, reading in a digital age, the digital divide and librarians' core competencies. Each of these issues can be understood, defined and approached in diverse ways from diverse perspectives. The chosen viewpoint affects both the definition of the problems to be solved and the solutions proposed[2]. The value of metatheoretical research lies in that it potentially offers tools for identifying and considering a wider range of theoretical orientations and options for developing practical technological solutions. Proposing novel suggestions and frameworks for design and evaluation is how research in information science (IS) should contribute.

The fact that IS has evolved into a complex interdisciplinary research field naturally poses problems for attempts to define its major paradigms. In this article, we compare the basic premises of the three metatheories that represent currently important or emerging perspectives on information seeking, retrieval and knowledge organisation in IS. We label these metatheories constructivism, collectivism and constructionism, and focus on five major questions:

(1) By which criteria can constructivism, collectivism and constructionism be identified as divergent metatheories in IS?

(2) What are the basic assumptions of these metatheories, i.e. what kinds of understandings concerning the nature of knowledge and language are they based on?

(3) What kinds of criticisms have been presented of the basic assumptions of these metatheories?

(4) How are these metatheories generally applied in IS research, i.e. what kinds of research questions do they address?

(5) What unexplored application areas can be proposed for them?

Any description of metatheories deals with ideal types and operates on a high level of abstraction. Thus, this review cannot do justice to the eloquent and detailed argumentation of many papers referred to in the following pages. We try to capture the essential qualities of each metatheory by focusing on the differences between positions. A detailed analysis of the differences between unit theories and studies within the outlined metatheoretical positions is beyond the scope of the present paper.

As there can be no neutral viewpoint for describing metatheories, our point of departure is constructionism, and our criteria for identifying metatheories reflect this orientation. We assume, however, that constructionism provides a sufficiently broad analytical framework for comparing epistemological assumptions, and also discuss the problems and limitations of constructionism.

Mapping metatheories and their proponents

Our categorisation between "isms" in IS rests on the distinction between constructivism, social constructivism and constructionism presented by Gergen (1999, pp. 59-60). Gergen's distinctions reflect the metatheories existing in the fields of psychology and education. We feel, however, that Gergen's distinctions are particularly well suited for describing metatheories in IS, because information

scientists have generally borrowed more from psychology and education than, for instance, social studies of science. Gergen's definitions are not necessarily more correct from the viewpoint of the history of philosophy than other definitions, since the philosophy of literature defines, for instance, social constructivism and constructionism in diverse ways[3]. Below, we briefly introduce Gergen's distinctions. A more detailed discussion of each metatheory follows in subsequent chapters.

Gergen (1999) defines constructivism as a view in which an individual mind constructs reality but within a systematic relationship to the external world. He associates the names of Jean Piaget and George Kelly with this position. In IS, constructivist ideas are commonly labelled under "the cognitive viewpoint". The cognitive viewpoint in IS, as initially formulated by Brookes (1980), Belkin and colleagues (Belkin, 1984, 1990; Belkin *et al.*, 1982) and Ingwersen (1982 1992), does not represent cognitivism, however. Cognitivism is an approach that significantly informed artificial intelligence in drawing straightforward analogies between human information processing and computing (Ingwersen, 1992, pp. 19-25, 227). The cognitive viewpoint in IS differs from cognitivism by laying major emphasis on the way in which knowledge is actively built up by the cognising subject, that is, by the individual mind to serve the organisation of internal and external reality. In addition, Kuhlthau's (1993b) Information Search Model (informed especially by the work of Kelly) and the early version of the Sense-Making Theory (Dervin, 1983; Dervin and Nilan, 1986) significantly influenced the development and adoption of this metatheoretical position within IS. In order to clarify the differences between constructivism and social constructivism, we refer to this position as cognitive constructivism.

Social constructivism is a metatheoretical position which argues that, while the mind constructs reality in its relationship to the world, this mental process is significantly informed by influences received from societal conventions, history and interaction with significant others (Gergen, 1999, p. 60). Gergen associates Lev Vygotsky and the later works of Jerome Bruner with this approach. In IS, the socio-cognitive viewpoint and the domain analytic approach as developed by Hjørland and Albrechtsen (1995; see also Hjørland, 1997, 2002b) represent social constructivism. However, to describe approaches within IS more adequately, we use a broader term collectivism to refer to approaches within IS that seek to reorient the unit of study from the level of the individual to the level of social, organisational or disciplinary communities. Hence, we also group Taylor's (1991) and Rosenbaum's (1993) conceptual work on information use environments (IUEs) under collectivism. Collectivism is a term that is used, for example, by Hjørland and Albrechtsen (1995) to describe the methodological stance of the domain analytic approach in opposition to the methodological individualism of the cognitive viewpoint in IS.

Finally, in social constructionism (in short: constructionism), the primary emphasis is on discourse as the vehicle through which the self and the world are articulated (Gergen, 1999, p. 60). The works of Valentin Volosinov, Mihail Bakhtin, Ludwig Wittgenstein, Michel Foucault and Harold Garfinkel have had a substantial influence on this position. In IS, for instance Frohmann's (1990, 1992, 1994, 2001), and the present authors' works (Talja, 1997, 1999, 2001; Tuominen, 1997, 2001; Tuominen and Savolainen, 1997; Tuominen *et al.*, 2002, 2003) can be associated with this position.

Table I summarises the major differences between cognitive constructivism, collectivism and constructionism and outlines some major philosophical influences and representatives of these positions.

This article does not attempt to create a detailed classification of individual IS researchers or theories into the outlined metatheoretical positions. First, individual scholars typically develop and more or less radically revise their theoretical approaches over the years. Their works cannot be expected to be consistent. An individual researcher can thus have one foot in one "ism" camp and the other foot in a different camp. Second, unit theories are often inconsistent in the sense that the empirical strategies used are not always necessarily in line with the stated epistemological views[4]. Such inconsistencies are unavoidable in the everyday practice of science (see Becker, 1993). Third, there is considerable fluidity among the three metatheoretical positions. For instance, between cognitive constructivism and social constructivism one may place the "holistic cognitive viewpoint" as described and defined by Ingwersen (1999; Ingwersen and Järvelin, forthcoming), and between social constructivism and social constructionism one may place the "sociological-epistemological approach" developed by Hjørland (1992a, 1998).

Metatheory	Constructivism (Cognitive constructivism)		Collectivism (Social constructivism)	Constructionism
Origin of knowledge	Individual creation of knowledge structures and mental models through experience and observation	Individual creation of knowledge structures and mental models; influenced by history and social relationships	Knowledge is social in origin; the individual lives in a world that is physically, socially and subjectively constructed; mutual constitution of the individuals' knowledge structures and the socio-cultural environment	Production of knowledge in ongoing conversations; knowledge and identities are constructed in discourses that categorise the world and bring phenomena into sight
Philosophical influences	Kelly Piaget	Bruner (early work)	Bruner (later work) Vygotsky	Bakhtin Foucault Garfinkel Gergen Wittgenstein (later work) Volosinov
Representatives	Brookes Todd	Belkin Ingwersen Kuhlthau	Hjørland and Albrechtsen Rosenbaum Taylor	Blair Frohmann Given McKenzie Savolainen Talja Tuominen

Table I.
Major features, influences and representatives of cognitive constructivism, collectivism and constructionism

Cognitive constructivism

Cognitive constructivism is a metatheoretical position that sees knowledge production as the creation of mental models. This position has been influenced by Piaget's theory of cognitive development proposing that humans cannot be "given" information which they immediately understand and use. Instead, humans must "construct" their own knowledge. Individuals build their knowledge through their experiences that enable them to build "mental models" of the world. Mental models consist of schemas, scripts and knowledge structures. These models may change and become more detailed and sophisticated as individuals receive new sensory data or encounter novel situations. Yet, mental models are understood as relatively stable conceptual structures orienting action.

Like their predecessors in psychology and cognitive science, cognitive constructivists in IS start from the assumption that the individual mind generates knowledge by creating knowledge structures and mental models which represent world and mediate – or filter – information. Constructivist theories in IS assume that the individual mind is the most important arena of knowledge creation. They are theories about "the information man" (Talja, 1997), about the ways in which individuals with specific states of knowledge interact with knowledge resources and information retrieval systems.

Cognitive constructivism emerged in IS in the late 1970s and 1980s as a reaction against the then predominant information transfer model[5]. With "the user-oriented revolution" (Nahl, 1998)[6] in IS, researchers like Dervin (1983) called into question the mechanistic and mundane understanding of information as the direct communication of messages between senders and receivers. They criticised the way in which the information transfer model emphasised the authoritative role of the sender and viewed information as an entity-like, objective and neutral informing brick. The emerging constructivist theories underlined that information is not a pill an individual can swallow in order to become informed, but a plastic substance that can be shaped in many ways. An information user is not a passive information processing system but actively makes sense of the surrounding reality and attaches personal meanings to information.

The cognitive viewpoint has undergone significant changes since the late 1970s, when it was proposed for the first time. The early attempts to develop cognitive approaches to information behaviour were inspired by natural scientific ideas of measuring the processes of information reception and use. The ideal of measurement is elegantly crystallised in Brookes' (1980, p. 131) "fundamental equation". Already in the late 1970s, however, more context-sensitive interpretations of the cognitive viewpoint were suggested, for instance, by Belkin (1978, 1984) and de Mey (1980, 1982). The ASK model developed by Belkin (1978, 1984) identified the significance of situational and task-related factors for the development of anomalous states of knowledge. Even more clearly, Ingwersen (1982, 1992) developed a model of information retrieval interaction that incorporates the socio-organisational environment and sees information seeking to be affected especially by the nature of the work task to be accomplished by the individual information searcher. With the emphasis on situational relevance, the cognitive viewpoint moved from the individual cognitive view toward a more socio-cognitive position (Ingwersen, 1999, pp. 4-16). The holistic cognitive viewpoint as defined by Ingwersen (1999; Ingwersen and Järvelin, forthcoming) differs from

collectivism, however, in that at least methodologically it gives primacy to the individual searcher's perception of the current work task and situated context.

The critique of cognitive constructivism

In his criticism of the cognitive viewpoint, Frohmann (1990, 1992) stressed that the assumption that world models, concepts and knowledge structures reside inside individual minds mentalises language and information. Enmark (1998) termed the meeting between information and individual cognitive structures "the non-existent point" – something that can be studied only in a metaphorical sense. Hjørland (1992b), in turn, argued that cognitive theories are generally unhelpful in solving the problems of knowledge organisation, as representations and interpretations of reality are seen as entities residing within rather than between individuals. He (Hjørland, 1992b) argued that information and information processes should be approached from the viewpoint of the social discovery and construction of knowledge, meanings and representations, and equated the cognitive viewpoint's focus on subjective knowledge structures with idealism.

Gergen and Wortham (2001, pp. 124-5) argue that if individuals are seen as the true originators of knowledge and meanings, this raises a question of how internal and external realities are connected, because the mental sphere seems to remain opposed to social and material processes. The cognitive viewpoint is characterised according to Frohmann (1992, p. 376) by the "erasure of the social". Sampson (1993) argues that to a large extent, the cognitive viewpoint is decontextualised in assuming that the development of cognitive models is an ingrained biological process that is the same for all individuals, regardless of gender, class, race and the social and cultural context in which learning and living takes place.

Criticism of cognitive constructivism is not limited to discussions in discursive psychology (see Edwards, 1997) or in IS (see Frohmann, 1992; Talja, 1997; Tuominen and Savolainen, 1997; Jacob and Shaw, 1998). Already in the 1940s and 1950s, Mills and Wittgenstein discussed the need to go beyond the differentiation between mind and language. They saw mental phenomena produced in talk as context-dependent discursive constructions. The assumption in cognitive constructivism is, however, that by analysing behaviour or responses (language), researchers will gain access to mental models – understood as Platonic, immaterial conceptual structures orienting talk and action. Cognitive constructivism thus overturned the information transfer model's conception of language as a mere vehicle for transmitting messages from senders to receivers. However, both the information transfer model and cognitive constructivists implicitly assume that language is essentially a neutral instrument for reporting observations and thoughts.

Although the theoretical assumptions of cognitive constructivism may be challenged from the vantage point of other positions, studies drawing on cognitive constructivism have in fact been successful in presenting solutions to central research problems in IS (Ingwersen, 1999). The results of empirical studies drawing on the assumptions of cognitive constructivism can be very useful and open up new important researchable questions. Therefore, although the assumptions of cognitive constructivism have been challenged, they are used routinely (paradigmatically) and without much worry within IS. As Kuhn's (1962) original notion of scientific paradigms suggests, whenever this happens, there is a period of scientific advance. Each scientific

paradigm is in its own way limited and directs empirical research efforts to focus on specific aspects of reality.

The application of cognitive constructivism in IS
Cognitive constructivism approaches information processes by describing how information needs, seeking and the relevance criteria of individuals are affected or directed by their current emotional and cognitive states, situations and work tasks. Cognitive constructivism has frequently formed a background for information needs, seeking and use studies, user-oriented and interactive information retrieval research, internet search behaviour studies and conceptualisations of information literacy. In cognitive constructivism, uncertainty is an important concept, referring both to the cognitive and affective states of the user in specific stages of problem-solving processes (Kuhlthau, 1993a), and to task uncertainty, the degree and structuredness of knowledge available for decision making (Byström and Järvelin, 1995; Byström, 2000; Vakkari, 1999).

With its emphasis on situational and subjective relevance (user-subjective approach), cognitive constructivism is a theoretical approach that is eminently suited for studying task-based information seeking. It is especially applicable in integrated studies on information seeking and retrieval. Cognitive constructivism has also been applied in user modelling and user requirements elicitation aiming at improved user interfaces and user-system interaction. In addition, cognitive constructivism is especially suited as a background theory for studies that aim at the development of personal information management systems and personalised digital libraries (see Bergman *et al.*, 2003; Kuhlthau and Tama, 2001). The emphasis of cognitive constructivism on individual actors makes this approach less appropriate for studying broader social aspects of information seeking and use, co-operative information seeking and retrieval, and the cultural formation of meanings, representations and classifications.

Collectivism
There is a great deal of overlap between cognitive constructivism and the socio-cognitive viewpoint in IS. The latter has been influenced especially by Vygotsky's social constructivist theory of cognitive development. Vygotsky emphasised that both cognitive processes and the social milieu are important in knowledge formation. Whereas Piaget suggested that individuals construct knowledge through their actions in the world, Vygotsky stated that understanding is social in origin. From the Vygotskyan point of view, knowledge formation and the development of knowledge structures take place within a socio-cultural context. Individual development derives from social interactions within which cultural meanings are shared by a group and eventually internalised by the individual. It is assumed that individuals construct knowledge in interaction with the environment and that in the process both the individual and the environment are changed. Thus, the subject of study is the dialectical relationship between the individual and the socio-cultural milieu.

The influence of Vygotsky's and Leontiev's activity theory can be seen, for instance, in Hjørland and Albrechtsen's (1995; Hjørland, 1997) work. Activity theory suggests that an individual lives within a world that is at once physically, socially and

subjectively constructed, and that living and acting in this world constitutes knowledge (Jacob and Shaw, 1998, p. 142). Because knowledge is constructed through – and embedded within – action, it provides an internal determinant for subsequent actions, which in turn modify the internal knowledge of the individual. In this way, the individual-as-actor constructs internal knowledge of facts, values and procedures through ongoing interaction between his or her internalised knowledge and his or her participation in the external world. Knowledge is both explicit in that it can be communicated through language and implicit or tacit in that it can be embedded within particular activities (Jacob and Shaw, 1998).

The socio-cognitive viewpoint in IS and collectivist approaches in general were developed as alternatives to individualistic, behaviourist and user-psychological approaches to information practices[7]. The core assumption of collectivism is that it is a mistake to psychologise issues like relevance and user needs as users are social and cultural beings (see Hjørland, 1998). In the past, especially in the late 1970s and 1980s, the main aim of many IS researchers was to build general and universal models of information behaviour. These models suggested that individual users' information behaviour is influenced by group memberships and a number of cultural, personal, situational, organisational and social factors (especially by social norms, values and customs) (Talja *et al.*, 1999). Nevertheless, these models rarely viewed information needs, seeking and use as a part of or embedded in a cultural, social or organisational practice. Collectivist approaches question the validity of universalistic models and argue against studying "users in general" (Capurro, 2000, p. 82). Cornelius (1996, p. 18), for example, states that:

> [A]nyone [. . .] who is using information is participating in a practice, is a part of social life. His or her actions should be understood as social actions, and the significance or meaning which any participant in a practice imparts to one of the objects of that practice (which could be a piece of information) is a socially constructed one.

Collectivist approaches emphasise that information processes should be seen as embedded in social, organisational and professional contexts. They shift attention from individual knowledge structures to "knowledge-producing, knowledge-sharing and knowledge-consuming communities" (Jacob and Shaw, 1998, p. 142). In addition to the socio-cognitive viewpoint (see Jacob and Shaw, 1998) and domain analysis (Hjørland and Albrechtsen, 1995), collectivist approaches in IS include, for instance, Brier's (1996) cybersemiotics, Taylor's (1991) theory of IUEs and Rosenbaum's (1993) application of Giddens' theory of structuration to explain how IUEs and individual actors' information behaviour reciprocally constitute each other. These theories effectively dissolved the image of the user as a monologic actor affected by environmental variables.

Taylor (1986, p. 35) stated that "it is for the most part organisation that provides the context and establishes the tasks and responsibilities from which problems, and hence, information needs, are generated". He argued that because of their education and working experience, different professions are socialised into their own world views: chief executive officers (CEOs) define and solve problems in the same way in Miami and Helsinki (Taylor, 1991, p. 219) and the information behaviour of teachers is similar in Pretoria and Portland (Taylor, 1991, p. 227). Thus, behind Taylor's (1991) theory of IUEs lies the idea of professions as the builders of their specific information universes. Characteristic of collectivism is a view of professional groups and domains as

thought-collectives in a sense given by Fleck (1986). In 1936, this Polish medical microbiologist and philosopher of science described the idea of thought-collectives by taking the collective mental differentiation of men as a starting point:

> ... people exist who can communicate with each other, i.e. who think somehow similarly, belong, so to say, to the same thought-group, and people exist who are completely unable to understand each other and communicate with each other, as if they belong to different thought-groups (thought-collectives). Scientist, philologist, theologian, or cabbalist can perfectly communicate with each other within the limits of their collectives, but the communication between a physicist and a philologist is difficult, between a physicist and a theologian very difficult, and between a physicist and a cabbalist or mystic impossible. The subject of conversation does not play a decisive role, because on an apparently identical subject, e.g. a certain disease or celestial phenomenon, a physicist will understand a biologist, but will be unable to come to an understanding with a theologian, or a gnostic. They will talk next to one another: they belong to a different *thought-collectives,* they have other thought-styles. What, for one of them, is important, even essential, is for another a side issue, not worth discussing. What is obvious for one, is nonsensical for the other. What is truth (or "lofty truth") for one of them, is a "base invention" (or naïve illusion) for another. Even after a few sentences, there appears to be a specific feeling of strangeness, which signals the interlocutor, which proves an affiliation with the identical thought-collective (Fleck, 1986, pp. 81-2).

The Fleckian view is echoed in Hjørland and Albrechtsen's (1995, p. 400) argument that "the best way to understand information in IS is to study *knowledge-domains as thought or discourse communities*, which are parts of society's division of labour". Hjørland and Albrechtsen (1995, p. 407) stress that knowledge is formed through "a dialectical relationship between a community and its members ... mediated by language and influenced by the history of the specific [domain]".

The critique of collectivism
Palmer (1999) offers the criticism that is not entirely clear how the concepts of domain, discourse and discourse community should be understood and defined, and how to carve out the units of empirical analysis in domain analytic research. Palmers' (2001) own research focussed on the information practices of interdisciplinary scholars at the level of individuals rather than at the level of specialist fields or research groups. Hjørland's domain analytic studies, in turn, mainly trace the mechanisms underlying information behaviour not by empirical user studies, but by drawing especially on science studies as well as document and genre analysis. Such studies reveal implicit and explicit relevance criteria and functions of scientific information and communication.

A central question related to collectivism is, then, how a "domain" can be defined, for instance, is it a paradigm, theory, specialism, or discipline? How far can we assume the existence of a consensus inside a domain or a professional group? Hjørland and Sejer Christensen (2002) argue that in a specific field like psychology there are many thought-collectives that will have different relevance criteria and that will interpret terms differently. That the epistemological postulations and theoretical starting points of a domain may be discontinuous has been emphasised also by Talja (1997), and Tuominen *et al.* (2002, 2003). Hjørland (2001, p. 776) similarly states that discourse communities will not necessarily or over a longer period of time agree on the meaning or topic of a specific document.

To be able to identify and capture the significant features of professional groups' information practices, and the factors that underpin these practices, collectivist approaches start from the assumption that fields, professions, and discourse communities have "a high degree of synchronised thinking, language, and knowledge" (Hjørland, 1997, p. 125). As stated by Hjørland (1997, p. 125), the actual degree of synchronised thinking within a domain is, however, always an empirical question. Sundin (2003, p. 34) emphasises that there may exist conflicts, competing interests and historical battles over the control of discourses and power within and between professional groups as much as shared practice and history.

The application of collectivist ideas in IS

Collectivist approaches aim at capturing field differences in information practices and relevance criteria, while cognitive approaches have tended to adopt a person-centred approach and focus on individual differences. Collectivist approaches, especially domain analysis, adopt a sociological-epistemological view of information practices and relevance, rather than a user-subjective view. The basic assumption of domain analysis (Hjørland and Albrechtsen, 1995) is that scientific domains have different languages, relevance criteria and ontological and epistemological commitments. Therefore, they make different demands of the systems for organising and retrieving documents. The view of domains as "fields of discourse", as collectives having specific ways of communicating and formulating ideas, can be fruitfully applied as a background in studies trying to distinguish the character of the terminology used in different fields so as to build better indexing and retrieval systems for those fields. The idea of domains as discourse communities may also be used in automatic domain vocabulary thesaurus construction, i.e. in the identification of the concepts used in a domain and mapping the relationships between them (see Morato *et al.*, 2003).

Domain analysis has thus far been used in empirical information seeking research by analysing of the epistemological and theoretical positions in professional and scientific fields to explain their information practices (see Sundin, 2003). As domain analysis theoretically focuses on the issue of how knowledge is formed within scientific domains, it has been less clear how or whether it can be applied in the study of everyday life information practices. Hjørland (1998, p. 610) emphasises, however, that there should be no dualism between theories of information seeking and retrieval in scientific domains and theories of information seeking and retrieval in everyday life. Hobbyists, for instance, can be viewed as domain experts, and hobbies can be understood as domains of knowledge in their own right, with terminology, discourses and perspectives that are analysable. Hartel (2003) has applied domain analysis in the study of leisure-related information seeking.

Collectivist approaches are oriented toward a deeper understanding of the practices of professional groups and scientific domains, and the tacit knowledge underlying these practices. Collectivism may be less applicable in the study of information practices in trans-epistemic (Knorr-Cetina, 1981) arenas of knowledge production, that is, varied and fluid coalitions that are not necessarily committed to a single epistemic position, and in the study of settings where work tasks are performed in teams across disciplinary and organisational boundaries.

Constructionism

Social constructionism or, briefly, constructionism, in the widest sense is a synonym for "the linguistic turn"" in human and social sciences. In constructionism, the primary emphasis is not on mental, but on linguistic processes. As an explicitly language-based metatheory, constructionism does not operate with concepts such as cognitive space, cognitive functions, mental models or knowledge structures. As mentioned above, these conceptualisations are based on the distinction between mind and language, on the subject-object dichotomy characterising modern thought. Constructionism sees language as constitutive for the construction of selves and the formation of meanings. Constructionism speaks of discourses, articulations and vocabularies, and replaces the concept of cognition with conversations. From the constructionist viewpoint, conversation is the condition *sine qua non* for the constitution of the social world, knowledge and identities. We produce and organise social reality together by using language. Communicating is always a two-way process, taking place between two or more human beings sharing (physically or virtually) the same conversation space.

Dialogic theories, criticising individualistic and mentalistic assumptions of human knowers and knowledge formation, were formulated as early as the 1920s and 1930s by Bakhtin and Volosinov. Wittgenstein's late language philosophy stressed the practical and fundamentally social nature of discursive practices. Wittgenstein stressed that when people produce linguistic representations of their thoughts, beliefs and emotions, they engage in historically shaped ways of language use. Harold Garfinkel founded an ethnomethodological research tradition that concentrates on the routine ways in which ordinary social life is inter-subjectively accomplished and on how language is used to constitute the factuality or neutrality and accountability of reasoning and decision making. Leaning on the work of Garfinkel, Harvey Sacks developed a methodology that later would be called conversation analysis. Raymond Williams' discovery of Volosinov's work and the subsequent work on articulation theory by, for instance, Stuart Hall and Lawrence Grossberg, were also important influences in the linguistic turn in human and social sciences.

Foucault's (1972) seminal work *The Archaeology of Knowledge* outlined the discourse analytic approach, a viewpoint that is often perceived and used as a synonym for constructionism. Discourse analysis, in turn, has a close relationship with rhetoric and genre analysis, which were established forms of critical thought from antiquity to the eighteenth century. However, not all studies using the term "discourse" or utilising discourse analytic methods embrace constructionist assumptions of knowledge production. What is common to different approaches is the understanding that discourse analysis studies units of language larger than sentences and paragraphs. Aside from that, there are many different ways of understanding the concept of discourse, and different definitions open up possibilities for different research programmes and experiments[8].

The main assumption of constructionism is that the boundaries of social knowledge are set by discourses that categorise the world and bring phenomena into view. It is understood that historically formed discourses function as repositories of starting points, definitions, and themes that position speakers as they give meanings to phenomena (Hall, 1982). Discourses are knowledge formations, entities that provide an effective and limited perspective for producing knowledge about a topic. In different

discourses, the topic is approached from different angles and different states of things are assumed (Foucault, 1972, pp. 49, 107).

The basic assumption of constructionism is that knowledge is constructed in "systems of dispersion" (Foucault, 1972). The production of knowledge is always positioned: we are not dealing with a pure reflection of a single position, but rather with dynamic tensions among multiple positions (Bowker and Star, 1999). Thus, while cognitive constructivism and collectivism assume that individuals' or discourse communities' mental models have a relatively stable form and existence, constructionism takes the view that the words of language do not carry meanings that remain stable "through the changing occasions of their use" (Garfinkel, 1967, p. 40). Constructionism thus emphasises the context and perspective dependent and argumentative nature of language use. Constructionism embraces a "rhetorical-responsive" view of language and takes a critical stance towards approaches that view language as a decontextualised system in which words have relatively stable meanings (the "representational-referential" view) (Shotter, 1993, pp. 13-14).

Constructionist approaches in IS assume that information, information systems, and information needs all are entities that are produced within existing discourses, i.e. linguistic and conversational constructs (see Talja, 1997; Tuominen and Savolainen, 1997)[9]. Frohmann (2001), for instance, emphasises that when information scientists analyse information needs, users' sense-making, relevance criteria, or keywords, they are always concerned with public practices of language use. Both domain analysis and constructionist studies (see Tuominen *et al.*, 2003) thus assume that all information seeking and retrieval takes place within the boundaries of specific discourses, paradigms and epistemic positions. Constructionism, however, entails a more direct focus on rhetorics, argumentation and language use than domain analysis or collectivism in general. Constructionism assumes that knowledge is produced from limited viewpoints as parts of ongoing conversations and reorients research and knowledge organisation strategies for mapping and visualising conversations, literatures and debates.

The critique of constructionism

The strong focus of constructionism on language use and discursive practices entails an assumption that real world problems are to a large extent defined, produced and solved in institutionalised discourses. This assumption may lead to a passive form of discourse deconstruction and critical reflexivity in IS, which should assist in the creation of innovative (technological) solutions. According to Ingwersen (1999, p. 33), constructionist studies in IS have mainly remained on a metatheoretical and philosophical level and have not generated sustained empirical research programmes and methodologies. Without empirical research efforts in the core areas of IS – document representation, information retrieval, document structure and genre analysis – the practical potential of constructionism remains unrealised.

The social constructionist view that rationality and what we take to be real and factual are mainly moves in conversations (discourses) that are credible only for certain people in certain situations may, according to Hjørland (2004), be classified as an anti-realist research position[10]. According to Michael (1996) and Cromby and Nightingale (1999) the "discursive turn" – the strong emphasis of constructionism on

language – can result a neglect of other significant elements of human life, that is, the role of non-linguistic, non-human and non-social entities. These include, for instance, the influence of embodied factors and personal-social histories on social situations and individual activity, and the ways in which the possibilities and constraints inherent in the material world shape and inform the social constructions we live through and with (Cromby and Nightingale, 1999, p. 2). Social constructions are thus not solely linguistic, but also constituted through embodied interactions with the world.

Edwards (1997) makes a distinction between ontological and epistemological constructionism. In the former, the research object is not solely language, but also organisations, technical artefacts, economic and ecological structures. In contrast, epistemological constructionism and discourse analytic studies usually avoid going beyond language, argumentation and rhetoric.

The application of constructionist ideas in IS

Information retrieval and knowledge organisation are practices that are always concerned with language and linguistic products. Documents and search terms consist of words. Therefore IS has an intimate relationship with problems related to vocabularies, discourse and language (Buckland, 1999; Hjørland, 2002a, p. 441). Constructionist theories can be used as a framework in approaching the problems of document representation. Constructionist assumptions can also be applied in the design of digital libraries, databases, user interfaces as well as recommender and filtering systems (see Baker *et al.*, 2002; Buckingham Shum and Selvin, 2000; Buckingham Shum *et al.*, 2000; Karasti *et al.*, 2002; Tuominen *et al.*, 2003). Empirical research testing the applicability of constructionist assumptions and discourse analytic methods in improving user-system interaction, in manual and automatic indexing, thesaurus building and digital library design, have mainly been undertaken in fields such as language technology, sociology and computer science. As far as we know, few empirical experiments in using discourse analysis in the organisation of knowledge resources or in the design of information retrieval algorithms have been undertaken in IS (for exceptions, see Talja *et al.*, 1997, 1998).

The majority of constructionist or discourse analytic studies in IS have concentrated on analysing the field's professional and scientific discourses (see, Budd, 2001, Budd and Raber, 1998; Day, 2001; Frohmann, 1992, 1994, 1997; Radford, 1998, 2003; Tuominen, 1997; Radford and Radford, 2001). The most often studied discourses in IS are those of libraries and culture (Frohmann, 1997; Talja, 2001), information (Day, 2000, 2001), users (Tuominen, 1997) and information technology (Jacobs, 2001). Some articles map the relevance of constructionist ideas for IS research in a more general manner (e.g. Budd and Raber, 1996) and some articles discuss the relevance and applicability of constructionist ideas in the analysis of subject literatures and indexing (Andersen, 2002; Frohmann, 1990). Chelton (1997, 1998) and Solomon (1997) use discourse and conversation analytic methods in empirical studies of user-mediator interaction.

Constructivist approaches are more commonly applied in empirical information seeking studies than constructionist approaches. Talja (1997; see Talja *et al.*, 1999) and Tuominen and Savolainen (1997) discuss the potential of constructionism as a theoretical and methodological approach in information-seeking research. In the field of everyday-life information seeking, Given (2002), McKenzie (2002, 2003), and Tuominen (2001) are constructionist empirical studies that focus on participants'

discursive accounts of their information needs and seeking. These studies bring into sight the presuppositions or "moral narratives" related to information seeking and use and demonstrate their influence on people's actions, self-understandings and institutional practices (see Tuominen, 2004). These studies show how information practices – often analysed from a behavioural perspective – look different and reveal new sides when looked at as part of the social negotiation of meanings.

In the field of knowledge management, constructionist assumptions have been applied in building representation support technologies (see Buckingham Shum, 1997; Sillince and Saeedi, 1999). Such tools can be used for the purpose of visualising different actors' and stakeholders' perspectives, i.e. for facilitating negotiation and argumentation in the context of organisational decision making. The usefulness of constructionism in such tasks is based on the knowledge that in a typical project, decisions are the product of much argument, compromise and the reconciling of different perspectives (Barry and Elmes, 1991; Buckingham Shum, 1997). In addition, constructionism can be utilised in the design of systems for collaborative document retrieval and synthesis. In science studies, groups working with different kinds of documents, technologies, corpuses and instruments are frequently studied from a constructionist viewpoint by focusing on the institutional practices governing the production, interpretation, organisation, circulation and availability of knowledge, interpretations and documents (see Latour and Woolgar, 1986; Knorr-Cetina, 1981).

Conclusion
This paper explored the differences between currently important or emerging metatheories in IS by using their conceptions of the role of language and views of the origin and production of knowledge as criteria. The differences are most obvious between cognitive constructivism and constructionism, whereas collectivism provides an intermediate position. The major differences between constructivist, collectivist and constructionist approaches in their thematic focuses, views of the role of language and fields of application are summarised in Table II.

As shown in Table II, cognitive constructivism, collectivism and constructionism differ in their views of knowledge and language. Constructionism takes discursive practices as its research object and perceives the production of knowledge in discourses as the primary context for information behaviour and knowledge organisation. Collectivism takes professions and knowledge domains as its research object and sees the information and communication practices and terminologies of professions and domains as the primary context for information behaviour and knowledge organisation. Cognitive constructivism takes individual searchers and their interaction with information retrieval systems as its research object and takes the view that work tasks provide the primary context for information behaviour.

We have attempted to show that all three metatheories analysed are equally applicable as orientation strategies in IS. Cognitive constructivism, collectivism and constructionism clearly complement each other. They give rise to different research programmes, address and solve different types of research questions. In short: each metatheory has its own area of applicability. As stated by Bates (2002, p. 13), each metatheory encourages and constitutes a distinctive type of learning, research and understanding, so that there is a valuable continuing role for all of the analysed metatheories. The kind of healthy debate between metatheories we have witnessed in

	Cognitive constructivism	Collectivism	Constructionism
Thematic focus of the metatheory	Individual searchers' interaction with information retrieval systems; situational relevance	Information practices and relevance assessments in organisational, professional and disciplinary communities	Formation of knowledge and classifications in discourses; knowledge production practices and epistemic disputes in knowledge domains
View of language	*Representational-referential* Language is a neutral vehicle for reporting observations and a (more or less clear) window to the speaker's mind	*Pragmatic-instrumental* Language is an instrument serving in the creation, organisation and sharing of knowledge in thought-collectives	*Rhetorical-responsive* Language is constitutive for the construction of selves and the formation of meanings
Major fields of application in IS	Information retrieval interaction; information search behaviour; task-related searching User requirements elicitation aiming at improved user interfaces and better user-system interaction Design of personalised libraries, filtering mechanisms and information management systems	Integrated study of information practices and knowledge organisation in specific domains Studies on terminology, document structures and genres in knowledge domains Development of domain-specific classification and indexing systems and thesauri	Information seeking research focusing on accounts of information practices Analysis of professional and scientific discourses of IS and information technology Design of digital libraries and argumentation visualisation systems for mapping literatures, perspectives and debates Design of collaborative knowledge filtering and synthesis systems

Table II.
Major fields of application of cognitive constructivism, collectivism and constructionism in IS

recent years in IS enables the field to move forward, reach new kinds of understandings, and be more explicit about its theoretical and epistemological commitments.

Notes

1. In short, a metatheory is as a set of assumptions about the nature of reality and human beings (ontology), the nature of knowing (epistemology), the purposes of theory and research (teleology); values and ethics (axiology); and the nature of power (ideology) (Dervin, 1999a). A metatheory enables researchers to determine what kinds of entities, for example, information, knowledge, users and information retrieval systems are. Metatheories serve as orientation strategies and are broader and less specific than unit theories (Vakkari, 1997, pp. 452-3). In essence, they are "systems of mutual dependencies" (Hjørland, 2003b, p. 73) bringing into researchers' view a specific object of study and a way of studying this object.

2. For instance, Tuominen *et al.* (2003) show how different views of knowledge, science and users influence the design of digital libraries.

3. Researchers use different criteria for mapping paradigms, and there is no single correct way of labelling metatheories or drawing the lines between positions. Dervin and Nilan (1986) spoke of user-centred and systems-centred paradigms. Ellis (1992) identified physical and cognitive paradigms in information retrieval research. Hjørland (1998) classified epistemological approaches in four main groups: empiricism, rationalism, historicism and pragmatism. Each classification represents a specific historical viewpoint and thus cannot be considered final or exhaustive.

4. The later version of the Sense-Making approach (Dervin, 1999b) exemplifies the difficulty of unambiguous classification. Sense-Making carries a strong constructionist orientation in its basic theoretical assumption that "sense is made and unmade in communication" (Dervin, 1994, p. 377), but methodologically Sense-Making does not focus on language use (Tuominen, 2001, pp. 32-7). Theoretical approaches such as phenomenography (Limberg, 2000) and Wilson's (2002) social phenomenology similarly exemplify the difficulty of clear-cut categorisations, since both approaches hold individuals' subjective meanings and interpretations as their primary subject matter while maintaining that language furnishes the individual with the means of understanding.

5. The background assumptions of the transfer model are more thoroughly discussed in Brier (1996), Cornelius (1996), Day (2000, 2001), Mokros (1993), Tuominen (2001) and Tuominen *et al.* (2002, 2003).

6. In fact, it is misleading to speak of the user-oriented revolution, as the history of social science research on the information practices of scholars goes back to the 1930s and to the International Conference on Scientific Information held in 1958 (see Bates, 1971; Paisley, 1968). Paisley's (1968) model of information seeking, for instance, identified several layers of social environment that scholars work in: their work teams, research projects, professional specialities, scientific cultures and invisible colleges. The pioneering work of Paisley (1968), Menzel (1959) and Allen (1964) was not, however, used as a background when researchers started to build theoretical foundations for IS as a science proper. Shannon and Weaver's mathematical information theory was influential because it provided a vocabulary for constructing convincing narratives of information processes (see Day, 2000, 2001). That is why most constructivist theories in IS were formulated in a critical relation to the so-called physical paradigm or systems-oriented research.

7. As pointed out earlier, in comparison to information search behaviour studies, studies on scholars' information practices often from the very beginning (from the 1930s) represented a sociologically and contextually oriented approach.

8. Morato *et al.* (2003) distinguish between structural and functional perspectives to discourse. The structural perspective is closely related to genre analysis in that it works with texts to discover regularities and units in document structures. Studies on discourse genres and styles are not necessarily related to constructionism, while the functional perspective – explaining language use in relation to its social context and stressing the indexical nature of words and utterances – usually is. The methodological perspective in functional discourse analysis may be micro-sociological and conversation analytic, embedding language use in the local context of social interaction, or macro-sociological as in critical discourse analysis (usually influenced by the work of Foucault) that focuses on language use to identify historically shaped forms of thought. Often, the most interesting discourse analytic works, like the research by Billig *et al.* (1988), creatively combine the micro- and macro-perspectives. In IS, the works of Chelton (1997) and Tuominen (2001) are examples of the combination of conversation analysis with broader sociological analysis.

9. Among the first studies introducing this view in IS is Blair's (1990) work on language and representation in information retrieval systems, influenced especially by Wittgenstein's later language theory.

10. Button *et al.* (1995, p. 223), Haraway (1991, p. 191) and Hollinger (1994, pp. 66-71), in turn, do not see the dichotomy between scientific realism and relativism as a relevant aspect of research. Wetherell and Potter (1992) have argued that both realistic and relativistic elements can be combined in constructionist research. Relativism does not necessarily constitute an absolute truth or basic assumption (Potter, 1996) in constructionism; rather, it is used as a research strategy. Researchers aiming at capturing the variability of versions or discourses on some particular issue conventionally bracket their own views to understand why the phenomenon is defined and approached in specific ways in specific contexts. A similar type of methodological relativism is adopted in grounded theory and in qualitative research more generally.

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