Conceptions are social constructs

Towards a solid foundation of the FRISCO approach

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Abstract: In this article we revisit some core concepts of the FRISCO report related to semiotics and the philosophical foundations of FRISCO. Starting from some earlier versions of the semiotic triangle we focus on its top corner labelled "conception" in its FRISCO version.

The notion of conception (which is most fundamental for the whole framework) has been (and still is) a source of many controversies. It is indeed problematic when it is seen from a pure mentalistic point of view or introduced via terms of perception psychology. However, if we apply the constructivist principles in a systematic way and associate conceptions rather with social groups than with individual observers, they become "social constructs" and thus objective and operational, i.e. verifiable or at least reconstructable by applying laws and rules. As a consequence, some circular definitions in the present report can be removed and the FRISCO basis be stabilised.

1 INTRODUCTION: THE FRISCO WORLD – A UNIVERSE BASED ON CONCEPTIONS

In its report [FRI 98] the FRISCO group intended to establish a framework of information system concepts, i.e. a consistent network of terms and concepts which can form a sound basis for the field of information system development and use. The overall approach of the group is based on language and semiotics, but psychology–related terms like observations and perceptions play a fundamental role in the definitional framework as well.

Information systems are human products which are formed to support the communication and co-operation of human beings living and working together. The essence of these activities is exchange of signs and its principal medium is language. *Semiotics* is the scientific field dealing with signs, their form (syntax), meaning (semantics) and use and effect (pragmatics).

Like many authors in the history and presence of semiotics, the FRISCO authors have used a triangular graphical representation to depict the different aspects of a sign and their relationships. The three corners of their figure stand for the *domain* of a sign (its *referent* or *pragmatic* aspect), the *conception* of a sign (its *meaning* or *semantic* aspect), and the *representation* of a sign (its *syntactic* aspect). However, the FRISCO authors have extended the triangle by a fourth point in the centre thus forming a pyramid or tetrahedron rather than a simple triangle (cf. fig. 1). This central point annotated by *"actor"* emphasises the essential role of the entity or group of entities which is responsible for forming, communicating, interpreting and using signs.

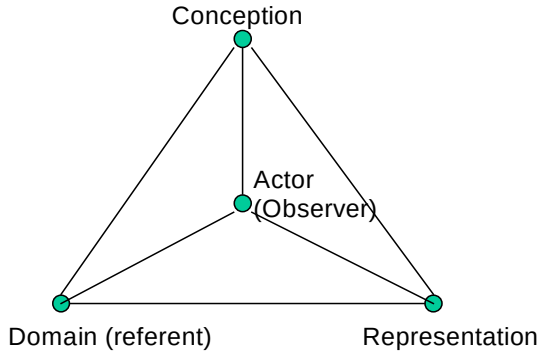

Fig. 1: The semiotic tetrahedron of FRISCO

By emphasising this central role of the actor the authors have expressed their belief that there is no direct connection between representations of

signs and their referents but that this is always mediated by something which they called “conceptions” – placed at the uppermost corner of the semiotic pyramid and inseparably linked with the actor in the centre. A closer look to chapters 3 and 4 of the report shows that the term “conception” is in fact fundamental for the whole terminological framework: Essentially, it assumes a “world” to be composed of “things” (and their states): “A thing is any part of a conception of a domain (being itself a “part” or “aspect” of the “world” [FRI 98, p. 36]). This way, the whole framework is based on conceptions and there is no way to understand or “re-construct” the world without understanding (and accepting) what the authors have called “conceptions”.

According to the FRISCO report, a conception is “a special actand (i.e. a thing involved in a post-state of an action) resulting from an action whereby a human actor aims at interpreting a perception in his mind, possibly in a specific action context.” ([FRI 98], ch. 3, def. E 20)

Ron Stamper has focussed and severely attacked this approach in his reflecting paper “A dissenting position” [Sta 98]. According to his arguments, conceptions are not an appropriate basis for a theory on Information Systems since “we cannot observe the ‘conceptions’ locked inside our skulls ...”. Further, for defining the ‘meaning’ of a sign he advocates for a “definition by ostention” and claims that this “does not work for the inaccessible conception which one can only ‘see’ in a metaphorical sense by introspection. ..”. His counter-proposal basically implies to replace “conception” by “*repertoire of behaviour”* thus avoiding the explicit reference to mental states and results of introspection.

Other critical arguments on the fundaments of the FRISCO approach are concerned with its “ontology” starting with the sentence “The world exists, independent of our own existence, or of our cognitive or intellectual capabilities:” [FRI 98, assumption [a], p. 31]. Stamper calls such a world a “ready-made reality” [p. 193] and argues that it “defies observation because the observer involved always gets in the way.” [p. 191]. As a conclusion, he classifies the FRISCO approach (in its “formal” parts) as “mentalistic with a touch of naive realism.” [p. 194]

Our group (as a whole) came across the FRISCO approach while trying to study and clarify the terminology of the so-called object-oriented approach of Informatics. Of course, this is a task which has to start with the concept of “object” itself and has to base it on a sound and consistent philosophical basis. Here the same questions arise: Does an “object” exist independent from our own existence? What is an object at all? Is it something “just for the picking” [Mey 88] or is it a “conception” we have to negotiate with others? This has led us to what we consider the crucial point of the whole

FRISCO approach: What, after all, is the nature and essence of conceptions? Are they the missing link between representations and their referents? Or are they some sort of mentalistic magic we should rather avoid to touch?

2 A TOUR D'HORIZON ON THE SEMIOTIC TRIANGLE

In order to answer the above questions, we will start with a closer examination of the semiotic triangle and, in particular, with its uppermost corner (cf. [Fer 98]).

Three Versions of the semiotic triangle

At a first glance one might ask whether we need a triangle at all. Ron Stamper's reflection paper suggests that meaning is a "relationship established by people in a language community" relating one *thing-A* to another *thing-B* it *"stands for"*.

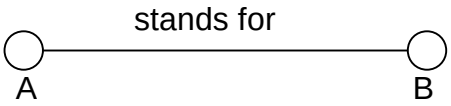

Fig. 2: The "meaning" relationship

But already Aristotle claimed to have good reasons to pose something in between which he called "Imagined thing" in order to express what we might call the n:1- (or n:m) relationship between *words* and their *references* (things they refer to).

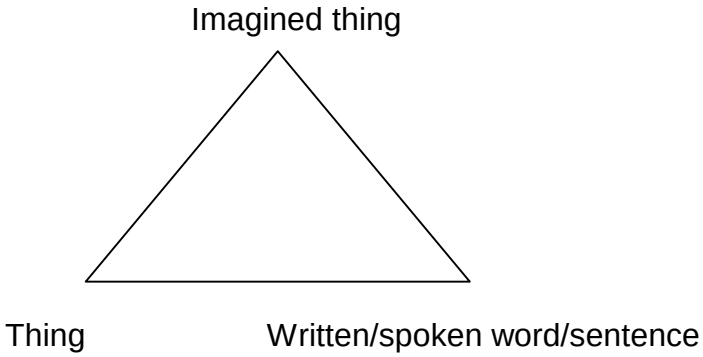

Fig. 3: Aristotle's triangle

For Aristotle "...spoken words are the symbols of mental experience and written words are the symbols of spoken words. Just as all men have not the

same writing, so all men have not the same speech sounds, but the mental experiences, which these directly symbolise, are the same for all, as also are those things of which our experiences are the images...” (Aristotle, on interpretation).

This way, the meaning of words is understood as a mental state resulting from what is imagined when words are spoken or written. This mental state is said to control speech in an unambiguous way.

About 2000 years later we find a slightly different version of the triangle used by the German philosopher G. Frege:

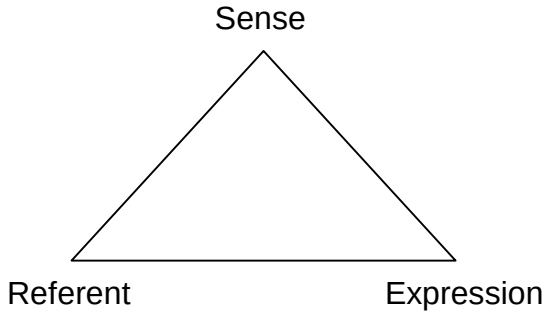

Fig. 4: Frege’s triangle

Frege argued that imagined things depend on a medium like a human being whereas the referents are independent from any medium. According to Frege, the meaning of an expression cannot be based only on imagining because mental states are private and understanding cannot work on such subjective grounds. Thus he extended the model of meaning by introducing *sense* as “the way things are given”. As the sense of a thing, like the thing itself, is the same for all people, it serves as an objective criteria for understanding. Thus, for Frege “meaning” consists of both imagining and sense. Frege’s explanation of meaning catches the argument of objectivity but it depends on a sort of metaphysical realm populated with sense-entities.

Another, quite different approach is taken by Wittgenstein (cf. fig. 5). For Wittgenstein, it is neither imagining nor sense that provides meaning to an expression. “The meaning of a word is *its use*”. To speak is nothing more than performing speech acts by following certain rules. Sharing the same meaning results from following the same rule. Only if the rules have been internalised beforehand, something like imagining can occur or the sense of a thing can be projected as “the way it is given”. We apply the rules blindly, without any mental pre-dispositions, in the same way as we apply the rules of a game. The meaning of words and sentences is nothing more than the restrictions, rules, and regularities that govern their use. As the same holds

true also for all kinds of games, Wittgenstein introduced the notion of language game. For him, the question "What is a word at all?" is analogous to "What is a piece in chess?".

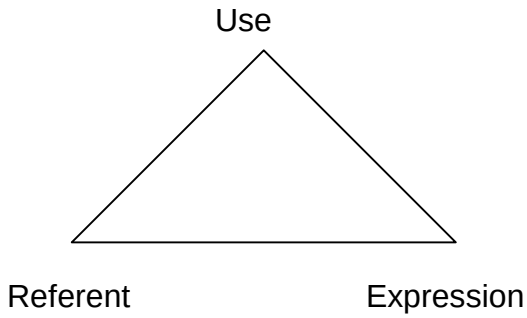

Fig. 5: Wittgenstein's triangle

The further development of the *use theory of meaning* is well known. Its most prominent result is the so-called *speech act theory*. Austin and later on Searle offered a systematic classification of the variety of speech acts. According to them, to *say something* is to *do something*, and what one does in saying something is typically indicated by a particular performative verb prefixing the "normal form" of the utterance. These verbs, such as "state," "request", "promise", "judge, "warn," "apologise," and so on, mark the illocutionary role of the utterance in question.

For our purposes - i.e. for a closer examination what conceptions really are - it is useful to see that a speech act like an assertive consists of two parts, namely an illocutionary role in the first place (e.g. judge, doubt, being afraid of, etc.) and a proposition which follows that role. While the illocutionary role evidently refers to a private mental state, the proposition is insofar constructed in a public way as the applied construction rules are everybody's rules.

The intuitively used construction rules and intuitively applied construction acts can be made explicit by pointing out the logic of the relations existing between terms, between referents, and between terms and referents of a proposition. As an example for the equivalence and dependence relations the following types of construction acts and their propositional expressions have been suggested by E. Ortner (cf. fig. 6, adopted from [Ort 83]).

This exposition of the construction acts and the relations founding these acts demonstrates how objective and how public everybody's rules are, even if applied only intuitively after having internalised them. Applying these rules ends up in a construct which owes its objectivity to the fact that it can be reconstructed in public at any time.

Abstraction (based on equivalence relations)

Construction act	Propositional expression	Relationship type	Example
Identification	$x \equiv N$	Identity	John is client no. 4711
Predication	$x \varepsilon P$ $x \nu P$ $x \pi P$	Subsumption	John is a CLIENT John has CREDIT John does ORDER
Inclusion	$Q \subset S$	Subordination	CLIENT is BUSINESS_PARTNER

Composition (based on dependence relations)

Construction act	Propositional expression	Relationship type	Example
Attribution	$x \nu A$	Participation	John has a CLIENT_NO
Possessive Integration	$Q \succ A$	Possession	ASSEMBLY has WHOLE_NO and PART_NO
Participative Integration	$Q \prec A$	Participation	ASSEMBLY has QUANTITY
Connection	A1 <<->> A2	Interdependence	Combination WHOLE_NO and PART_NO serving as denotation

Fig. 6: Construction acts and their propositional expressions following [Ort 83]

3 CONCEPTIONS: THE ESSENCE OF OUR ASPECTS OF THE WORLD

After this tour d'horizon we will try to summarise our understanding of the semiotic relations with a particular focus on what the FRISCO authors have named "conceptions":

(1) Any attempt to draw a link between a *representation R* and its *domain (referent) D* has to start with an *observer A* who is forming or recognising a representation. This justifies the central position of the observer in all sign processes which the FRISCO authors have highlighted in their version of the semiotic figure. However, in the FRISCO report, no distinction is made between the observer (a sort of "meta-actor" used to explain the philosophical background) and the concrete actors occurring in the context of every specific information system. We consider this distinction essential (also to end up with better layering of the FRISCO report, see below) and therefore have deliberately chosen the term *observer* for the first kind of FRISCO "actor" and restricted the term *actor* to the second one.

Thus, for any closer examination of the "meaning" relationship, its relativity with respect to the observer A should be emphasised: We prefer to say: "*R*

represents D for A" or *"R is interpreted by A as representing D"* instead of just "*R stands for D*" (cf. fig. 2).

(2) To form or to interpret representations are often complex processes. Since we cannot grasp a domain in its totality while representing it and we do not (re-) create that domain in its totality while interpreting its representation we have to distinguish the considered domain from those *aspects which are relevant for an observer* while representing it or analysing its representation. Thus we prefer to extend the above sentence to its final, more comprehensive form:

> *"For observer A, the expression R represents the aspect(s) C of some domain D"*.

With this interpretation, we are now able to (re-) explain the four corners of the semiotic tetrahedron and – in particular - to find a satisfying explanation for the "conception" corner:

(2A) Again we start with the central point of the figure: the *observer*. Above we have already emphasised his/her importance for the whole sign process. Essential for the flexibility of the whole approach is the fact that we can consider individual observers as well as groups or even whole societies. Whenever more than one individual is involved, only those statements (on representation or interpretation) are accepted as "valid" which are shared by all individuals of the group or society or at least by a substantial majority of those individuals. Such statements are the result of negotiations and can be summarised by collections of (written or unwritten) rules and laws.

(2R) *Representations are* symbolic, graphical, depictive, auditive or otherwise (by observers through their senses) perceivable expressions or signals for which corresponding references exist.

(2D) The *reference* of a representation may be any "something" or *domain*: The whole or any part of the concrete or abstract world, perceived or imagined by the observer, including him- or herself, his or her physical components or thoughts (self references), and other representations or their parts (mediated references).

(2C) The *conception* at the top of the triangle reflects the aspect character of all recognition which is an epistemic prerequisite: a referent can never be recognised and then represented as a whole but only in the form of *aspects* the observer is able to perceive. Note that *"aspect"* in this sense does *not* imply previous full knowledge of the referent but on the contrary may be used as a means to "approach" the referent, i.e. to get more knowledge on it. The normal form of its statement points it out: Some D is *recognised as* a C.

Thus “conception” or better “collection of aspects” is “*that as what the observer has recognised the subject of his/her reference”*.

In other words, “conceptions” are collections of aspects of things which are relevant for an observer while forming or interpreting representations. Note that with this explanation, a conception is always an abstract entity. It is neither the subject of reference (which may be concrete or abstract) itself nor a representation (which is always concrete). But it can be represented: for example by listing the relevant aspects, stating rules, drawing graphics or pictures, filling data bases ...

If we try to define the term “entity” such an approach can be helpful: In a narrower sense, an *entity* can be defined as a “conception”, i.e. as a collection of aspects - which we normally call *attributes* and represent by *data elements* in the IS field. In a broader sense, constructing an entity starts up by building a “conception” in the above sense, namely by collecting aspects but eventually an *entity* will cover all three corners of the triangle including one or several representation(s) and a domain, i.e. something in the real or imagined world it refers to.

What is considered to be an entity and which of its aspects are considered relevant is determined by the observer(s), i.e. the system analysts in our case. In a more general sense, it is the society which has determined, delimited and named its entities through continuous use and communication – a process which continues and will continue as long as human beings are able to do so. In this view, conceptions are *social constructs, formed by a language community through common use and shared understanding*. Thus they are a *product of social agreement* and may vary if such agreements change in time. They might, for example, be represented by collections of rules which are acknowledged and agreed on in that community or in terms of a standardised “norm language” common for (most of) its members. It is important to note, that not the rules by themselves bring conceptions into existence, but it is their common use by a language community that *dynamically* produces conceptions and meaning. So, if the underlying rules and/or the language community varies, the resulting conceptions and meaning may vary as well, even if their representations remain the same.

Whether the term "conception" is the most appropriate wording to express this view, is still a matter of dispute. As an alternative, we have discussed the terms "construct" or "social constructs" but the first seemed to be too wide and the second too narrow to us.

4 CONSEQUENCES FOR THE FRISCO LINE OF REASONING

What have we achieved with this explanation and what are the consequences for a possible revision of the FRISCO outline of concepts?

- We have given an explanation of "conceptions" which is rather based on the results of cognition of an (individual or social) observer than on psychological dispositions like perception. Depending on whether the observer is an individual one or a group of observers we might call such conceptions *subjective* or *objective*, bearing in mind that agreements of groups or even societies may change in time and therefore this kind of "objectivity" is a relative one.

- We have given an explanation which is *operational* in that sense that an individual itself or an independent deputy of a group or society is able to prove or at least reconstruct - for example, *by applying certain given rules* - whether a given interpretation of a representation is correct or not. In fig. 6 we have sketched how existing formal mechanisms can be used to formulate concepts and their relationships in an reconstructable way.

- The term *thing* (if useful at all) might be identified with the term *conception*. That means: Everything what an observer has "recognised as a C" (for example, by analysing its aspects) deserves to be called a "thing". This approach circumvents (and thus avoids) one of the most problematic circular definitions in the FRISCO report concerning the *terms "thing"* , *"actand"* and *"conception"* (cf. definitions E1, E20 and E15). With this interpretation, "things" are social constructs as well: they are the result of social communication and consensus achieved by a group. Such a consensus is achieved when "things" are treated in the same way or at least in an expected way (i.e. following the same rules) by the people involved. This corresponds to Stamper's "repertoire of behaviour" and helps making things "operational".

A further consequence of such an approach would be a better layering of the whole framework of FRISCO definitions: Semiotics including observers and their cognition would form *the base layer* including terms like *observer, domain, representation, conception*. Neither of these terms must occur in the now following first layer of defined terms – thus circular definitions like the mentioned ones can easily be avoided. In particular, most of the definitions E19- E23 should be (re-) moved to the base layer.

The *kernel layer* would start (as in the original report) with *things* (explained as *conceptions*) and build terms like *entity, relationship, type, state, action*, etc. on it. This works quite well with the exception of *"set*

membership" where FRISCO tries to redefine basic terms of mathematical set theory. This has to be removed (to avoid another source of circular definitions) or better to be replaced by something like "composed thing".

On a third layer, terms like *model, system, information system* etc. can be added as has been done in the original report. A list of proposed modifications of the conceptual framework (which would essentially affect chapters 3 and 4 of the report) is given in the appendix.

In our view, such a modification of the FRISCO report could remove some severe sources of dispute including flaws like circular definitions while maintaining the overall line of reasoning which we appreciate as a very important contribution to an evolving theory of the Information Systems field.

A future version of the FRISCO report revised along these lines and exhibiting a clearer, layered structure might well be used in the practice of Information Systems design since it could provide a well-founded compendium of basic concepts and a line of reasoning for professional designers. This way they can build their models on top of the FRISCO framework instead of inventing general basic concepts each time when a specific application domain has to be modelled. Such a standardisation might help the practitioners to save much work and the whole community to reduce inconsistencies and sources of misunderstanding.

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Appendix: Proposed modifications and error corrections in the FRISCO tutorial and formalisation (chapters 3 and 4)

The FRISCO authors have chosen a two-level approach for explaining concepts:

. Base level: Concepts introduced by assumptions (ch. 3.1)

. Definition level: Concepts introduced by definitions (ch. 3.2)

There are terms introduced in the base level (i.e. by assumptions) which occur again as defined terms on the upper level. This contradicts to a fundamental principle of the definition process. The base level forms a "platform" for the following definitions. All terms introduced in the base level are taken for granted and are used as a prerequisite for the following definitions. The distinction between base level and definition level must be clear and unique.

Any attempt to (re-) define terms introduced in the base level necessarily ends up in a circular definition ("petitio principii"). A necessary consequence is: Concepts to be formally defined must not be introduced earlier by informal "assumptions", or vice versa: What has been introduced by an assumption, must not be (re-)defined in the definition part. In the present version of the report, these rules are violated at the following points:

(1) *Perception/conception:* introduced in assumption [b] and [c], p. 31 and then in definitions E 19 and E20, p.48

(2) *Actor:* introduced as the originator and interpreter of conceptions on pp. 30/31 (there sometimes called "human being"), in assumption [f] on p. 31, but also in definition E 13, p.43, and again – now as a "human actor" - as "capable of performing perceiving actions, conceiving actions, transforming actions" (p. 48), and as "representer" (p. 50).

(3) *Predicator/predicated thing:* Explicitly these do occur only on the definition level (def. E2, p. 37), but they are already implicitly used (and necessary!) on the base level: "A thing is any part of ..." (def. E1, p. 36), "A

predicator *is a thing* ...” (def. E2, p. 37) is not admissible since *"is a thing"* is already a predicator!

(4) *Set membership:* In chapter 3 (def. E4, p. 38) "set membership" is defined as a FRISCO concept, but basic knowledge of (mathematical) set theory is assumed throughout the report (including definitions where "set membership" is based upon - e.g. “ ... the set of all things”, def. E1, p.36). The corresponding definition in ch. 4 (def. D4, p. 97) suggests (by identifying the notation) that the “set membership” relation defined here is identical to mathematical set membership (cf. the “usual abbreviations” in def. D4). This would, however, lead to an inadmissible definition circle. The problem can be solved by replacing "set membership" by a concept of "composition" or "aggregation", which in fact is required as a FRISCO concept. On the other hand, set membership is a (different) basic concept from mathematics which need not (and must not) be redefined.

Most of these problems can be solved by a better separation of the layers:

- Base layer: It starts with an explanation of the overall constructivist approach which has to be based on an *observer* (in the sense explained above). This (*general) observer* has to be newly introduced and to be well distinguished from the “actor” on the following definition level. The base level has to comprise *basic ontology (assumptions), semiotics, linguistics (language, predicators etc.), perceptions (if still needed) and conceptions. Set theory* is assumed to belong to the underlying basic knowledge like any other used concepts of mathematics, logic or philosophy.

- Kernel layer: The pivotal definition which links this layer to the base layer is that of *"thing"* - explained as some sort of *conception* (but not vice versa!). The kernel level basically covers the main part of chapter 3 of the FRISCO report (def's. E1 - E29), but without the *semiotics* part (section 3.4), *“per/conceptions”* and with the *“actor”* reduced to his role in def. E13 (p. 43), i.e. *not identical* with the (world) *observer* introduced in the assumptions at the beginning of chapter 3.*“Set membership”* should be replaced (and reduced to) *“composition”* or *“aggregation”* or be replaced by definitions of *"composed"* or *"aggregated things"*.

- System layer: This level covers all system- and organisation-related concepts. It contains the material of sections 3.6-3.10 of the original FRISCO report (def's. E30 - E41).