

A Framework for Analysing the Epistemological Assumptions of International Research Methods

Björn Niehaves

University of Muenster, Dept. of Information Systems, Leonardo-Campus 3, 48149 Muenster, Germany
bjni@wi.uni-muenster.de

ABSTRACT

Within information system (IS) and information technology (IT) research as well as IS and IM management, a methodological pluralism has developed. This results mainly from great differences between competing research traditions, especially those of European and America. In the contexts of multi-disciplinary and international IS research, an epistemological discussion of competing (research) methods offers the chance to support a comprehensive comparison of particular strengths and weaknesses. Thus, the aim of this article is to develop an epistemological reference framework for analysing the epistemological assumptions of research methods in an international context. The consensus-oriented information modelling is given as an example to demonstrate this framework.

INTERNATIONAL PLURALISM OF RESEARCH METHODS

Within an international context, substantially differing international research traditions have shaped a situation which can be described as method pluralism. A wide spectrum of heterogeneous approaches can be found, which differ very substantially in their foundations and basic assumptions. Reconciling different research approaches is ultimately an explanatory or analytical and communication problem, the solution to which requires the development of an epistemological reference framework and its consistent utilisation! Nevertheless, the lack of epistemological funding of IS and IT research methods is apparent and discussed extensively within the discipline (Fitzgerald, et al. 1985, Keen 1980, Mingers 2001). Mainly in the contexts of multi-disciplinary and international research, the extensive publication of epistemological assumptions is thus, in effect, almost mandatory.

The internationalisation of research is conspicuous. Particularly within the European Union, the increasing shift of research emphasis from national to international institutions and organisations is quite evident, e.g. 6th EU-Framework Programme. International research projects are becoming more and more important and will become standard in the future. Not only the research activities themselves, but also the publication of research results is becoming increasingly international in alignment. For many academics, the allocation of research funds depends on the quantity of publications in A-journals. This applies mainly to the Anglo-American academic community, in which behaviourally-oriented empirical research methods dominate, coined by positivistic standpoints (Frank 2003). Due to the internationalisation of IS research, there is a risk that the diversity of research subjects, objects and methods will be reduced as a result of certain dominant approaches. An epistemological discussion of competing research methods offers, beyond subjectively vulnerable positions, the chance to support a comprehensive comparison of particular strengths and weaknesses.

For this reasons, the aim of this article is to develop an epistemological reference framework for research design and to generalise this framework in terms, for example, of consensus-oriented information modelling.

EPISTEMOLOGICAL REFERENCE FRAMEWORK

The selection of research methods forms the core of the research design. The method selection depends on the research objective on the one hand and on the researcher's position on basic epistemological questions¹ on the other hand. Especially the different research traditions in America (dominance of quantitative research approaches) and Europe (tend towards analytical and qualitative research) are result of fundamentally differing epistemological assumptions. But the discussion of epistemological questions must, at least presently, be considered as an open issue. For this reason, no theory based on a philosophy of science should be considered as binding on researchers (in information systems). The individual selection, however, necessitates the fundamental basic approach of making cognitions in terms of a jointly conducted search for knowledge. Here, basic and central epistemological questions must be differentiated from one another and will be presented in the following in form of an epistemological reference framework. The basic concept of this framework is the explicit breakdown of epistemological questions, which reveal especially high relevance in IS and IT research.²

Ad 1) What is the object of cognition? (Ontological aspect)

Ontology is the science, the theory or the analysis or investigation of 'what is' and 'how it is' (von Foerster 1996). In the context of this epistemological analysis, ontology reveals its relevance in that objects are analysed, to which the process of cognition refers. The process deals with the question of the way reality exists beyond the realms of pure imagination of the subject.

1. If the researcher assumes a real world in his investigation, a world that exists independently of cognition, i. e. independent of thought and speech processes, he thus assumes the position of (*ontological*) *realism*.
2. If the researcher negates the existence of a real world independent of human thinking and speech, that is, if he perceives reality as a construct dependent on human consciousness, he thus assumes the position of (*ontological*) *idealism*.

Ad 2) What is true cognition? (Concept of truth)

A central topic of epistemology is the question as to how humans can achieve "true" cognition. Expressed more intuitively, that means how far "correct" knowledge can be obtained and how the "correctness" of knowledge has to be verified.

1. Theory of correspondence of truth. According to the theory of correspondence, truth causes a correspondence in terms of an analogy or equivalence between two related statements. The first relatum of a two-digit relation are statements. The capacity for truth determines the characteristic of statements. By correlating statements and facts, the former can be classified as true or false. Facts thus represent the second relatum in the context of the correspondence view and act as truth inducers for statements, because of their assumed status as objective (Baumann 2002). An operationalisation of the term correspondence is made by Wittgenstein, designated as *image theory* (Wittgenstein 2001) which links the correspondence to two conditions:
 - a) The elements of a statement represent appropriate, corresponding, elements of a fact (*semantic condition*).
 - b) The elements of a statement are arranged between each other as the elements of a fact (*condition of structural consistency*).

This deconstruction of the correspondence term, presents another problem: the likewise unclear term *structural identity*, cannot be perfectly and accurately defined. Thus, image theory creates the dilemma, that it either requires the term *truth* to be clarified or that it is substituted with the less clear term *structural identity* (Baumann 2002).

2. Tarski's concept of truth. Tarski's (Baumann 2002, Davidson 1984, Kirkham 1992, Tarski 1944, Tarski 1956, Tarski 1993) so called *semantic theory of truth* achieves clarity and precision of argumentation by using the compact instrument of modern semantics. Tarski's vision of truth is based to a large degree on linguistics. Thus, truth (T) is determined in terms of Tarski's semantic concept as follows. It applies to: s, L and p:

(T) „s“ is a true sentence of the object language L, if it applies: p
 s: the statement of the object language, whose validity has to be proven
 L: object language, which expresses the statement, whose validity has to be proven
 p: translation of the object language based statement „s“ into the meta language M
 M: meta language, which contains predicates of truth regarding object language based statements

Tarski does not define the term truth. With his semantic theory of truth he rather expresses a condition for appropriateness, which represents the necessary requirement of a definition of the term truth (Baumann 2002). He transfers the predicate of truth to the meta language and thus relocates the problem of comprehension of truth into the linguistic area.

3. Consensus theory of truth. The consensus theory of truth is a social variant of the epistemic truth concept. Truth results from the consensus of everyone (Apel 1979, Baumann 2002, Habermas 1973):

A statement is true (for a group), if it is acceptable under ideal and optimal conditions for the group.

This concept of truth implies that nothing exists or proves to be relevant in the context of a test of truth, which would not be apparent to the community/group doing the perceiving. Within the search for consensus and truth, the existence of facts and things which are independent from thought and speech of the subject striving for cognition, are not necessary conditions.

Ad 3) By what means can cognition be achieved? (Methodological aspect)

The methodological aspect of epistemology deals with the question as to how humans perceive.

1. Cognition can be obtained *inductively* on the one hand. Induction is understood as the extension from individual cases to universal phrases (Seiffert 1996), the generalisation. An inductive conclusion means the transfer from statements via (observed, empirical) individual cases to a universal law statement on the basis of an assumption of homogeneity on nature (Rott 1995).
2. On the other hand, cognition can be acquired through a *deductive* method. Deduction is seen as the derivation of a statement (thesis A) from other statements (hypothesis A_1, \dots, A_n) with the help of logical conclusions. It is the derivation of the individual from the universal.

Ad 4) What is the relationship between cognition and the object of cognition?

This epistemological question, which is often regarded as central, is about the relationship of cognition obtained by the subject to the object of cognition. The point is whether things beyond human thoughts and speech can at least in principle be recognised as objective. Two possible answers to this question can be differentiated according to their basic notions:

1. The understanding of cognition in *constructivism* is subjective, i. e. „private“. The relationship of cognition and the object of cognition is thus determined clearly by the identifiable subject.
2. In *epistemological realism*, the objective cognition of an independent reality is possible. It claims the possibility of eliminating subject-dependent distortions of the cognition of reality, as soon as suitable measures for the removal of appropriate intervening variables are found (Loose 1972).

The question of the relationship between cognition and the object of cognition has important implications. The assumption of the possibility of objective cognition (epistemological realism) is necessarily linked with the assumption of the existence of an objective world that is independent of human consciousness. The constructivist position with respect to the relationship between cognition and object, does not determine a specific ontological position. The combination of epistemological and ontological questions results basically in three possible positions. (1) In terms of *naive realism*, the world is given objectively and in principle as something that people can recognise. (2) *Moderate constructivism* assumes an objective reality, but assigns a high level of importance to subjectivity in the process of cognition. (3) On the other hand, *radical constructivism* (Glaserfeld 1986, von Foerster 1984) states that neither a subject-independent world exists, nor is cognition independent of a subject, in fact possible.

The presented batteries of questions can be the basis for the epistemological discussion of competing (research) methods and offers the chance to support a comprehensive comparison of particular strengths and weaknesses. Furthermore, these questions can be very helpful within the planning process of multi-methodological and/or international research projects. Where appropriate, this list of questions can be extended to further issues (e. g., linguistic aspects).

CONSENSUS ORIENTED INFORMATION MODELLING

The consequences of the basic epistemological positioning are on the one hand the selection and the combination of research method(s), on the other hand the degree of inter-subjective validity that is claimed. Therefore, in the following section, a possible basic epistemological positioning is presented. In addition, an example for an IS and IT research method is given in terms of the *conceptual information modelling*. It will become evident that information modelling can be understood as a research method in the context of specific basic assumptions, that is, as a set of rules to be applied in order to achieve a research objective (Lorenz 1995). The concept of information modelling relates to the basic position used here, and is called consensus-oriented information modelling. This article is within the tradition of the so-called *critical linguistic approach* (Kamlah & Lorenzen 1973, Ortner 1991, Wedekind 1979). The consensus-oriented information modelling is based on following basic epistemological assumptions:

- 1) What is the object of cognition? (Ontological aspect). The existence of a (real) world is assumed, which is independent of human thoughts and speech and for this reason exists even beyond human consciousness. The assumption of the existence of an objective real world implies the denial of the radical constructivism (See Section 2).
- 2) What is true cognition? (Concept of Truth). With respect to information modelling, the understanding of truth is relevant mainly with respect to the validity and quality of information models.

With the *semantic theory of truth*, Tarski develops a concept of truth, which is always relative to a language (object language). Simultaneously, the existence of a meta language is assumed, which contains the predicates of truth about statements of the object language. In this context, both languages ultimately emerge in linguistic communities.

On the other hand, the *consensus theory of truth* confirms that a statement is true if and only if it's rationally acceptable to everyone under ideal and optimal conditions. In a modified version, this means that (for a group), a statement is true if and only if it's acceptable to the group.

It becomes apparent that, both in the context of the semantic theory of truth and in the context of the consensus theory, that truth is regarded as relative. In the first case, truth is relative to the language in which the statement to be confirmed, is made. The languages which are to be applied for determining the truth, are ultimately the property of a *linguistic community* (Kamlah & Lorenzen 1996). In the second case, truth is relative to the community in which consensus was obtained about the truth or non-truth of a statement. The foundation of this truth verification is ultimately the exchange of speech artefacts. Accordingly, finding a consensus within a group requires the existence of a *linguistic community* as well.

In the context of *consensus-oriented information modelling* it should be assumed that truth emerges through the consensus of a linguistic community. Truth is thus regarded as relative to a language (semantic theory of truth) and relative towards a group (consensus theory of truth), in this case to a speech community (critical linguistic approach).

- 3) How does cognition emerge? (Methodological aspect). Information models are one form of artefacts of a formalized language and can contain both empirical and a priori knowledge. Both inductive and deductive conclusions can be accessed firstly in the context of the model creation and secondly in the context of truth verification.

If in the context of *model creation*, single statements are generalised on the basis of a set of individual tests, for example in the context of reference modelling, the relevant process is that of induction (Becker & Rosemann & Schütte 1999, Becker & Schütte 1996). Creating an information model can, however, be achieved deductively as well, for example by attaching object-class-specific attributes to model elements on the basis of their linkage to certain object classes.

Truth verification is based on the procedure of interpersonal verification (Kamlah & Lorenzen 1973, Kamlah & Lorenzen 1996). The formalized linguistic statements contained in an information model are logically decomposed (deduction) until they are accessible as elemental statements for purposes of truth verification. This takes place by means of a group of experts who obtain a consensus (Becker, et al. 2003). The validity of statements in the model can be confirmed, for example, in the case of business-specific models, with a single case. In case of a pattern or reference model, however, the generalised abstraction of different individual verifications (induction) is necessary. Based on the present explanation of research methods, this means that in the context of the procedure of interpersonal verification, additional, mainly empirical research methods are used.

- 4) What is the relationship between cognition and the object of cognition? In the context of consensus-oriented information modelling, specific importance is attached to the influence of

subjects in the process of cognition. In this sense, consensus-oriented information modelling follows the tradition of constructivism, which becomes particularly obvious in relation to the studies of Kamlah and Lorenzen. Here, the subjectivity of cognition, but also the existence of a real world, which exists independent of human consciousness, is accepted. Against this background, an information model can be understood mainly as a linguistic (re)construction of a real world issue.

Thus, consensus-oriented information modelling is characterised by a moderate constructivist position, which is mainly coloured by the critical linguistic approach of Kamlah and Lorenzen. The information models developed contain formalized linguistic statements to be tested for validity in combination with additional (empirical) research methods. This is done through members of a linguistic community in order to obtain consensus. Therefore, elements of the semantic theory of truth and the consensus theory of truth are considered and used.

CONCLUSIONS AND FURTHER RESEARCH

As a reaction to the pluralism of methods within international IS and IT research, a framework for analysing epistemological assumptions of competing approaches has been developed. Furthermore, this framework was applied to the consensus-oriented conceptual information modelling.

As future research, the framework presented here has to be applied for explicating the assumptions of different IS and IT research methods. Further research especially concerning linguistic aspect is necessary.

NOTES

1. Epistemology attempts to clarify how valid and true cognitions about objects of cognition and the appropriate changing of cognition can be achieved.
2. An attempt is in fact made to address the largest possible spectrum of research methods of IS research with the given central questions. However, there can be no claim of completeness. Certain questions might be added or even omitted, for example those depending on the individual assessment of the researcher or issues dependent on particular research methods. Furthermore, many questions should not be answered independent of each other. Interdependencies can be identified, though, on the basis of global arguments and can thus be taken into account by the specifically positioned researcher. It is only possible to achieve the objective of the framework and to create a basis for the inter-subjective and inter-paradigmatic comparison of research methods and results, if the researcher is able to use a differentiated basic positioning.

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