

# Sign Processes and the Sheets of Semeiosis (S<sub>s</sub>)

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## Abstract

*After positioning our work in the field of information systems science, we introduce the basic Peircean semiotic terms pertinent to sign analysis (sign aspects) and those pertinent to interpretation processes (interpretant aspects). Next we will match the sign aspects with the interpretant aspects in order to be able to derive our semiotic process model of cognitive activity. In order to do this we introduce the concepts 'semiotic sheet' and 'dynamical interpretant response'. The semiotic sheet enables us to look at information processes not just as sequences of sign types, but as consisting of sign interactions that are analyzable by inspecting the way in which the sign aspects are processed. The dynamical interpretant response is introduced as a place holder for the sign types regarded as the relatively stable yields (intermediate products) of informational processes; ready for further processing either on the same sheet or on a different sheet. We see a close connection with viewpoint approaches as advocated by [11], [12], [13]. For a first exploration of the way in which the model may be put to use see [10].*

## 1. Introduction

The results of a major European attempt to build a conceptual framework for information systems along semiotic lines are laid down in the FRISCO report. The framework is intended not only to cover computerized information sub-systems, but also to be applicable to information systems in the broader sense. Such as 'information systems for companies, government departments, other organizations, and communities of people' [1] p.1.

The authors of the FRISCO report relied on Morris' behavioristic interpretation of Peirce<sup>1</sup> [6] as their primary source for semiotics and only secondary on Peirce's Collected Papers [7]. This is perfectly understandable for anyone with some knowledge of Peirce's way of working, the fragmentary manner in which his work is made available to the general public and the subsequent reception of the fruit of his labor. With regard to semiotics this can be exemplified by pointing out that Peirce on regular base experimented with new terms; that many of the finer details still have to be searched for in the microfilm manuscripts; and that, as a consequence, interpreters did not reach consensus at all. But, although it is understandable, it goes at a price since Morris' definition of a sign is much more restrictive than Peirce's. As a result Morris' analysis of signs is less fine grained and not as tightly intertwined with logic and ontology.

In general terms the difference between Peirce and Morris can be stated thus: where Peirce holds that reality itself can be regarded as an evolving information system that is to be analyzed as the interplay of sign processes, Morris confines sign processes to being a sub class of all possible mediative processes. For Morris, in contradistinction to Peirce, sign processes:

- (1) do not include anything mental (stimulus, response and conditioning through reinforcement will do);
- (2) do not include processes in inorganic nature;
- (3) do not cover all forms of behavior;
- (4) do not always generate new signs [6] (pp.287-291).<sup>2</sup>

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<sup>1</sup> Other groups of people in information science are also taking recourse to Peircean semiotics. But they too work with an incomplete version and share as a consequence the characteristic of the FRISCO project that is pointed at in this section.

<sup>2</sup> For Peirce only death or total annihilation puts an end to semeiosis, not so for Morris.

Since the interest of the FRISCO report, as it is a compromise of the interests of the individual members, is connected with Peirce's triadic definition of a sign and the distinction Morris made between the syntactic, the semantic and the pragmatic levels of communication (extended by Stamper into a 6 layered semiotic ladder) and not in the behavioristic underpinnings, the risk of some kind of materialistic reductionism is reduced as is shown by the frequent occurrence of the term 'conception'. But the remaining restrictions on what counts as a sign process do have consequences. For our present purposes the most important of these is the severing of information systems from organizational systems of whatever kind by regarding an information system as a sub-system that delivers services to another type of system (cf. [1] p.15) which governs the interplay of presumably disconnected processes of semeiosis. In this manner the study of the representational side of information processes tends to get severed from the interactional or social side.

For fairness sake we must point to the fact that it is not the Morris flavored background of the semiotical impetus in information sciences that in isolation accounts for the way in which semiotics entered the field. Information systems science started as a consequence of information technology and the practitioners tended to restrict themselves to what they regarded as their core business, i.e. computer based information systems. In this setting a restricted approach is a natural choice. By now however the interdependencies between and fusion of IT-based information systems and man conceived as information system, in combination with the level of development of the field, calls for a shift in emphasis from the material object to the formal object in the definition of the science in order to be able to develop theories with a more encompassing span. But then the broad Peircean conceptions of signs and sign processes are of more service than the narrowed down version of Morris.

In this paper we will tie our Peirce based process model of semeiosis to his sign theory. We will start with an exposition of the semiotical terms we use; then we will develop a model of his theory of interpretants from some sign definitions he provided; next we will match the interpretants with the sign aspects Peirce identified; finally we will introduce the concept of a semiotic sheet, which we derived from the sheet of assertion he introduced in logical theory, as a stepping stone to the introduction of the process model.

As a cautionary remark: due to the explorative character of Peirce's work, the complex nature of his

philosophical system and the space available, we are not able to justify our interpretational choices, but we hope that the tightness of our model will compensate for that. For completeness sake we mention that the process interpretation of Peirce's classification of signs, first proposed in [2] and most recently in [8], is due to Farkas and Sarbo. The embedding of their model in the Peircean theory of interpretants, as well as the introduction of the Semiotic Sheet is due to Van Breemen.

## 2. Sign aspects and Interpretant aspects

In the Logic Notebook (LN)<sup>3</sup> Ch. S. Peirce comments on the way in which he used to conceive the relation between sign and interpretant:

I have thought of the Object of a Sign as that which determines the sign; and this is well thought. I have thought of the interpretant as that which the sign determines or might determine or should determine; but this is not so well. For my idea of determination is dyadic while the idea of the relation of the interpretant to the sign is triadic. (MS 339, 276r, April 2, 1906)

We do not take this quote as a remark only triggered by the dyadic character of determination, but also by the questions he faced while working out the different interpretant aspects, that is to say by work on signs as they are involved in processes of semeiosis. Looked at from this perspective the remark may indicate a progress in Peirce's semiotical work from an analysis of signs for classificatory purposes to an analysis of signs in the process of their interpretation.

Peirce's research gradually enlarged its scope from signs to genuine processes of semeiosis but the work was not completed before his death. The terms coined for the first task we will call *sign aspects*. The nine well known sign aspects distinguished are: qualisign, sinsign, legisign, icon, index, symbol, rheme, dicent, argument.<sup>4</sup> The terms coined for the second task we will call *interpretant aspects*.<sup>5</sup> The interpretant aspects come in two classifications that are not related to each other by

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<sup>3</sup> We will refer to LN through its manuscript number according to the Robin catalog, MS 339, followed by page number, recto or verso, and date.

<sup>4</sup> Peirce coined lots of alternative terms and expanded the number of distinctions made in what is known as the Welby classification. We will pass that in silence since it is of no consequence for this paper.

<sup>5</sup> With the interpretant aspects the situation equals that of the sign aspects, but in a far more open ended way.

Peirce himself. It concerns the triad *immediate, dynamical and normal interpretant* (IDN) on the one hand and the triad *emotional, energetic and logical interpretant* (EEL) on the other.

It will cause little wonder that in the secondary literature different ways to combine both classifications of interpretant aspects have been proposed and discussed with a recall to the sources (for instance, Fitzgerald, Almeder, Lator, Zeman, Short, Van Driel, Bergman). Since this is not the place to engage in intellectual history, here we just state what we are going to work with in the next paragraphs:

- From Van Driel [3] we take the arrangement of terms in which the IDN-interpretants form a sub-division of the logical interpretant of the EEL triad.
- With Bergman [5] we share the communicative approach in which it is assumed that human beings cannot communicate, unless they have a common fund of knowledge. To this end Peirce coined, according to Bergman, the term *commens*, or the common mind, that has to be assumed in order to account for communication (cf. [5]).

In order to keep in line with the Existential Graphs where the concept of a Sheet of Assertion ( $S_A$ ) fulfills the role of accounting for what is commonly assumed, we introduce the semiotic sheet ( $S_S$ ) as an analogue in the Speculative Grammar of the  $S_A$  used in the Critic, or logic in the stricter sense. Like the  $S_A$  the  $S_S$  itself is a sign.

This paper is based on the assumption that it only makes sense to distinguish different aspects of signs, if those aspects make a difference, that is, if they play a distinctive role in the process of their interpretation. Now, let us assume that the function of the utterance of a sign is the generation of a meaningful response, then with the help of a modification of Langefors' infological equation [4] it is possible to state in general terms what we are aiming at. We may write as an equation for the process of semeiosis:

$$MR = i(S(\text{asp}), S_S(G, K), t)$$

where MR is the meaningful response obtained by the interpretation process  $i$  from the sign aspects (asp) of the Sign (S) and the goals (G) and the knowledge (K) written in the semiotic sheet ( $S_S$ ) at the moment of actual interpretation (t). Against this background the work we offer here is a model for process  $i$ . Notice that the use of  $S(\text{asp})$  instead of S is only technical. We assume that all

of them are generated in the course of triadic interpretation.

### 3. Sign, Sign type and sign interpretation

At several places Peirce offers sign definitions and at many places, in a variety of contexts he presents his thought on semiotics. We will use fragments from different dates in our attempt to construct a diagram for his thought on signs. A good start is provided by his 1902 definition:

A *Sign*, or *Representamen*, is a First which stands in such a genuine triadic relation to a Second, called its *Object*, as to be capable of determining a Third, called its *Interpretant*, to assume the same triadic relation to its Object in which it stands itself to the same Object [...]. (CP 2.274)<sup>6</sup>

A diagram of this definition is provided in fig. 1 for several instances of a sign that realizes its possibility to determine an interpretant. Each instance of  $\text{int}/S_i$  ( $1 \leq i \leq n$ ) represents a sign as an interpretant-that-became-a-sign by actualizing its relational capability  $I_i$ ; and that, as a consequence, stands in a relation  $R_{i+1}$  ( $1 < i < n$ ), to its object. That relation to the object is 'the same'. So,  $R_1 = R_2 = \dots = R_n = R$  and  $I_1 = I_2 = \dots = I_n = I$ .

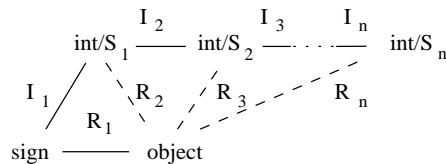


Figure 1. Diagram of the 1902 definition of a sign

From this point onwards we can move in two directions. On the one hand we may be interested in the modes of relation that are possible in  $R$  and  $I$ . If this is the case we are dealing with what above we called sign aspects. On the other hand we may ask what kind of objects and interpretants are possible. This leads us to a theory of interpretants (see section 3.2). Above we designated the term interpretant aspect for the results of the interpretant part of this enterprise. We start with the sign aspects.

#### 3.1. Sign aspects and sign types

Due to the categorical underpinnings of Peircean semiotics each of the sign relations - i.e. sign in itself,

<sup>6</sup> A reference to [7] is given by CP, followed by volume and paragraph.

sign in relation to its object and sign in relation to its interpretant - is assumed to be amenable for a threefold distinction of aspects pertaining to the relation at hand. Although the sign aspects cover a field of study on their own, below we just give the list of sign aspects and we add some remarks at the end.

### Sign in itself

**Qualisign** is a quality which is a sign. It is impossible to present a qualisign, it needs an instance for its embodiment, but the embodiment has nothing to do with its character as a sign (CP 2.244).

**Sinsign** (token) is an actually existent thing or event which is a sign. It can only be so through its qualities; so that it involves a qualisign, or rather, several qualisigns. But these qualisigns are of a peculiar kind and only form a sign through being actually embodied (CP 2.245).

**Legisign** (type) is a law that is a Sign. This law is usually established by men. Every conventional sign is a legisign [but not conversely]. It is not a single object, but a general type which, it has been agreed, shall be significant. Every legisign signifies through an instance of its application, which may be termed a Replica (sinsign; the authors) of it (CP 2.246).

### Relation of sign to object

**Iconical** is the relation if it is solely based on a similarity between characters expressed by the sign and characters of the object. The sign conveys something but does not denote any object of which it professes to be a sign.

**Indexical** is the relation if it is based on a physical connection between the sign and its object. It does denote an object, but does not convey anything of it besides its existence.

**Symbolical** is the relation between sign and object if it is established by convention. Symbols may have a symbolical indexical (this, that), symbolical iconical (man, model) or mixed function (the man over there). In the understanding of symbolic expressions non-symbolical indices and icons are involved.

### Relation of sign to interpretant

**Rhematic** or term like is the relation if a sign addresses its interpretant by just raising an idea.

**Propositional** is the relation if a sign addresses its interpretant as a statement of fact.

**Argumentative** is the relation if a sign addresses its interpretant as a relation of reason – as if it were a sign of the state of the universe to which it refers, in which the premises are taken for granted (cf. CP 8.337).

The reader may have noticed an imbalance in the sources provided for the different terms covering the sign aspects. This is due to the fact that Peirce usually determines the sign aspects in the context of a classification of sign types, not in the context of interpretation processes. Since a sign type can be characterized by specifying the aspect on which it scores in each of the relations,<sup>7</sup> it is very tempting to use one of the aspects as shorthand for a complex of aspects, e.g. an iconical-rhematic-legisign can be alternatively characterized as an iconical sign, a legisign or a rheme (term) depending on the context. One of the consequences is that one finds abundant determinations of the term icon in the CP that are akin to the determination given by us above, but that one looks in vain for similar determinations if one searches with strings in which the word iconical is used.<sup>8</sup> Maybe the wish to develop a periodic table of signs lies at the bottom of this feat. However this may be, we did not provide sources in order to keep this feat visible.

A drawback of the habit to use shorthand is the risk of not clearly making a distinction between taking the sign types as compositional parts of complex signs on the one hand and a more precise determination of the contribution of sign aspects in actual processes of semeiosis on the other. For the first task one has to work with sign types, but for the second this may not be the case. Peirce got well aware of this as is shown by the remark '[...] the difference between the Term, the Proposition, and the Argument, is by no means a difference of complexity, and does not so much consist in structure as in the services they are severally intended to perform' (CP 4.572, 1905). The question this quote raises is for what it is that services are offered. The first part of the answer is straight:

It [an argument; the authors] is a Sign which has the Form of tending to act upon the Interpreter through his [its, since every dynamic sign is potentially an interpreter: the authors] own self-control, representing a process of change in

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<sup>7</sup> As a consequence of categorical constraints only 10 of the 27 possible sign types are really possible.

<sup>8</sup> A search of the InteLex database of the CP with the terms 'iconical' or 'propositional' will confirm this.

thoughts or signs, as if to induce this change in the Interpreter. (CP 4.538, 1905)

But we have to realize that for Peirce signs are all pervasive in order to realize that interpreters themselves are signs and thus that signs offer services to signs that have the ability to be responsive through abductive reasoning and/or established habits (deduction and induction). Before we proceed, some last remarks about the definition from which we derived fig. 1.

In the possible trajectory from sign to  $int/S_n$  the relations in  $R$  and  $I$  remain the same. This means that in this part of the definition we are only dealing with what may be called the ability of the sign to generate copies of itself or, to put it in the terms of the sign aspects, what is stated is only that if the relations in  $R$  and  $I$  remain the same we are dealing with the profusion of sinsigns governed by a legisign as it happens when we think or converse with others. It is only when we become critical that we have to take the aspects of the relation of the sign to the object into account: an interpretant sign has the same  $I$  and  $R$  relations as the initial sign if the relation of the interpretant sign to the initial sign is iconic, but in that case the object of the interpretant sign is the initial sign and not the object of the initial sign. This not only implies the possibility of a shift of view, it also is a first indication of a possibility of self control as a result of degrees of freedom, and it points to the need of a teleological account of sign processes, since only through the possibility of a shift in goal signs can grow. The sign itself offers this possibility, but only as a possibility. Some interpreting sign has to realize that goal by taking the sign that offers itself as a term or proposition capable of entering different arguments. This in our opinion is what Peirce wrote about in the Logical Notebook at p. 276r above.

### 3.2 Signs and interpretant aspects

At October the 12th in the year 1905 Peirce wrote in his Logical Notebook: 'The truth of the matter is that my division of the interpretants is feeble and doesn't come out clearly nor effect what it should' (MS 339, 259r). This may be taken as a clear indication that interpreters of Peirce's interpretants here meet the muddy end of the stick. However, without being able to substantiate this claim here, due to lack of space, we hold that notwithstanding the complaint he already got astonishing far in his exploration of the area. We can point to three interrelated factors that may account for the lack of

clearness in arranging the terms. The first concerns the rigor with which he applied his anti-psychologist approach and that probably prevented him from bringing the EEL and the IDN interpretants in one scheme. The second factor concerns something we pointed at above, it is the possibility to approach semiotics from two angles: on the one hand as a classificatory enterprise with a resulting pars pro toto use of terms and on the other as a process approach to semeiosis with an aspectual use of terms. The third factor concerns what we call for want of a better term the scalability (in level of detail) of the semiotic terminology. As a clue consider that if a command is given, the whole range of interpretant signs between getting the command in one's mind as a copy still without the meaning of the command spoken (an iconic rhematic sinsign in sign type terminology) and actually obeying it by showing the ordered behavior (which if interpreted as a statement is a symbolical propositional legisign) is of the character  $int/S$ , which easily results in lack of clarity if one tries to find the right tools to approach the problem.

In this section we first introduce the EEL and IDN interpretants. Where possible we provide for the interpretants the accompanying sign aspects. In order to achieve the required clarity in terminology we will introduce a new term, the Dynamical Interpretant Response (DIR), which always is a *sign type* generated by the interpreter on the occasion of being confronted with a sign that offers itself for processing, as a response. (The DIR, in other words, expresses the termination of an interpretation process with a sign type and offers thereby a new sign capable of initiating a new cycle.) After that we will present the sign aspects and the interpretant aspects in one diagram. Finally we will present the same terms in a diagram out of which the place holders are removed as a last preparatory step towards our process model of cognitive activity. We are well aware of the fact that this section relies heavily on the pre-knowledge of the reader.

It is when we are going to zoom in on the recipient mind (later to be generalized by the authors in the  $S_S$ ) that we find the EEL interpretants in Peirce's writings. In the CP we find two passages in which this triad is discussed. The first is from 1905 (CP 5.475-476), the second from 1907 (CP 5.486-494). We will bend the content to our purposes by omitting what we do not need and we are well aware of the fact that from the point of view of the reception of ideas the treatment is not sufficient.

### Emotional interpretant

CSP: The first proper significate effect of a sign is a feeling produced by it [...]. It [a tune; the authors] conveys, and is intended to convey, the composer's musical ideas; but these usually consist merely in a series of feelings (CP 5.475).

CSP: By a feeling, I mean an instance of that kind of consciousness which involves no analysis, comparison or any process whatsoever, nor consists in whole or in part of any act by which one stretch of consciousness is distinguished from another, [...] (CP 1.306, 1907).

It designates the moment in semeiosis in which a sign intrudes our mind as a series of feelings in its unanalyzed form. Note the correspondence with the concept Qualisign. Peirce continues 5.475 with:

CSP: If a sign produces any further proper significate effect, it will do so through the mediation of the emotional interpretant, and such further effect will always involve an effort. I call it the energetic interpretant.

Here we have a sure indication of a process oriented line of thinking. But, not making the distinction between dynamical interpretant and dynamical interpretant response muddles the treatment of this term to such a degree that the interpreter of the passages has to take recourse to systematic, (in the philosophical sense) instead of interpretative thinking.

### **Physical energetic interpretant**

CSP: The habit conjoined with the motive and the conditions has the action for its energetic interpretant; but action cannot be a logical interpretant, because it lacks generality (CP 5.491, 1907). The effort may be a muscular one, as it is in the case of the command to ground arms; [...] (CP 5.475).

Here Peirce writes about the energetic interpretant character of the responding sign, the DIR. In order to compensate we give a quote where the firstness of feeling is contrasted with the actuality of an event.

CSP: A feeling, then, is not an event, a happening, a coming to pass, since a coming to pass cannot be such unless there was a time when it had not come to pass; and so it is not in itself all that it is, but is relative to a previous state (CP 1.307, 1907).

The term physical interpretant designates that the series of feelings has to be a here and now occurrence in order to be able to produce any further significate effect. Note the correspondence with the concept Sinsign.

### **Mental energetic interpretant**

CSP: [...]; but it is much more usually an exertion upon the Inner World, a mental effort. It never can be the meaning of an intellectual concept, since it is a single act, [while] such a concept is of a general nature (CP 5.475).

Here a correspondence with the concept Icon, in its pure non-symbolical form can be constructed. The mental energetic interpretant designates the moment in semeiosis in which the series of feelings is a one time (single act) ordered collection of qualisigns. Note the correspondence with the concept Icon.

Since we resolve the Logical Interpretant into the IDN triad we proceed immediately with that triad. For orientation purposes we start with a passage in which the terms are introduced:

CSP: [...] It is likewise requisite to distinguish the *Immediate Interpretant*, i.e. the Interpretant represented or signified in the Sign, from the *Dynamic Interpretant*, or effect actually produced on the mind by the Sign; and both of these from the *Normal Interpretant*, or effect that would be produced on the mind by the Sign after sufficient development of thought (CP 8.343, 1908).

### **Immediate interpretant**

CSP: In regard to the Interpretant we have equally to distinguish, in the first place, the Immediate Interpretant, which is the interpretant as it is revealed in the right understanding of the Sign itself, and is ordinarily called the meaning of the sign; [...] (CP 4.536, 1905/06).

CSP: [...], the immediate interpretant is the interpretant represented explicitly or implicitly in the sign itself (MS 339, 2.276r, April 2, 1906).

Immediate interpretant is a term that designates the meaning of a term as it is presented by the sign. It is not what a given interpreter at a particular time takes that meaning to be, but it is the meaning in general that any interpreter in the right understanding of the sign would

develop. The immediate interpretant is related to the dynamical interpretant as the dictionary meaning of a term is related to the same term in actual use. Note the correspondence with the concept Rheme.

**Dynamical interpretant** (Ambiguous term in Peirce's work, covering also the dynamical interpretant response.)

CSP: The dynamical interpretant is the determination of a field of representation exterior to the sign. This field is an interpreter's consciousness which determination is affected by the sign (MS 339, 253r, October 8, 1905).

CSP: The dynamical interpretant is just what is drawn from the sign by a given individual interpreter, [...] (MS 339, 276r, April 2, 1906).

CSP: The dynamical interpretant is the actual effect produced on a given interpreter on a given occasion in a given stage of his consideration of a sign (MS 339, 288r, October 23, 1908).

Two aspects are involved according to the quotes, see above and CP 8.314 just below: (1) the here and now moment in semeiosis and (2) the narrowing down of the whole field of possible meaning of the immediate interpretant to the meaning elements used by an individual interpreter. The first aspect is to be found again in the designation of the physical energetic interpretant, see above. So, maybe it is better to say that a dynamical interpretant in an interpreter's mind always involves a series of occurrences of physical energetic interpretants.<sup>9</sup> Note the correspondence with the concept Proposition.

**Dynamical interpretant response** (a new, responding sign, not a sign aspect; DIR)

CSP: For instance, suppose I awake in the morning before my wife, and that afterwards she wakes up and inquires, 'What sort of a day is it [...] This [the answer; the authors] is a sign, whose Object, as expressed, is the weather at that time, but whose Dynamical Object is the impression which I have presumably derived from peeping between the window-curtains. Whose interpretant, as expressed, is the quality of the weather, but whose Dynamical Interpretant, is my answering her question (CP 8.314).

DIR is a term that designates the generation of a new sign on the occasion of a specific clash between a sign and a

given interpreter or, alternatively it designates the sign that results from this process.

**Normal interpretant** (synonym: representative interpretant)

CSP: The commanded act in the mere doing of it as influenced by the command is the dynamical interpretant. (DIR; the authors) But insofar as that conduct involves the recognition of the command and is obedient to it and recognizes this correctly, it is the representative interpretant (MS 339, 253r, October 9, 1905).

The term normal interpretant designates the movement of thought, expressible as an argument in which the sign and habits inscribed in the receptive mind, as premises, generate a conclusion (DIR). The relation between premises and conclusion may be abductive, inductive or deductive. Note the similarity with the concept Argument.<sup>10</sup>

The obedience supposes a habitual goal operative in the field of interpretation that yields a specific response (DIR) in conformity with the command. If we remove that constraint, that is, if we think about the normal interpretant in general and not as acted out in a specific context, we get a description that leaves all possible conclusions open. The tendency of the normal interpretant to generate 'satisfactory' responses in the long run can only be accounted for if we suppose a sequence of arguments aiming at a final interpretant. In this case each argument as a whole is taken as a sign itself and confronted with higher level habits.

In figure 2 we provide the interpretant terms as arranged by Van Driel. In order to facilitate a comparison of the interpretants with the sign aspects, we provide the sign aspects in figure 3. In figure 4 the placeholders are removed from the list of interpretants of figure 2. Roughly, we arrived at this schema by replacing the three valued placeholders by the triadically arranged terms to which they are prefixed and the two valued terms by their accompanying pair. For completeness sake we included the sub-divisions of the object node in the basic sign scheme. Without it the subdivision into mental energetic and physical energetic interpretant is, from a systematic stance, the odd man out, with it one expects a subdivision in the dynamical interpretant.

<sup>9</sup> Note that not distinguishing the dynamical interpretant (aspect) from the DIR (new sign) paves the way for Short's ordering of terms [9].

<sup>10</sup> In order not to alienate ourselves from the general reader we stick to the commonly known terms, in order to be precise we should use Delome, Pheme and Seme because they have a more general application.

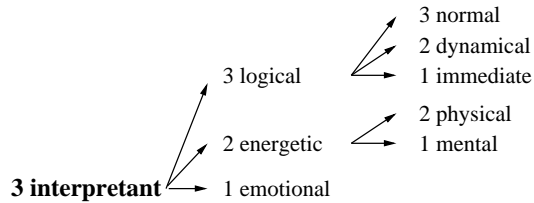


Figure 2. Interpretants according to Van Driel [3], p. 63 ('interpretant' suffixes are removed)

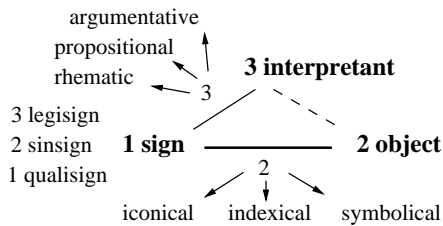


Figure 3. The nine sign aspects arranged according to the relation to which they pertain

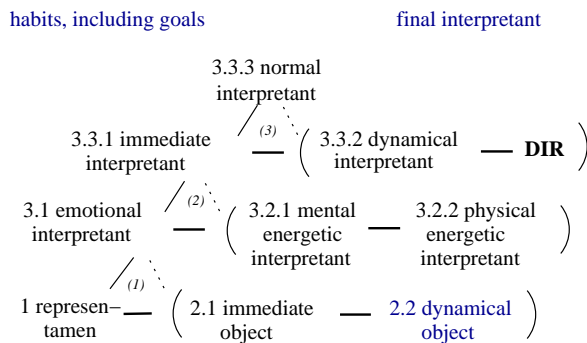


Figure 4. Sign model after reduction of placeholders (note the occurrence of the DIR)

### 3.2 The incompleteness of the reduced model

Whatever the value of this scheme, it does not properly account for all the phases we commonly ascribe to common sign interpretation processes like reading a sentence. A short Hungarian sentence may point the way to what is missing. If we are confronted with the sentence 'Últél?', the first thing that happens is, that our field of consciousness is being entered by a collection of qualities that makes up the sign, but just considered as a collection of possible feelings or, in other words, a primordial soup that contains everything the sinsign contributes to the receptive mind. This moment is indicated by the term 'emotional interpretant'. This possibility of a sign

develops into an existent sign if it settles as a one time occurrence (physical energetic interpretant) with a definite form (mental energetic interpretant). But, since it is only as a one time occurrence (instance), for the recipient mind it appears as a possible object and not as a habitual or familiar sign (type). In order to be grasped as the instance (sinsign) of a type, we need to develop the legisign of which this specific occurrence is an instance. (Try, without looking back, to write down the Hungarian phrase. If you succeeded you developed a legisign; if not, you did not.) For, without a legisign, already a change of type or color in the representamen leads to a change in sign. However, there is no interpretant in figure 4 that accounts for the legisign.

Let us proceed, for the sake of the analysis, with the assumption that somehow a legisign did develop in the recipient mind. On this assumption the next possible step would be the development of the meaning (immediate interpretant, see above) of the sign 'Últél?' 'Últél?' is ambiguous and may mean "Have you been sitting?" but it can also mean, "Have you been doing time (in jail)?" Those two possible meanings are narrowed down, according to the scheme, to one specific meaning in a given recipient. This comes down to stating that out of the two symbols conventionally connected with the sign, one is chosen and further tailored to a specific context. In the reduced scheme the two moments -selecting a symbol out of a range (not properly accounted for) and the contextualization of that chosen symbol (dynamical interpretant)- are not distinguished. So, although the normal interpretant designates the way in which a sign tends to generate a responsive sign (DIR), the reduced scheme is not enough to account for the way in which a response is generated.

A solution to this problem is proposed in section 4. We introduce the Semiotic Sheet enabling us to analyze semeiosis as a process of sign interactions in which the sheet contributes the legisign, the symbol and the contextual knowledge that also play their role.

### 4. From sign interpretation to sign processes

A sign only functions as a sign if it is involved in an interpretive process and generates interpretants. According to Peircean semiotics man is a sign, 'The man-sign acquires information, and comes to mean more than he did before' (CP 5.313). From this we conclude that a sign model of interpretative processes must account for the fact that such a process sets off at the moment a sign gets inscribed in another sign, which is capable of



generating DIR's. In the critical logic Pierce introduced the Sheet of Assertion:

It is agreed that a certain sheet, or blackboard, shall, under the name of The Sheet of Assertion, be considered as representing the universe of discourse, and as asserting whatever is taken for granted between the graphist and the interpreter to be true of that universe. The sheet of assertion is, therefore, a graph (CP 4.396, 1903).

This sheet is enriched by inscribing graphs in it, just as the man-sign grows when it acquires new information. We transpose this idea to the domain of semiotics with the introduction of the Semiotic Sheet ( $S_S$ ). This sheet has three modalities: the Possible, the Actual and the Lawful. In its P-modality it is conceived to contain whatever is inscribed and potentially can be used if a sign offers itself for interpretation. In its A-modality it is conceived to be in the state it is in at the moment a sign inscribes itself, this has a sinsign as well as an icon aspect. In its L-modality it contains the habitually inscribed goals<sup>11</sup> that govern the production of a DIR on the occasion of a sign offering itself for interpretation. Since, as with the interpretant aspects, the modalities can be applied recursively, we do not claim to provide an exhaustive account here.

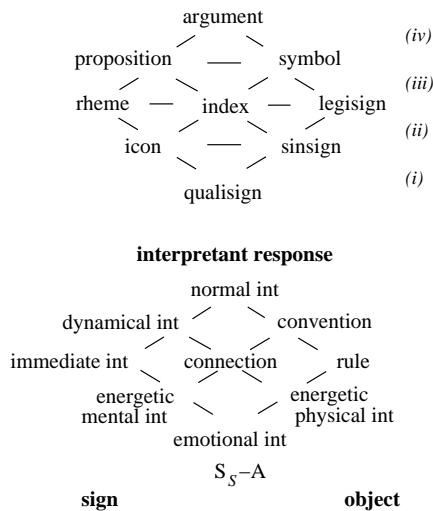


Figure 5. The process model with the sign aspects (top) and the identified interpretants (int) aspects (bottom) projected on it. The horizontal lines designate interpretation events (sign interactions)

In figure 5 in the bottom diagram we project the identified interpretants on the sign aspects as they are conceived to be placed in the process model. The assumption underneath that model is that all thought is in the form of arguments and that in arguments all sign types are involved. Space forbids an extensive treatment, those interested in details and applications of the model may consult [2] and [8], amongst others. Let's assume the  $S_S$  in its P-modality is the page or screen on which the model is written, included in this is what pertains to the L-modality. The sign and its supposed object are severed from the page by placing them in boldface, as is the interpretant response (DIR).  $S_S$ -A represents the A-modality of the  $S_S$  at the moment the sign knocks on the door.

In order to give an impression of how the process works according to the model we provide a sketchy example. The interpretation events are indicated by (i)-(iv). Let's assume this sign is 'halt'. It enters the  $S_S$  as a series of feelings (emotional interpretant).

- (i) The feelings get sorted out as an icon (mental interpretant) and settle as a singularity (physical interpretant).
- (ii) Since it is a familiar *iconic* singularity a legisign arises (rule). Up to this point the copy function of fig. 1 is executed, a new sinsign of the word "halt" is generated. Since it is a *singular* icon out of any context at this moment, a rheme (immediate interpretant) arises.
- (iii) Assuming there is a strong habit that is connected to the legisign, by means of the connection a conventional meaning is retrieved and the sign is interpreted as a request to stop (convention). But, of course, at this point it also could mean that someone limps or that some actor is rehearsing. Those possibilities are contained in the rheme. If, later on, the strong convention proves wrong, a new run of the process may delve up those possibilities. Doubt is time consuming after all. Through the connection with what is contained in the  $S_S$  about the present situation (Who has to stop? I am not moving), the conventional meaning gets embedded in an understanding of the situation at hand (dynamical interpretant).
- (iv) This dynamical interpretant is, again through a connection with what is contained in  $S_S$ , placed under a rule of habit that covers this kind of case and a response (DIR) is generated (normal interpretant). Since experience with the effect of different types of response will be fed back in the mechanism, successful responses tend to strengthen interpretation habits (final

<sup>11</sup> For the importance of goal orientation see [10].

interpretant). But also note that if the  $S_S$  is in the state of expecting a sign, a 'top down' response speeds up the process considerably by action on expectation; the child in the candy store says in that particular voice "Mom, [...]" and gets "No!" as an answer before being able to finish.

Notice that the horizontal lines in the top diagram of figure 5 indicate some kind of interaction between the associated nodes. The icon – sinsign pair, for instance, indicates that both are involved in the development of a legisign and a rheme. With a stress on the sinsign aspect -repeatability of the form- a legisign is formed, with a stress on the form -interpretative possibilities the form offers- the rheme develops its of possible interpretations.

We have to break it of here with some last remarks.

1. Notice that the index, the legisign and the symbol do not have a counterpart in the division of interpretants. Those aspects of the sign are brought to life if a sign gets interpreted, thus turning an existent sign into an effectual sign. Although this points in the direction of a dual determination of the DIR, this does not mean without further qualification that it is the individual sheet that co-determines the DIR. The tendency to modify the strength of habits entailed in the normal interpretant, dictates that it is reality that mediated by the sheet determines the DIR in true cases (final interpretant) and that it is the individuality aspect of the sheet that co-determines the response in false cases.
2. An interesting consequence of our approach is that it enables the discrimination of different kind of views on information systems. A main divide is provided by the distinction between formally determined views and accidentally determined views. Accidentally determined views are associated with the way in which information processes are cut up in any given organization (information system), as when we distinguish the view of sales from the view of book keeping. Formally defined views are associated with the moments distinguished in our process model. They pertain to any information system whatever. This however is a domain of study we just entered, so it is better to finish off this point with the cautionary remark that the relation between formally defined views and the specific nodes in the diagram need not to be very straightforward. A consideration of Stampers semiotic ladder in the light of our process model seems however a reasonable first step.
3. At the start of the paper we referred to the FRISCO project. There we only told half of the story. Here we like to point to the fact that enterprises like that

generated and will generate more distinctions and a precision of language that are of great value and still wait to get embedded in a Peirce oriented research program of information sciences with a scope far beyond IT-based systems, but with the same rigor of language. The material object of such a program would be the interplay of goal-oriented information processes for any interpreter ( $S_S$ ), computerized, human or whatever, by which the signs are processed.

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