tripleC 7(2): 214-227, 2009
ISSN 1726-670X
http://www.triple-c.at

The notion of 'being informative' & the praxiological-information perspective on language

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Abstract: *After a concise introduction on the analysis of truth and meaning in philosophy of language, two notions of information are grasped by the analysis of Situation Semantics and Situation Theory. The first is that of correlation, the second that of constraint; the latter is reducible to the former. More than that, the phenomenon of "alethic nature of information" is highlighted and the notion of "being informative" is pointed out. The difference between a meaning-oriented and an informational-oriented perspective of language is marked. Messages are recognized as being the atomic constituents of the informational perspective of language; the architecture of language is shown; and a praxiological-information perspective on the study of language is outlined.*

Keywords: Correspondence, correlation, Situation Semantics, Situation Theory, tokens, types, infons, data symbols, codes, message

Acknowledgement: I am grateful to the professor J. M. Larrazabal for the invitation to discuss a preliminary draft of this paper in an open seminar at ILCLI in October 2008 and for the feedback I received in that occasion. I'm grateful to the professor F. Salto for the invitation to "The First International Meeting of Experts in Information", where I presented a preliminary draft of this paper, and for the feedback that I received after that meeting.

Situation Semantics is a theory of natural language and, following the classical subdivision of language in syntax, semantics and pragmatics, it represents a pragmatic approach to meaning. In such a sense, for Situation Semantics the minimal constituents of language are those speech acts, those performative utterances, that Austin first recognized being the alternatives to propositions as atomic constituents of language from a pragmatic point of view.

The main assumption of Situation Semantics is that people use language to talk about limited parts of the world. These limited parts of the world are called situations. As the inventor of Situation Semantics tells:

> *"Situations semantic was originally conceived as an alternative to extensional model theory and possible world semantics..." (Perry, 1999, p. 1).*

This is the pragmatic turn which Situation Semantics is about: meaning is not an interpretation of the propositions in the set true or false or in the set of possible worlds, but it is a relation between an utterance, a speaker of the utterance and the described situation of that utterance. Formally, the meaning of an expression *P* is a relation between an utterance or discourse situation *d*, a function *c* that associates the speaker to that utterance and a situation *e* described in the utterance: *d,c//P//e*.

In this first perspective Situation Semantics is just a meaning-oriented theory of natural language and it adopts the correlational view that Austin first proposed to explain language. The theory of Austin is known as correlation

theory of truth. It is a theory of correspondence, but it is alternative to the classic correspondence theory of truth which was suggested by Moore and Russel and which finds its root in Frege's foundation of arithmetic and Ideography.

The simplest formulation of the idea of correspondence applies between two heterogeneous sets, the set of truthmakers and that of truthbearers: both are in correspondence (figure 1). It is easy the comparison with the idea of number: the number eight corresponds to all the collections of eight objects. (Formally the correspondence is a bijective application, it is surjective and injective).

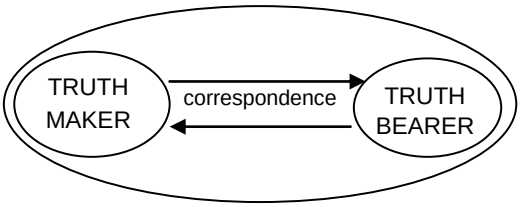

Figure 1: correspondence

The classical idea of correspondence in language is that propositions are the true bearers (Frege first defined the meaning of propositions as being the true and the false) and they correspond to the world (figure 2). Being language composed of propositions, then language corresponds to the world. In formal way: language for formal logic is a theory about an universe of objects. This thesis was developed in Wittgenstein's "Tractatus" and in Carnap's "Logical Structure of the World": language is the theory and the world is the model of that theory. This idea was again to the core of the conception of Trasky and it was improved by Kripke who enlarged the correspondence to the modal framework and to many-valued logics.

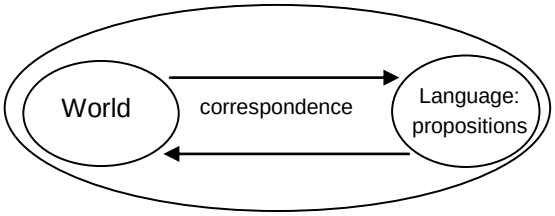

Figure 2: correspondence in language

The idea of correspondence as correlation is founded on two very important concepts of which the introduction in philosophy is due to Peirce (1838-1914). In fact Peirce thought that numbers as well as logical formulas are ontological relations between tokens and types. Moreover he thought that mathematics as well as every science did have its foundation on semiotic and that logic itself was grounded on semiotic. In fact semiotic was, in the view of Peirce, the science of inquiry. It was composed by triadic relations, that is the interpretants which relate tokens (which in turn divide in signs, symbols and icons and which correspond to the Latin division in de re, de facto and de dicto signa and which correspond to the modern division in de re, de dicto and de fact data) and types (which correspond to the modern symbols or messages).

Peirce was too much ahead for his contemporaneous and in many respects he is again too much ahead for the pragmaticians of ordinary language as well as for the intentional semantic scientists of our time. In fact, given his pragmaticism (Peirce, 1995) rather than pragmatism, as he named it to distinguish his philosophy from James' psychological pragmatism, he held for a view of the scientific inquiry by which the idea of truth, if anything at all, did have to be regarded as the end of inquiry (Misak, 1991).

But nevertheless, with the passing of time, the philosophy of Peirce attracted many researchers, above all those analytic researchers of the last century which considered philosophy as essentially analysis of language. And it was so that the time in which the pragmatism emigrated from USA to Europe arrived. In Europe J. Austin (1911-1960), (who worked in the 'intelligence' of the United Kingdom's Army as a lineout colonel during the Second World War and after became eminent professor of philosophy of ordinary language in Oxford but of which the influence was strong above all in the University of Cambridge) propounded the thesis which was a challenge to the Wittgenstein idea of correspondence: correspondence as correlation[1].

[1] It is to note that the thesis of Austin was criticized by Strawson (1950) who held for a view of language by

This thesis marked that fracture in the analytic philosophy between philosophy of language of Oxford, essentially semantic, and philosophy of ordinary language of Cambridge, of which the outcome was nothing less than the psychological, rather than philosophical, and linguistic fashion of the last fifty or sixty years, the pragmatic of natural language.

In its simplest form the idea is that, being the objects of language utterances and being the meaning of utterances "like a relation" between types and tokens, then the language is a relational entity that correlates types and tokens. The types are the truthbearers, the tokens are the truthmakers, and language is the relation or better, the correlation between them (figure 3).

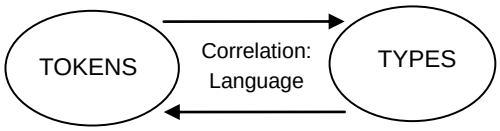

Figure 3: correlation

This primitive idea of correlation, nwhich in its first formulation was a theory of truth and meaning of language, will pass through a process of evolution that will be driven and highlighted by the birth of the concept and phenomenon of information.

1. Two notions of information

Situation semantics finds its roots in the correlational conception of truth and of language but it emancipates from a meaning-oriented perspective and it suggests an informational-oriented one.

This is the movie of Situation Semantics: it starts from utterances, the minimal constituents of "language in use". Being the objects of language utterances and being the meanings of the utterances like-relational-entities, what Situation Semantics does is a classification of these relational entities by classifying situations and types of situations (the situation tokens and the situation types) which relational entities relate and which the meaning of utterances is about.

It happens at this point that Situation Semantics transforms from a meaning-oriented perspective of language into informational-oriented one. In fact the classification suggests a first notion of information. As Seligman tells:

> *"The basic information supported by a situation determines how it is classified, i.e., how it is typed. If a situation s supports the information σ, written s ⊨σ, then it is of type [x/x ⊨σ]." (Seligman, 1990, p. 147).*

It is to note that the structural relation ⊨ between the situation s and the information σ is the formalization of the idea of correlation. We will come back in the next paragraph, devoted to Situation Theory, to stress deeper this idea of correlation.

Now is time to introduce the second notion of information nested in Situation Semantics.
In "Situation and Attitudes" of Perry & Barwise (1983), another concept was proposed as well, to give an account of meaning, which will become central in the development of language towards informational perspectives. This concept is the concept of "constraint".

The basic idea is simple: in classifying situations we observe that some types of situations involve, in such a sense "constraint", other types of situations. The classical ex. for this is: "smoke means fire". In the above ex. the constraint is of the kind of natural law. Different kinds of constraint exist in language. Perry and Barwise, in their book, identified four kinds of constraint: lawlike, conventional, linguistic, reflexive. But Situation Semantics does not intend to be exhaustive about the different kinds that could be recognized. What is interesting for Situation Semantics is that the function of these constraints is always the same: they link certain types of situations with other types.

This is the second notion of information that Situation Semantics suggests: information flows by constraints. It is the linguistic version

which the notion of correspondence must be expelled rather than purified as Austin instead believed (Austin, 1950, 1961). Nevertheless the thesis of Austin was accepted from the most part of pramaticians and, what is interesting for us, that notion of correspondence as correlational theory of truth was accepted from the linguistic side of the correlational paradigm of information and, among others, it was accepted by Barwise and Perry (Penco & Sbisa', 1998).

of the idea of flow of information that first Dretske (1981) theorized being "the psycho-epistemological process" of cognition in his first book: "Knowledge and Flow of Information".

The central role played by constraints in developing the study of information is something that the inventor of Situations Semantic, J. Perry, emphasizes. As he tells:

> *"the concept of constraint, developed in S&A as an adjunct to the relational theory of meaning, has become central to the development of situations semantic as a general account of informational and intentional content (Barwise 1993, Israel and Perry 1990 and 1991, Perry 1993)" (Perry, 1999, p. 2).*

The idea of constraint is not that of relation between two heterogeneous sets (which is the idea of correlation): it is a relation between two or more entities of the same set, the set of types.

Constraints are linkages among types of situations. In "Smoke means fire", all the situation types in which there is smoke are linked to all the situation types in which there is fire (figure 4). It is a lawlike after all!

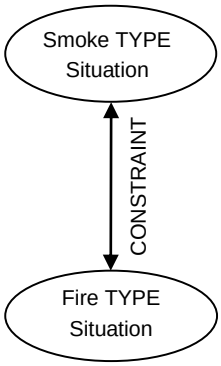

Figure 4: constraint

But although the emphasis on the notion of constraint, it is to note that the concept of constraint is derivable from the notion of correlation. In fact we have seen that the idea of correlation is the idea of relation between two heterogeneous sets, between tokens and types. Now in order the notion of constraint holds as functions between types, the correlation has to connect the types with the tokens (figure 5).

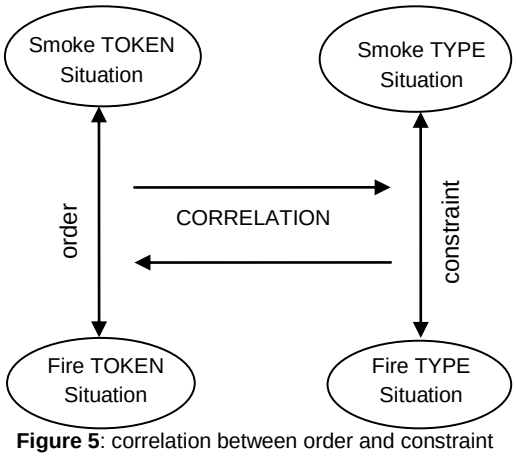

Figure 5: correlation between order and constraint

So that as a result the notion of correlation is basic and it connects the function constraint between situation types to the function order between situation tokens. It is a transformation in the set of tokens and in the set of types that preserves the relation. (The mathematical formalization of this definition is the concept of bisimulation.). Constraints are relations among types. Order is the relation among tokens. Correlation is a structural relation between order and constraint. The function constraint simply cannot hold if the correlation between that function and the function order does not hold.

Correlation is a structural relation between two relations. It is completely stressed in this relation between relational differences from the size of tokens (or data or indexical) and relational unities from the size of types (or symbols). Constraints are the linkages between types and these linkages are isomorphic to the order of reality. This is perfectly consistent with what Israel and Perry tell us about information:

> *"What underlies the phenomenon of information is the fact that reality is lawlike;" (Israel & Perry, 1990, p. 3).*

In a metaphysical perspective sympathetic to Armstrong's realism (Armstrong, 1983) one can think of tokens and types as representing respectively particulars and universals. In this case the linkages between universals have the form of laws of nature and the linkages between particulars have the form of causal

relations. The correlation, in this case, relates laws of nature with the causality of reality.

Now is time to go deeper in the idea of correlation as it has been formalized by Situation Theory.

2. Situation Theory & the notion of 'being informative'

Situation Theory is the logico-mathematical formalism, developed by Situation Semantics, to classify situations.

As Devlin (2001) has shown, a classification is an ontological structure $\Delta = (A, \Sigma, \models)$ (figure 6):

- A is the set of objects or tokens;
- Σ is the set of types or properties by which tokens are classified;
- ⊨ is a binary relation between tokens and types;

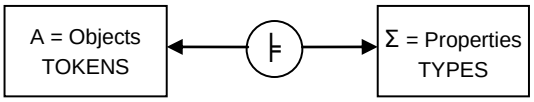

Figure 6: ontological structure

The above figure shows the relation between two heterogeneous sets: tokens and types. It is an ontological structure.

This is the big turn which Situation Theory is about: we are adopting an ontological perspective rather than a semantic one. From the ontological perspective makes sense to divide the reality in tokens and types and to represent ontologically the relation between tokens and types that language embodies. The hypothesis is that language is composed of relations between tokens and types or simply "relations between" and more simply "relations". Language becomes ontology, it is made of entities and these entities are "relations". The "relations" relate two heterogeneous sets: one made of objects of which the reality is composed and the other made of properties by which the objects of reality are organized. We are abstracting and taking the relations between them as the entities that compose reality. They are informational objects.

This is the metaphysical hypothesis: reality is composed of informational entities[2]. Even if the metaphysical perspective which the correlational paradigm supports has not been explicated, when Dretske (1981) writes in the preface of his "Knowledge and Flow of Information": *"At the beginning there was information. The world came later."*; Devlin (1991) writes in his "Logic and Information" that information is in the Information Age what iron was in the Iron Age, that is the structure of the matter; and Perry (1999) holds for Situation Semantics the thesis that: *"Basic properties and relations are taken to be real objects, uniformities across situations and objects, not bits of language, ideas, sets of n. tuples or functions."*; it is pacific that the surrounding metaphysical hypothesis, which projects as a shadow from that paradigm, is the monist and materialist realism. It is, in fact, a realist metaphysic updated to the information age that which the correlational paradigm supports.

But not only that, in fact the informational objects show the same nature of the notion of correlation (figure 7): they are structural relations between two relations, that of difference (tokens) and that of unity (types). Information is completely stressed in the relation between relational differences from

[2] Recently L. Floridi (2003) introduced in philosophy of information the metaphysical hypothesis that reality is composed of informational relations. The hypothesis of Floridi (ISR) is that reality is composed of informational relations, that the objects that these structural relations relate are unknowable although there are and that those objects are themselves relations. But, despite the name, Floridi's hypothesis is an informational idealism rather than an informational realism. As L. Floridi tells, the relational entities or the informational objects are relational differences and we cannot know the data itself but, at most, we can know that data are relata, because, Floridi thinks, the relation comes before the relata.

The metaphysical hypothesis that Situation Theory inspires is really different from that of Floridi: reality is composed of informational relations, as for Floridi, but the "relations" relate two heterogeneous sets: one made of objects which is composed the reality and the other made of properties by which the objects of reality are organized. These objects, these ontological relations are knowable. This is the hypothesis of a genuine realism. The difference in the two types of metaphysics is basic: they differentiate in the objects that constitute the reality. The informational objects for Floridi are semantic objects or structures; the infons of Situation Theory are ontological entities or structures.

the size of tokens (or data) and relational unities from the size of types (or symbols).

Figure 7: infon

The informational objects are that infons which are the objects of Situation Theory and that Devlin (1991) exploited in his book "Logic and Information". In fact Situation Theory is logic.

The set of tokens consists of objects called individuals and denoted by a, b, c…

The set of types consists of properties or relations: P, Q, R...

Each property or relation P has a fixed number of individuals that are appropriate to P.

There are different properties that can be classified, these are something which philosophers are familiar, they remind something as "categories":

- Individuals a, b, c, ...
- Relations P, Q, R, ...
- Spatial locations l, l', l'', ...
- Temporal locations t, t', t'', ...
- Situations s, s', s'', ...
- Truth values or polarities 1, 0
- Space-time basic relations overlap @,…

Each property $\langle\langle P,a_1,...,a_n,t,l,...\rangle\rangle$ with polarity 1 or 0 is an infon: $\langle\langle P,a_1,...,a_n,t,l,1\rangle\rangle$ or $\langle\langle P,a_1,...,a_n,t,l,0\rangle\rangle$. Properties have not a true value (they are not true or false, that is they are not truthbearers), but they have a true maker which is called the polarity of the infon (i=1 or 0). An infon with polarity 1 represents a fact. In formal way, the infon is supported by the situation: s ⊨ information. But when an infon is not supported by the situation, that is it has polarity 0, than simply the (cor)relation does not hold.

In such a sense 'infons are or are not' and, in such a sense, they have not a true value (true or false) so that they, roughly speaking, have not a semantic. But nevertheless they have a true maker, the polarity. In such a sense, the polarity of an infon is called improperly "the true value *i"* of the infon and it gives to infons, which are ontological entities (they are ontological relations), a 'semantic nature' too. It is for this genetic move of Situation Theory that I suggest the thesis that 'semantic' (if any) is overdetermined by ontology (or ontology overdetermines semantic). Moreover, I derive from that thesis the other thesis that, given that an infon with polarity 1 represents a fact, information is a fact: "the fact that it is rather than it is not". This phenomenon, the "being or not being of information", is what I call "the alethic nature of information". The idea at the base of this phenomenon that I name "the alethic nature of information" is nothing less than "the concept of information": "what information is". Information is just a fact, the most wonderful fact, "the fact that it is and not that it is not", and it coincides with being. It is the ultimate level at which being is manifesting: "the being informative[3]".

The alethic nature of information is at the core of all the theories of truth, those of concordance and those of coherence. In fact all the informational theories of truth are the answers to the skeptical doubt that doubts this fact: "that information is rather than it is not". So that all the theories of truth concerning information will find their starting point in the alethic nature of it. It is the nutshell for every theory of truth. Nevertheless it will not be my task to formulate an informational theory of truth because the theories of truth find their place in the representationalist, semantic and pragmatic theories of language and information. Instead of that, I will offer an alternative to those representationalist theories. In fact I will outline an operative and action-oriented theory of information and an operative and action-oriented view of language.

[3] Recently P. Allo (2005) has introduced the formal approach to information as "being informative". P. Allo (2007) defines "being informative" as "the assessment that the information that p as non-zero content". L. Floridi (2006) defines it as one of three way (the other two being: "being informed" and "becoming informed") in which an agent menages with information: "how p may be informative for a". It is evident that the " being informative" of P. Allo and L. Floridi is really different from the "being informative " which I refer, because for Allo and Floridi it is a semantic object while for me it is an ontological entity.

3. The sharping difference between the meaning-oriented and the informational-oriented perspective of language

There was a time in which the study of language was carried out by the paradigm of analysis. At that time propositions were the atomic constituents of the semantic theories of language and utterances were the atomic constituents of the pragmatic theories of language. In both cases the focus of the theories of language was the analysis of meaning.

Today a new nature of the language is disclosing at the horizon. It is the informational nature of language.

It is not so easy to picture the gap between the meaning-oriented and the informational-oriented perspective of language. There is a sense in which there is no difference in between because both share the same correlational view of language (even if the informational perspective takes not the correlation as truth) and, in what follows, we will focus the attention on the evolution of the notion of correlation in that of information. Nevertheless, there is another sense in which the two perspectives are really different; in fact there is a jump between them.

They are really different because for a meaning-oriented perspective of language, the speaker and the hearer as well as the writer and reader communicate by language that, in such a sense, is a code to communicate meaningful objects. It does not makes sense to distinguish between the process of communication speaker/hearer and that writer/reader since in both cases the communication is achieved by language and what is communicated are meaningful objects. But from an informational-oriented point of view, it makes sense to distinguish between the process of communication of speaker/hearer and that of writer/hearer. In fact, although what is communicated is communicated by language and what is communicated is understandable, the informational objects involved in these two forms of linguistic communications have two different physical implementations. In the first case the informational objects are of the type of data sounds (phonetics), in the second case the informational objects can be, for ex., books, newspapers, artistic products and so forth.

In fact, differently from meaning, information must have a physical implementation (Laundauer, 1996). There is a slogan for this:

> *"no information without physical implementation" (Floridi, 2003a, 2005).*

We must gain a level to which it makes sense to speak about informational objects without getting lost in the particularity of the physical implementations (books, sounds, artistic products, or whatever....). We have to generalize from the particular physical implementations of the informational linguistic objects and to look to their architectures. This move is in accordance with what Wiener tells us about information:

> *"Information is information, not matter or energy. No materialism which does not admit this can survive at the present day" (Wiener, 1948, p. 155).*

4. The atomic constituents of language

All the linguistic informational objects have a physical implementation. This is our starting point. But the informational objects have not only a physical implementation. In fact they have an architecture too. Now my task is to show which are the candidates to play the rule of atomic constituents of the informational-oriented language and to outline their architecture.

Messages are our candidates. Taking messages as constituents of language is not a very orthodox move in linguistics, but certainly messages have more than fifty years of well established scientific status. In fact they have a quantitative measure[4] .

[4] The basic idea of "The mathematical theory of communication" and of those theory of Semantic Information in the paradigm of Carnap & Bar-Hillel (1953) and Floridi (2004b), that paradigm that in according with van Benthem (2005) we know as "range paradigm", is the measurement of the quantity of information or entropy H of a massage with the logarithm N of the number of equiprobable message:

log(*N*) = bit per Msg.

If the occurring messages are equiprobables, the quantity of information of every message is given from the

But we do not want only a quantitative measure; we are searching for the architecture that all the messages share. This architecture is our guarantee of the functionality of messages to play the rule of atomic constituents of language.

The architecture of message is composed of three alphabets (figure 8):

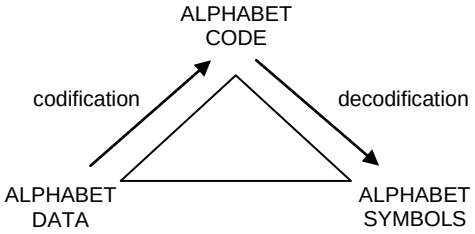

Figure 8: the architecture of message

- INFINITE ALPHABET DATA (IAD): A datum is a difference: the shortest and simplest datum is the bit, binary unit of information, made of [1,0]. You can look easy if I write 0 and 1 as $x \neq y$ that it is a difference. It is a relation of difference (Floridi's Diaphoric Definition of Data (DDD), 2003a, 2005) or it can be defined as "a sign that stay for something else". The infinite set of data is called the Alphabet Data (AD).
- FINITE ALPHABET CODE (FAC): The Bit (1,0) as Code is the finite and simplest binary and digital Alphabet Code (AC), made of data, of information. The Code is derived from data: from the bit units [1,0] to the Bit Code (1,0).
- INFINITE ALPHABET SYMBOLS (IAS): With this finite and digital Alphabet Code (AC) that we call Bit (1, 0) we can produce all the infinite symbols and strings of symbols of the Alphabet Symbols (AS). Symbols (or messages) "are that something else for which data stay".

By the Alphabet Code data are codified in symbols and symbols are decodified in data. The Code (AC) is a bijective function from AD to AS that is injective and surjective:

a) injective: $\forall x \, \forall n \, (f(x) = f(n) \rightarrow x=n;$
b) surjective: $\forall m \in AS, \quad \exists n \in AD, \quad f(n)=m;$

Practically the Alphabet Code becomes a free monoid AC* (Alphabet Code star) that is the set of all the strings that we can make with AC. Where $x \in$ AS means that a string of the Alphabet Code star AC* belongs to the Alphabet Symbols (AS). The Alphabet Code is a function from the set of data and structures of data to the set of symbols and strings of symbols: $AC^* \leftrightarrow AS$. In computer science jargon it is called Interface.

At this point, from the architecture of message we directlly derive the principle of information that I name the Data Operational Principle (DOP) which completely distinguishes our approach from the semantics and pragmatics approaches which take as principle of information the Data Representational Principle (DPR) (Floridi 2005, Allo 2007). The DOP in its negative formulation tells to us that there is no information without data operation and, in its positive formulation, asserts that information is made by the codification and decodification operations.

5. Messages, language and information

Now my task is to go deeper in the understanding of messages and to show that the architecture of messages, in respect to the architecture of language, is of the type micro/macro. That is in each message is operative the whole architecture of language.

Hofstadter (1979, chap 5) suggests a good perspective for understanding "what a message is". He analyzes the message in three levels: picture message, inside message and outside message; and he makes explicit what this means by comparing

probability of occurring of that message multiplied by the logarithm of such a probability:

$H = -p_1 \log p_1$

The function that defines the quantity of information generated from source is defined as the natural logarithm of the sum of messages:

$H = \log N_1 + \log N_2 + \ldots$ bit per Msg

If the occurring messages are not equiprobables, like in natural language, the function that defines the quantity of information generated from the source is the sum of probability p_1, p_2, p_3,... of the occurring messages multiplied for the logarithm of such probability:

$H = -(p_1 \log p_1 + p_2 \log p_2 + \ldots)$ bit per Msg;

the picture message with a record, the inside message with the song contained in the record and the outside message with the record player (figure 9).

After having divided the message into these three levels, Hofstadter starts to search for "what is" the meaning of the message. In fact, what he says is that knowing that a message is a picture-message "means only" ("is equivalent to") that we need a decodification of it, knowing that a message is an outside-message "means only" that we can build a mechanism of decodification of it and knowing the meaning of the inside-message "means only" that we have a faithful codification for it (figure 9).

After having distributed the meaning of message in this three levels, and having explained the meaning of message like a triadic relation among these three levels, Hofstadter takes the step of asking, now, "where is" the meaning of the message and he makes explicit what this means by comparing the record with hardware, the song with software and the play recorder with interface (figure 9).

But this explanation of Hofstadter, being only computational, is only partial. Now I will correct it using an example coming again from music. It is a common knowledge among musicians that each musician, listening a song in the air, must be able to write that song on a pentagram until the last pause, the last note, with the time of the composition, the key and the style, the linkages and all. What the musician is able to do is a perfect copy of the song. He simply associates to particular data sounds correspondent entities of that type. He knows the language of music and can codify the song in a faithful 'codification'. This artifact, the music paper, can be read by every other musician who, knowing the code, that is the language of music, can reproduce the song. In such a sense it is nice to think of the first musician as a codificator of the song on an hardware, that is the music paper, and the second musician as a DVD player who can decodify that hardware in a software reproducing faithfully the song. What is required is that the software is compatible with the hardware. Otherwise it is well known that the criterion of computation is the compatibility between hardware and software.

But not only that. In fact now we try of think of "the song in the air" as the source of information, of the first musician as a sender who codify the song, by the code language of music, in a music paper and of the second musician as the receiver who, knowing the code of music, can read (can decode) the music paper and can reproduce the song in a faithful artistic performance (rather than representation). What is required is that the source is connected with the destination by the channel or code or language of music[5]. Otherwise it is well known that the criterion of communication is the connection between source and destination.

At this point the architecture of the message is complete and it is computational and communicational. The messages show an architecture hardware-software and source-destination. The interface, from the side of computation, has to be compatible and, from the side of communication, has to be connected.

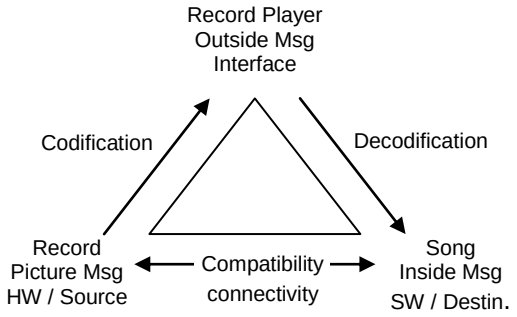

Figure 9: the architecture of the message

[5] In the modern experimental music, which replaces the time of the composition by the time of a clock and the harmony by the noise, the music code (or language) is replaced by the type recorder, simply! But there is to say that this kind of experimentation in music, if from one side, offers a nice understanding of that process by which the noise transforms in sound, from the other side, lacks completely that sense of mathematico-geometrical beauty which is intrinsic of the harmony and it regresses the musical composition not only to the pre-Hilbertian space, not only to the pre-Euclidean geometry, but even to the pre-Pythagorean classical quadrivium (geometry, arithmetic, astronomy and music).

Now it is time to answer to the questions of Hofstadter[6]: "What and where the meaning of the message is?"

Naturally there is not a level of meaning, call it the semantic level. Messages have architecture hardware-software/source-destination, but they do not have semantic. The understanding of messages is exhausted in a process, that is the flow of information: codification and decodification. Simply the meaning disappears: information is information, neither meaning nor representation. Any philosophy which does not admit this can not survive at the present day.

In fact the disappearing of meaning is not something which I have decided. Reality, from which language flows, decides. And reality is evolving, it is in constant transformation. It has became too much complex for being accounted by meaning. The next generations will not feel like good with something as meaning (this happens already to me, after all I'm the native philosopher of the era of information!). Meaning will become an old myth of an old world.

Now we have to see in which way messages, regarded as the atomic constituents of language, are transforming the language.

Messages are hybrids between spoken and written language. They are the last product of the evolution of language. The evolution of the language is the evolution of its objects: from propositions to speech acts to messages.

Given that the hypothesis is that messages are the atomic constituents of language, we directly derive from that hypothesis the thesis that language is an interface or a code (figure 10) between an hardware and the way in which that hardware is organized by a software. Naturally hardware and software have to be compatible. But not only that, in fact language is too an interface or a code (figure 10) between a source and the way in which the source comes in contact with the destination. Naturally source and destination have to be connected.

The hypothesis is that the hardware and the source of natural language is the reality itself and the software and destination of natural language is the way in which that hardware is organized by an intelligence and that source comes in contact with that intelligence.

Language, from the side of computation, is an interface between reality and the program (in the past the programs were called laws) that can run on that reality and, from the side of communication, is an interface between reality and the agents which are the destination of that (figure 10).

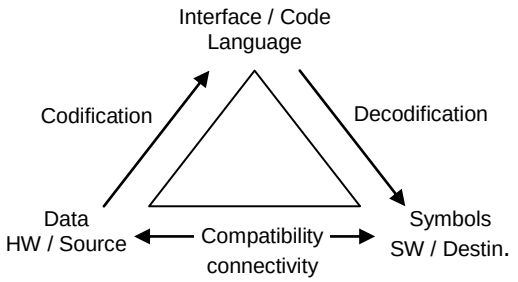

Figure 10: the architecture of language

At this point there is to remark that this hardware-software and source-destination architecture is the evolution of the notion of correlation which I have outlined in the analysis of Situation Theory. It is useful to remark too that now the set of tokens and the set of types of Situation Theory become respectively data and symbols and that the infons became codes. Language becomes an interface that correlates two heterogeneous sets, one made of data that compose the reality (that can be natural and made of carbon as well as artificial and made of silicon or whatever) and the other made of symbols by which the reality is organized by human beings.

So we have to understand that the entities (the messages) which compose the theory of language are not objects and set of objects and therefore the theory of language does not recognize any compositionality and contestuality. In fact the messages are interfaces between structures of data and

[6] Hofstadter makes an ulterior step since he, stressing the question if an extraterrestrial form of intelligence that finds the record in a faraway galaxy of the universe can or cannot decode the record, characterizes the intelligence as the capacity of discovering interfaces (or codes) to decode information.

strings of symbols and the criteria of the theory of language are the connectivity and compatibility between them.

The language looks like an architecture: micro-macro architecture. The micro configurations of language are messages. The macro configuration is the language itself. In fact the feature of language is 'being informative'.

6. The praxiological information perspective on language

Although the process of transformation of language was born in pragmatic field (and we have followed this process), the evolution of language makes a challenge to the idea of philosophy of language as the study of syntax or the formal study of language, as the study of semantic or the study of meaning of language and as the study of pragmatic or the study of language in use or as the agentive view of language.

In fact if language is an interface or a code which is the producer and the product of the informational operations of codification and decodification and if it is an interface or code which is compatible and connected between reality and the way in which reality is organized by human beings, its study can be approached by an informational perspective. Actually codification and decodification are the formal rules of an informational operative syntax, and connectivity and compatibility are the informational criteria of communication and computation. They are not criteria for semantics and pragmatics.

I usually name praxiological information that philosophical perspective which takes the rules of codification and decodification as operative and syntactic rules of language and which takes the compatibility and the connectivity as criteria of the study of language.

Praxiological information is a pactical, action-oriented and operative notion of information. As I conceive that, it has to be understood as a term which consists of the union of the term 'praxis', which in philosophy designs the practical activity as different from the theoretical activity, and the term logical, that in this case refers to the theory which takes in account the implementation of informational phenomena, dynamics and technologies.

Certainly language is one of the most wonderful phenomena (in the philosophical sense of being manifest as contrary to being hidden) by which information manifests its dynamics and its constitutive operativity and technique. And about the relation between the technique, language and technology there is again a lot to write. It will be on that relation that we will tell the stories of tomorrow.

This scenario requires a change of mind about the idea of language.

The classic view of language as natural language is that it is used by human beings who are natural agents and therefore it receives its naturalness from the users. But this view takes meaning, and therefore language, as a human resource and it is contrary to our hypothesis: language is an interface or code; it receives its nature from reality which is its hardware and source as well as by the agents which are the resource and organizers of the software of that hardware. Language is the product and the producer of the interaction between agents and reality. In fact it is an emergent and complex phenomenon: the being informative.

Reality could be natural or virtual. In both cases it is physical and material and language will be a physical a material product and process. But not only that. Natural languages run on natural supports as well on artificial. In fact it is not language that is natural or artificial, but the hardware.

The agents could be natural or artificial and just what kind of language they will be able to speak depends by the sensory system and the memory they are equipped with. What distinguishes the agents in their ability to be or not linguistic agents is a matter of complexity.

Plants certainly do not show any form of language comparable with human language even if they manifest computational and communicative abilities.

Animals can employ communicative and computational activities of a higher complexity than that of the plants. At some degree of complexity of the animal kind they show attention and learning and therefore some forms of linguistic behavior.

For a lot of time on this Earth there was silence and noise until when, with the evolution from the Homo Faber to the Homo Sapiens, who is equipped with a sensory system able to extract from the environment the relevant information and with a memory which is effective in learning, emerged something as the human language.

The specific criteria for human language are relevance and effectiveness. Relevance and effectiveness are respectively the human specific criteria of communication and computation and they are a speciae specificus subset of the general servomechanic criteria of connectivity and compatibility.

The servomechanisms or the artificial agents are not able to show any linguistic behavior similar to the human language because, even if they are computational and communicational agents and even if the criteria for their language are connectivity and compatibility, the connectivity and compatibility of their languages is of a degree of complexity very law and general.

The human language is specific of the behavior of the human specie. This behavior is of a level of complexity so high that the criteria of connectivity and compatibility transforms in relevance and effectiveness and then the phenomena of attention and learning emerge. With attention and learning finally the human linguistic behavior emerges.

But it is not language which is natural or artificial but the agents. Language is informative. It is the human specifie specificus phenomenon of the being informative.

There is another view, closely linked to the classical one, which considers language as natural language. It is the view that language is natural because it represents the characteristics of life: it is born, it develops and it dies. More than that, languages shows the same process underlying life, the process of evolution.

This is a view that I like, but it requires a change of mind about the concept of life in philosophy of information. This is the task for another work. For the present attempt it is just to note that if life is an informational process (which is the hypothesis of many thinkers), it means that information flows by life and that life itself is a channel by which information flows from reality.

Just this architecture forces to reconsider the boundaries between alive and dead. If life flows by channels or is itself a channel, call it channel of information, alive “means only” (is equivalent to) on-channel or on-line and dead “means only” off-line.

Focusing on language, it does not make sense to speak of “natural language” and distinguishing “natural languages” in dead and alive languages because the boundaries between them disappear; only on-line languages, the languages of which we know the code, and off-line languages, the languages of which we do not know the code, exist.

The enterprise that cares of discovering of codes is cryptanalysis. It is one of the most fascinating and essential future of intelligence. Regarding language, it is an archeological cryptanalysis.

A beautiful example of archeological cryptanalysis is the story of the decodification of the hieroglyphics. That decodification was achieved when a young diplomatic, Jean-Francois Champollion, compared the structure of Greek with the structure of Hieroglyphic (sacred Egyptian language) and the structure of Demotic (common Egyptian language) in an archaeological discovery known as the Rosetta's stone. On this stone was codified the translation of a law of the Greek empire in the three institutionalized languages of the empire. The young diplomatic noted that the position of the names of Gods in the structure of the Greek message, in the structure of the Hieroglyphic message and in that of Demotic message was the same and that in general the order of the symbols in the three structures was the same. By the comparative analysis of the structure of Greek and that of Hieroglyphic he made a generalization and claimed with certainty the hypothesis that the distribution (the order) of hieroglyphic symbols was an image of the phonetic data, as in Greek and in all languages the symbols are images of phonetic data.

Once this hypothesis was made the game of decoding the alphabet code of hieroglyphic was a cinch. In fact, taking in consideration the architecture of messages (figure 9 and 10)

it is easy to note that in the alphabet code there is the codification of data in symbols and vice versa. So that an Alphabet Code can become an Alphabet Data for another Code and so on and so forth. This is the infinite process of information (figure 11).

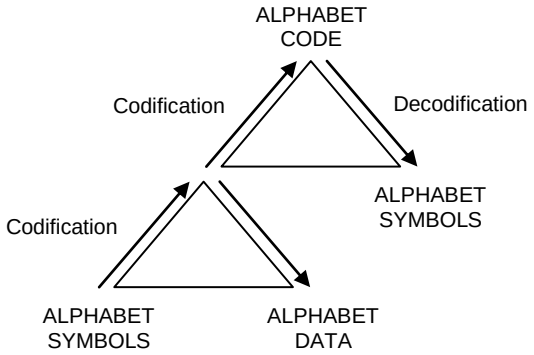

Figure 11: The architecture of infinite process of information

In the case of the decodification of hieroglyphics, the primary code was the Egyptian code. When it was realized that in the Rosetta's stone there was the translation of the Egyptian in hieroglyphic, then the Egyptian became data for the second code that is the hieroglyphic hidden code. At that point it was only a question of time and in fact, by further and further comparisons between the data of the Egyptian and the symbols of hieroglyphic, the alphabet code of hieroglyphic was completely decodified. It is a code and like all the codes it is not semantically committed but by that alphabet it is possible to decode all the Egyptian linguistic artifacts. From that time hieroglyphic became a known (interface) code, as every language is, that give to us an access to (an old) reality.

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