Minute Semeiotic

**Speculations on the Grammar of Signs
and Communication based on the work of C. S. Peirce**

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Acknowledgements

Dedicated to my children Pedro and Clara

ABSTRACT

This work is dedicated to the branch of semiotic that Charles S. Peirce called speculative grammar: the study of the formal conditions that enable a sign to function as such, the survey of all possible types of signs and their ordered classification. Speculative grammar is the first branch of semiotic, logic is the second and communication, its third. A fruitful semiotic treatment of the communication depends, therefore, on grammar and logic being sufficiently developed. This was the motivation of this work. After an introduction on Peirce and the development of his theory of signs, we present a proposal for a generation of 66 classes of signs and some considerations are made on how this table could help to solve some problems of logic and to construct a formally semiotic theory of communication.

All classification, whether artificial or natural, is the arrangement of objects according to ideas. A natural classification is the arrangement of them according to those ideas from which their existence results. No greater merit can a taxonomist have than that of having his eyes open to the ideas in nature; no more deplorable blindness can afflict him than that of not seeing that there are ideas in nature which determine the existence of objects.

(Peirce, CP 1.231)

SUMMARY

INTRODUCTION

I will explore in this work some of the ontological and epistemological foundations of communication from the point of view of Peirce's semiotic. The first step to take in such a project is to adopt the broadest possible definition of communication – an ***essential definition*** – and only afterwards proceed in qualifying it according to its ramifications, such as animal, human or social communication.

The most general definition of communication states that it is a transmission of information, with no need to worry *a priori* about what information is, where it goes through, and how its transmission occurs. It is enough to verify that some change of state, or transformation, has happened either in the world external to us or in the interior of our minds, to establish the occurrence of some kind of communication.

If information flows everywhere, as physics and biology have demonstrated in the past decades, we should consider communication as an ontological component of reality. This is the vanguard position in the studies relating communication and semiotic, whose theoretical possibilities have been attracting researchers from several fields.

Communication is not the same everywhere, though. It is necessary to establish a communicational gradient that starts from the transmission of information in the basic level of matter, strongly constrained by the laws of physics, and climbs the ladder of complexity to achieve the freest and most creative forms, as those among intelligent and conscious beings. In fact, Nöth states that it is not possible to postulate a clear cut border between communicative and non-communicative phenomena in nature, but one should conceive a gradual transition which goes from the most rudimentary proto-communicative interaction towards the most complex ones (*apud* Santaella, 2001, p.17).

Therefore, I will consider communication as a product of the intentionality, or "mentality", which sprouts from the elemental levels of nature and goes up in the hierarchy of nature until it achieves its most elaborate forms in human consciousness (cf. Short, 2004, p. 14). That is the reason for adopting in this work the "grand vision" of the Peircean semiotic, which has been supported by Deely (1994). This conception of semiotic can comprise even the physical processes of nature, considered as result of the action of signs, a phenomenon Peirce named as semiosis.

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It is from this point of view that I will defend that semiotic and communication can be united in the same science. The reason is that the action of signs corresponds precisely to the essential definition of communication we provided above: wherever there is semiosis, there is also a change in the state of things, which involves a flow of information. Thereupon, as Joseph Esposito (L6) affirms, "signs and communication are the two sides of the same coin"[1].

This broad conception of communication, based on a holistic approach of semiotic, usually bristles the theorists who insist on a logocentric vision of the area, not to say a *mediacentric*[2] one. They think the science of communication should be narrowed to the human culture (cf. Eco, 1977); some on them restrict the field even more to concentrate only on the media of Mass Communication. This restriction is, in my opinion, a kind of intellectual perversion because it transforms the accident in norm. Communication is not born with the drum, with the book, with the telegraph, newspaper, television or any other technology. On the contrary, these technologies are created only to widen, improve, and make more efficient a process of communication in which we are immersed and on which the survival of every organized system depends, be it a single individual or the most complex conceivable society.

That was certainly the opinion of Charles S. Peirce in the last years of his intellectual production. In 1903, he affirmed that the whole universe is a sign similar to an impressionistic painting (CP 5.119[3]). In 1905, he wrote that "a sign perfectly conforms to the definition of a *medium* of communication" (MS 283). In 1911, he defined sign using the reading of a newspaper as example: "if a person reads an item of news in newspaper, his first effect will probably be causing in this mind what may conveniently be called an "image" of the object, without making any judgment about its reality" (MS 670). From the universe to a page of newspaper or a thought, therefore, there is a flux of information that unites us all as signs.

The kind of information that goes through the flux of semiosis is not the same of Claude Shannon, though. When Shannon discovered the mathematical concept of information, during the II World War, he was researching a method to break the codes of cryptographed messages used by the Nazis. His famous formula expresses the level of grammaticalization of a message, the amount of uncertainty it eliminates from all possible

combinations expressed by a code defined in advance. Peirce, on the contrary, sees the information as the form of matter, the Predicate that is connected to the Subject driven by an evolutionary principle analogous to love. Peirce's information is an ideal that calls us to higher and higher stages of knowledge while we seek the *summum bonum*. If Shannon's information is a product of the war, Peirce's information is born from an esthetical and ethical ideal that put us in harmony with the Universe.

That's why Peirce's semiotic, when detached from this metaphysical philosophy, becomes a strange collection of neologisms aligned over a table of categories that has little to offer a theorist of the communication. In his concise *History of Communication Theory*, for example, the Mattelarts (1999, p.33*, my translation*) criticize the vagueness of Peirce's concept of sign, considered by them so general that it becomes almost useless:

> (...) Peirce's work continues to be of a terrible abstraction (...). Everything is sign. The universe is an immense representamen. From there derives in Peirce some vagueness indeed in the definition of the concept of sign, in order to define it, one should be able to distinguish what is a sign from what is not. That is why it is so difficult to delimitate the disciplinary field of semiotic.

This evaluation is typical of those who look at the field of communication through lenses infected by the positivistic yearning to eliminate all metaphysics from the world. Nevertheless, while the human sciences still seek to espouse the foundations of Positivism to delimitate and validate their fields, the "hard" sciences have already signalized that it is necessary to abandon these same foundations and start a deep conceptual revision in our way of dialoguing with nature if we want to stay tuned with reality. Recent researches in mathematics, physics and chemistry are widening the scientific vision of the world to comprise the research of mentalistic aspects of the nature.

The mathematician Roger Penrose, for example, insists that the behavior of the sub-atomic particles requires that mentality must be "considered as fundamentally ontologic as the mass" (1997, p. 176 *apud* Taborsky). Ilya Prigogine, while studying the mysteries of the organization and the complexity of nature, speaks of "communication' among molecules (1989, p.3) that, while interacting in systems far from the thermodynamic equilibrium, start to "see" and show "sensitivity" or "creativity" (1996, p. 71). Lee

Smolin, who strives to produce a theory capable of unifying the theory of relativity with quantum mechanics, affirms that we might need a fundamental theory that would describe the history of the universe as a flux of information (2002, p. 184).

Peirce had already said similar things a century ago. One may ask, then, why Peirce's semiotic did not produce a theory of communication that would recommend it to the future. In order to understand that, one must know a little bit about the personal history of Peirce and the vicissitudes of his philosophic work. Peirce died in poverty and isolated in a small city in the hinterlands of Pennsylvania. He did not have the opportunity to publish books or articles about his semiotic and, for many decades, everything known about his theory of signs was extracted from letters exchanged between Peirce and some of his friends. It was necessary to wait for decades until his manuscripts started to come to light – a process that has not been finished yet.

As a journalist, I feel obliged to tell a little about this history, too. Hence, the first chapter of this work draws a brief profile of Peirce and shows how his ideas have slowly been brought up. In the second chapter there is a retrospective of the evolution of Peirce's thought, mainly in relation to the changes he made in his theory of signs throughout nearly half a century of studies he dedicated to it. Before we get into the formal details of the semiotic, we still have to an incursion in his theory of perception, not completely understood by the commentators of Peirce yet – but that must be considered essential if we want to understand the last phase of his research, dyed of very intense phenomenological shades. Only then we shall enter the labyrinth of semiotic, which was divided by Peirce in three branches following the medieval tradition of the *trivium* of the liberal arts.

The third branch of the *trivium*

The study of the formal proprieties of signs is the role of the first branch of semiotic, the one that Peirce called speculative grammar. The second branch is critical logic, the study of the conditions that enable the sign to truly represent its object. Finally, the third branch is communication, which Peirce also calls rhetoric or methodeutic – the study of the process of transference of information and the methods of inquiry necessary in the search of truth. Peirce said that communication (or rhetoric) was the most important of the three branches of semiotic, for it would lead to the most important philosophic

discoveries. However, most part of his research in semiotic was dedicated to speculative grammar: an intense, almost obsessive, search for the correct definition of sign and the classification of its possible types that lasted for more than four decades.

The reason for that is simple: grammar, being more basic and universal, is the branch that must supply both logic and rhetoric with the fundaments that will allow them to fully develop. It is not possible to advance our understanding of communication without first solving some of the problems that surround the definition and the classification of signs. Peirce felt that deeply. To his great frustration, Peirce's most important system of logic, based on diagrams (the Existential Graphs), remained incomplete because some of its aspects depended on the understanding of how the sign evolves when representing its object. Communication depends both on logic and grammar and there is no way for it to develop independently from its correlates.

That explains why this work is dedicated mostly to speculative grammar, in the hope that, when we clear up some obscure questions about the functioning of signs, a theory of the communication might be built on a more solid basis than the one we have today. Although this work is based on the Peirce's semiotic, it is not my intention to make a detailed or critical exegesis of his challenging theory of signs. It would be a fascinating journey, but probably would leave us paralyzed by the complexity of the theme and by the many substantial discrepancies among the *scholars* – not to mention that Peirce has left his theory incomplete, mostly in the form of drafts or letters sent when his research was still going.

I have no intention as well of making a comparative analysis of the several hypothesis and theories of communication and how the several streams of semiotic can be applied to their study. Many researchers have been working intensively in the relation between semiotic, seen as a science with its own status, and the so-called sciences of communication. Their studies will be mentioned, whenever I find necessary, in the notes and the general bibliography at the end of this work.

I will present Peirce's semiotic as I understand it, advance some hypotheses in order to fill in some blanks and try to extract results of some value for the logic, the philosophy and the theory of communication, which will always be my main concern – even when I seem to drift through waters apparently strange to the field of communication. This is an

academic thesis, but I will try to maintain the text in an accessible language also for the professionals who are seeking a little reflection and theoretical grounding for their everyday activity. My roots in the department of journalism in the University of São Paulo (USP) naturally lead me to this concern.

The main result of my research is the elaboration of a Periodic Table of Classes of Signs. Starting from the two most well-known classifications of signs, the 1902-3 one (based on three trichotomies) and the post-1905 one (based on ten), and some precepts linked to his theory of categories, I claim that it is possible to derive the 66 classes previewed by Peirce and order them according to the logic of the triadic relations.

A chart like this is a dream at length desired by the logicians and semioticians, for it would open doors for the solution of many of the problems that today obstruct the advance of semiotic, as the definition of what class of sign represents the predicate of a proposition and, also, how we can make a satisfactory distinction between assertion and proposition. These semiotical (and logical) problems are at the heart of the contemporary researches in philosophy of the language in general. That is why, according to Houser (1992, p 502),

> A sound and detailed extension of Peirce's analysis of signs to his full set of ten divisions and sixty-six classes is perhaps the most pressing problem for Peircean semioticians. What is needed first of all is a well motivated *rationale* for the ordering of Peirce's ten divisions of signs.

Although in his mature expositions Peirce showed a fertile general outline of possibilities to classify the signs, he was never satisfied with any of his countless attempts. He knew that only a detailed analysis of the classes of signs could give consistency to his logic, making possible a definite proof of his pragmaticism. In his late manuscripts, it is possible to sense the huge effort he dedicated to this task, followed by the always-present frustration for not having achieved a satisfactory final version.

The many classifications of signs, drafted by Peirce between 1905 and 1911, are just attempts, sometimes contradictory among themselves, and there has been a lot of controversy about their validity. Here and there we see commentators proposing the adoption of one or another, but none of them could impose itself either for its logical

structure or its practical advantages. Thus, we need to take the torch from Peirce's hands and try to produce a classification that goes beyond the limits he encountered.

As Thomas Short says (*apud* Colapietro, 2004, p. 32)

...if Peirce never worked out the basic principles of semeiosis to his own satisfaction, we may find that there are one or two things that he never worked out even to our own, less demanding satisfaction. To make sense of his semeiotic, we may have to hazard a guess as to what he should have said. To do Peirce justice, we may have to go beyond him.

Vincent Colapietro (2004, p. 32) agrees. He ponders that

...paradoxically, it may not be possible even to catch up to Peirce without striving to go beyond him, without trying to put in particular his theory of signs in a more complete, coherent, and perspicuous form than he was apparently ever able to accomplish.

Our proposal of classification of signs is inspired in this disposition to continue the research that Peirce could not complete. We believe that the Periodic Table of Classes of Signs that we will present in this work advances the state of art of the Grammar of Signs, maybe opening new windows of study for a problem that many believed was doomed to remain forever as a dead-end.

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[1] The proximity, if not the identity, between semiosis and communication is defended mainly by many Peircean semioticians. Santaella and Nöth (2004, p. 77, *my translation*), for example, state that "(i)t is not difficult to realize that, among all the sciences or fields of knowledge, the one that is closest to semiotic is, undoubtedly, communication. There cannot be communication without action of signs and vice-versa. It is argued that communication should not be reduced to the transmission of messages. Although this is true, one cannot deny that, without the transmission of any kind of message, there is no communication. Thus, if we are not locked up to the very vague and poor vision that all that a message transmits is information, and also if are not limited to a languocentric conception of the sign, we can affirm that each and every message is made of signs of many kinds. In fact, signs are the material that messages are made of. If semiotic studies the signs, the point where communication and semiotic cross is clear. If we take into consideration that the study of the action of signs is not reduced to a mere descriptive formalism of the internal properties of the signs, but includes its relations of reference, its contextual connections, its processes of emission, the effects that are apt to produce in the receptors and, mainly, if we take into account that sign is a mediation between something to what it refers or applies and the effects that are produced in the receptor, which includes the consequences resulting from it in the future, the relations between communication and semiotic become more complex and much more substantial than it may seem at first sight.

2 Trabant (1980, p. 67, *my translation*), for example, affirms that "a generalization of the concept of communication based on the theory of information is in the origin of a *semiotic imperialism*, of an enlargement of the field of semiotic, which surpasses the saussurean semiotic *faits humains* (and also the signic behavior of the "organisms" of Morris), to comprise physical or biologic processes, or that at least starts to include a theory of the human interpretation of the world.

3 The work of Peirce is conventionally quoted as follow: CP indicates the *Collected Papers*, the number to the left of the point indicates the volume and the number to the right the paragraph(s); the two volumes of the Essential Peirce (EP) are indicated in the same way. The acronyms MS and L mean manuscripts edited by R. Robin; LW and SS mean letters sent by Peirce to Lady Welby.

I – SOME BIOGRAPHIC AND BIBLIOGRAPHIC NOTES

1. Pride and prejudice

Ideas able to illuminate important aspects of reality are usually strong enough to impress and reproduce in our minds regardless of the biography of their formulators. In case of Peirce's ideas, however, some knowledge on his personal life, as well as the trajectory his work took after his death provide a useful context to avoid mistakes about his theories and his role in history of both philosophy and semiotic from appearing and propagating as they have frequently occurred– usually in the academic circles where Peirce's contributions for language, communication and cognition in general only now start to be systematically discussed[1].

Peirce was born in 1839, the second of five children of a traditional family of scientists and intellectuals. His father was a professor at Harvard University and considered the most respected mathematician of his time. Since he was very young, Peirce demonstrated to possess an exceptional talent for Logic, Mathematic and the scientific method, as well as an enormous spiritual hunger to know the historical and conceptual foundations of Sciences. This led him to study practically all the great past philosophers, with special interest in those with some aptitude for logic or metaphysics, as Aristotle, Duns Scotus, Kant, Hegel e Leibniz.

Peirce's cultural environment was the puritan region of Boston, Massachusetts, to the northeast of the United States of America. There emerged the "cream" of the great politicians, scientists and inventors that produced, during the nineteenth century, the technological boom that would lead the USA to the position of the world's richest and most powerful country. The scientific method, the analogies between the biological and scientific evolutionary processes, the vision of logic as an instrument to pursue the truth and the debate about the place of metaphysics in a universe dominated and explained by human reason were some of the issues that occupied the intellectuals in the end of the 19th century.

Peirce worked for thirty years with empirical research for a governmental institute specialized in metrology, the *U.S. Coast Survey*, conducting measurements about gravity and the movement of pendulum. This job gave him the opportunity to travel much to

collect data and as well as to present the results in conferences in the United States, Canada and Europe. He designed more precise measuring instruments than the existing ones at his time. As an example of Peirce's competence as a scientist, we can say that not only was he the first to propose the light wave should be adopted as the standard for the measurement of length, but effectively applied this idea in his researches.

Although Peirce achieved respect working as an experimental scientist, he saw his career in the *Coast Survey* mainly as a way to make a living in order to sponsor his true philosophical and mathematical interests that he kept in parallel. Personal letters from this early phase of his life show that Peirce was a spoiled young man and, as an adult, had an irascible personality. In this early years lived in society, he was seen by many as an arrogant man, apt to eccentricities, sometimes violent, keen on alcohol and women and decided to make easy fortune with his ideas and inventions.

His first important philosophical contributions would appear throughout the 1860's in articles that criticized the cartesianism and determinism dominant in his time. Peirce was interested in proposing a new logic for the scientific method, capable of embracing chance and process of the formation of hypotheses. By the end of 1870, Peirce published his first article about what he called Pragmatism – a method to clear up ideas, produce inferences sustained by reality and base our actions on the beliefs resulting from these inferences. The influence of his ideas upon Cambridge philosophers, such as William James e Josiah Royce, as well as upon John Dewey, based on the University of Chicago, produced the first wave of pragmatic movement that soon would become the most original contribution of the United States to the Occidental philosophy.

For still nearly ten years, Peirce shone in his conferences about logic for the Johns Hopkins University and in articles which had impact in Logic history – he was the first to create a logic notation, which later on would be adapted by Giuseppe Peano and would become the standard with the classic *Principia Mathematica* of Russell and Whitehead. Peirce also earned fame and worldwide respect in the fields of Mathematics and Physics. In Mathematics, he reinforced the importance of topology as a mathematical instrument to reveal and study the relations, and researched deeply the notion of continuous and the infinitesimal. It was also at this time that he developed a triadic conception of

Phenomenology, showing that the universal categories could be reduced to only three, called by Peirce Firstness, Secondness and Thirdness.

From the mid-1880's, after his father's death and the divorce from his first wife (1883), Peirce's scientific and academic careers started to decline. It seems that without his father's counseling the most harmful traces of Peirce's personality began to emerge. His contract at Johns Hopkins was not renewed and he began to suffer pressure from his superiors in the *Coast Survey*, what continued throughout many years until his effective dismissal. In part, this was due to how Peirce spread his ideas, always crushing critics even to the work of his closest colleagues or superiors. Also, it was due to the prejudice of the bourgeois society of Massachusetts against a man who dared to live with a woman without being legally divorced from his first wife.

In fact, in the *Coast Survey* Peirce was no longer seen with the admiration of the past. He had accumulated a huge amount of data in his field measurements of gravity, but would take too long in the analysis and production of reports, what put him under the increasing pressure of his superiors. Depressed by the professional and personal successive deceptions, Peirce decided to withdraw from the social life of Massachusetts. In 1886 he moved to New York, where he lived with his second wife – a Frenchwoman whose real origin and biography remains surrounded by mysteries – in hotels and rented rooms.

In the following year, he moved definitely to Milford, Pennsylvania, where he bought some land with the money inherited in the occasion of his mother's death. Peirce dedicated many years reforming the house of this property. These repairs happened while Peirce was working with the foundations of his philosophical building – a coincidence that did not pass unnoticed by his biographers that see in the work in this house the perfect metaphor for his intellectual activity in this period. In fact, Peirce named that mansion as Arisbe in honor of the Greek colony where some of the first great philosophers of Antiquity appeared.

In an article written in 1887, while still exulting in health and intellectual vigor, Peirce considered himself ready to raise a philosophical system similar to that of Aristotle, "so comprehensive that, for a long time to come, the entire work of human reason, in philosophy of every school and kind, in mathematics, in psychology, in physical sciences,

in history, in sociology, and in whatever other department there may be, shall appear as the filling up of its details" (*apud* Brent, 1993, p.1).

As he settled down in Milford, Peirce kept searching for means to get rich quickly – many times with spectacular ideas and inventions that never provided the planned results. Apparently, he intended to reach a financial situation that would let him live as an independent philosopher. After many failures, though, Peirce faced the fact that his age and health no longer advised him to go on taking risks. After allowing Juliette to take control of the family finances, Peirce plunged deeper in the foundations of his Semiotic, Logic and Pragmatism.

The circumstances for this assignment, however, had become very difficult: his health and his wife's showed debilitation and the lack of money would force him to deviate from his intellectual goals to write entries for encyclopedias, articles and projects of books that he continuously submitted to publishers and agencies in the hope of prepayments and grants that could guarantee a living in his last years.

Juliette suffered from tuberculosis and had long periods of convalescence, demanding dedication and special care from her husband. Peirce, in his turn, suffered from a trigeminal neuralgia, a disease that had accompanied him throughout his life, but that seemed to become worse with aging. In crisis ever more frequent and severe, he felt excruciating pains, which he tried to ease with large doses of drugs. Peirce admitted that he went through periods when he himself doubted his sanity and, in letters, more than once told his friends that life had become so miserable that he considered committing suicide. In the late years his agony got worse with the appearance of a cancer, which would finally lead him to death.

Even facing aging and the health problems that would consume him, Peirce did not cool his intentions off. On the contrary, he threw himself into a greater effort of tying up his many doctrines and theories in a coherent body, with the hope that it could be published. He did not have many interlocutors, besides the correspondence he kept with some old friends, like William James, and a new research partner to share ideas, Victoria Lady Welby – a self-educated English lady who had studied and written about semiotic and the problem of meaning, and whose work Peirce had reviewed for one of the magazines he worked with. Without having ever met Lady Welby, Peirce had an intense correspondence

with her for eight years, which today is the main source of research on the type of semiotic that Peirce tried to develop in the mature phase of his researches.

In fact, it was in the final decade of his life, between 1903 and 1914, that Peirce worked harder and simultaneously in what he considered two of his greatest accomplishments: semiotic and his logical system of Existential Graphs (EG), a diagrammatic method of representation designed to be a sort of "moving picture of thought" (CP 4.11 *apud* Houser, 1998, p.xxxvii). It is not a coincidence that Peirce was working in these two projects at the same time, for he considered the EG and semiotic essentially the same thing: logic conceived as a science responsible for revealing, classifying and explaining the processes of inferences in our minds.

As death rapidly approached, this old and sick man, who had never had children nor was able to finish a single book of Philosophy or Semiotic that he could recommend to the future generations, continued to write in an intense and convulsive way as if he were carrying out some kind of mission. The thousands of pages of manuscripts full of ideas launched by him without any hope that they would even be read some day remind the way stars send light during their final collapse. How many aspects of reality did Peirce's mind illuminate, only now start to be revealed.

2. The future of Peirce's ideas

When Peirce died, in 1914, the world had just started its troubled trajectory towards our modern times. Peirce did not see the beginning of I World War, neither seemed to be informed of the first works of Albert Einstein – which would give birth to the Theory of Relativity – or those of Sigmund Freud that peered into the basements of the human psyche. He is not, in this sense, a contemporaneous of our time, marked by the world wars and epidemics, by the excessive cult of individualism and by the triumph of mass culture brought by the new *media*. Nevertheless, and in an impressive way, Peirce's ideas are capable of accommodating, without solution of continuity, most part of the theoretical and scientific advances produced after his death.

In 1965 Karl Popper, one of the most respected philosophers of sciences from the post-war period, affirmed that Peirce was bound to be recognized as one of the greatest

philosophers of all times for having moved on hypotheses and concepts which only began to be understood after Einstein's Theory of Relativity and Heisenberg´s Quantum Physics (Auspitz, 1994). For Max Fisch, the patron of the *Peirce scholarship* who for nearly 50 years researched sheet by sheet the manuscripts and articles written by Peirce, he is bound to figure among the three major thinkers that mankind ever produced. Fisch places him in the direct line of Aristotle and Kant who also structured their philosophy in architectural form uniting its ramifications from a finite list of predicaments.[2]

Belgian chemist Ilya Prigogine, one of the main exponents of the Theory of Systems far from Thermodynamic Equilibrium, recognized that Peirce was the pioneer in observing the pluralism involved in the physical laws, putting creativity and sensibility as essential components of physical reality (Brent, 1993: 176). Prigogine (1984: 303) says that until some time ago,

> Peirce's metaphysics was once considered as just another example of philosophy alienated from reality. However, Peirce's work appears today as a pioneer step towards the understanding of the pluralism involved in the laws of Physics.

Lee Smolin, a modern theoretical physicist who works on the unification of Relativity and Quantum Mechanics, recognizes that many of his ideas – as an evolutionary universe where the laws themselves can evolve – seem only to paraphrase physical and semiotic concepts that Peirce raised over a century ago:

> As the philosopher Peirce said over a century ago, it is fundamentally irrational to believe in laws of nature that are absolute and unchanging, and have themselves no origin or explanation. This is an even more pressing issue now, because we have strong evidence that the universe, or at least the part in which we live, came into existence just a few billion years ago. Were the laws of nature waiting around eternally for a universe to be created to which they could apply? To resolve this problem we need an evolutionary notion of law itself, where the laws themselves evolve as the universe does. This was the motivation for the cosmological natural selection idea that Martin Rees is so kind to mention. That is, as

Peirce understood, the notions of evolution and self-organization must apply not just to living things in the universe, but the structure of the universe and the laws themselves.

This Peircean notion of evolution is directly linked to his concept of Semiosis, as Vieira explains (unpublished, p.55, *my translation*) when he links semiosis with Theory of System:

> Semiosis is a universal characteristic spreading in time/space as a *crescendum* of complexity that reaches its known apex in the most complex life systems; and these life systems emerge in the universe through evolution; that is why we need a protosemiosis of the inanimate satisfying the thermodynamic conditions of systems far from equilibrium, as the dissipative structures of Prigogine.

Peirce's ideas continue to live and reproduce among us because his mind was not stuck in the scientific paradigms of his time, but showed to be tuned in the deepest truths of reality: those same ideas that determine the existence of the classes of phenomena – as we will see in the next chapters. The best proof for that is in the fact that the scientific advances that followed after his death never contradicted his ideas, but seemed to be continuously approaching them. They prove to be valid and updated enough to influence and inspire new generations of thinkers.

3. Crossing the bridge

The path to Peirce is not an easy one, though. A reader who confronts Peirce's work directly, without any historical and biographical context, tends to assume that he emanated coded messages whose contents could only be understood by a few initiated in the philosophic jargon of the nineteenth century. Peirce would be, as it came to be affirmed and repeated many times, much more a "philosopher of philosophers" (Hook *apud* Houser, 1998, p. xxxviii) than an author accessible to graduate students or researchers from applied sciences, such as Communication. Many initiated in the reading of Peirce think he had a confused mind, as the fragmented and flourished style of his texts and the long list of odd neologisms he introduced would demonstrate, such as Dicisign (instead of proposition),

Phaneroscopy (instead of Phenomenology) and Tychism (the acceptance of the casualness of the world) and Abduction (our ability to guess correctly the laws of nature) and many others scattered throughout his work.

Unfortunately, the worst judgments usually come from intellectuals who have effectively dedicated some time studying Peirce but who, due to their incapacity to penetrate the deepest layers of their thoughts or to fear of moving forward through territories still very unstable, such as metaphysics and logics, base their critics on superficial or second hand readings. These critics end up emphasizing not what Peirce produced as a scientist, logician, mathematician and semiotician but the continued reformulation of his ideas and hypothesis over half a century of uninterrupted intellectual work. In a way that seems unfair to us, they transform the result of a commitment to the scientific and philosophical inquiry into the opinion that Peirce was inconsistent or contradictory.

We should bear in mind, though, that one of the crucial neologisms of Peirce's philosophy is *Falibilism*, the doctrine that no belief can ever be considered as absolutely true. On the contrary, it must be reformulated every time it does not supply a satisfactory answer when confronted with reality. On the other hand, ideas and concepts are symbols that have a natural tendency to evolve – carrying with them the person in whose mind they are embodied. The human mind – as the mind of any other living being – emerges as a result of a synthetic process where signs called by Peirce Interpretants are determined by Objects external to the mind thanks to the mediation of the Sign. Note that the object of the sign is not of transcendental nature (such as Kant's "thing in itself"). It is simply another sign, produced by some other mind (or quasi-mind, as we will see in the following chapters of this work), but which is presented to the interpreter in question, in a given instant and place, as something that demands to be interpreted.

Peirce's intellectual life is a good example of the application of this doctrine: every single theory he developed went through some degree of transformation. In some cases Peirce changed positions radically. He was, for instance, a declared nominalist in the beginning of his career, but became a strong critic of this philosophy in his mature phase, when he embraced the idea that general concepts – such as mind, intelligence and purpose – possess a special kind of reality in the world. Although Peirce made the reasons for

changing his mind notable and discussed them openly in his texts, some of his most acid critics preferred to ignore this fundamental characteristic of his work in order to emphasize contradictions among texts written at very different points in time. As the biographer Joseph Brent demonstrated with many examples (1993), the narrow-minded intellectuals of career have always been the most ferocious of Peirce's detractors.

In his own time, a good part of the intellectuals hired by the best universities and scientific agencies in the United States accused him of being blurred, insane and even fake. With these slanders, not only did they block irremediably Peirce's way of inquiry, hindering him from the access to academic positions and resources which would have greatly facilitated his work, but also discouraged young thinkers to get in touch with and continue the lines of research that had been opened by Peirce.

In the decades subsequent to Peirce's death, the prejudice against his ideas was enforced even more by the difficulty to understand some of his idiosyncrasies of language and style. The frequency with which the themes of the 19th century appeared in his work, along with his hermetic vocabulary and parenthetical style of writing – full of deviations and reflexive considerations[3] – and his insistence on metaphysical issues led many theorists to discard "at first sight" the validity of his work. Regarding semiotic, the impact of this prejudice can be verified in many manuals and dictionaries published throughout the 20th century, which diminish or even "forget" to mention Peirce as a precursor of the theory of signs.

In fact, in many academic circles Peirce's semiotic has been relegated to a secondary level for the benefit of the European Semiology, much more tuned in vocabulary and methodology with the sciences born from Positivism. Through the eyes of many theorists of the new Human Sciences, for example, the original sin of Peirce's semiotic was to aim at too many issues without offering a clear and well-developed method that would enable these newly born sciences to face the problems and challenges of their time: the explanation of how human languages and cultures appear and develop, the study of non-linguistic systems of signification, the ideological and literal criticism and the studies of the new media of mass communication, for example.

The European extraction of the theory of signs, although developed by Ferdinand de Saussure during the same period when Peirce was outlining his semiotic, turned out to be

the paradigm adopted in the studies of the processes of signification in most part of the world, especially after Claude Levi-Strauss generalized the structuralism to most of Human Sciences. Enhanced by Roman Jakobson's, Louis Hjelmslev's and Roland Barthes' contributions, the structuralistic semiology had, to the eyes of its followers, the advantage of defining precisely its subject matter, as well as offering a method capable of giving to Linguistics a scientific status according to the academic and ideological canons current in the 20th century (see Ginzburg *in* Eco and Sebeok, 1991, p.128).

When a more logical and scientific treatment to language was necessary, the work of Wittgenstein was always there to fill the gap, useful both for those who saw the issue from a more positivist and empiricist angle (as it appears in the first phase of the author, condensed in the *Tractatus Logico-Philosophicus*) and for those who had already realized that the syntax of Logic was very close to the probabilistic rules and the logic of a game, an idea that pretty much sums up the late phase of Wittgenstein's work – although few people were aware of (and some may still not be) that he might have absorbed the central concepts of his second phase from a contact with Peirce's pragmatism[4].

The banishment of Peirce's ideas concerning the sign was not complete though. Still in the first decades of the 20th century, some important names of the first generation of linguists, such as Morris and Jakobson, realized the richness of the triadic division of the Peircean sign. In fact, after learning about Peirce, Jakobson (considered one of the greatest exponents of the European tradition) recognized that the triadic division icon-index-symbol would open a "new, urgent and promising" (*apud* Auspitz, 1994, p. 603) horizon for the studies of the sciences of language and that Peirce had become his "most powerful source of inspiration" (*apud* Brent, 1993, p. ix), although not all of Jakobson's disciples seem to have understood what Peirce had to add to the dyadic model of Saussure.

3.1. Increasing interest

The fate of Peirce's semiotic changed gradually throughout the second half of the 20th century, when the so-called "crisis of paradigms" and the post-modernity were installed between the scientific method and the occidental culture. While dyadic semiotic

and structuralism weakened faced by challenges brought by the post-modern age – marked by the appearance of concepts such as complexity, emergence of systemic properties, cybernetics, artificial intelligence and sciences of cognition – Peirce's semiotic and his metaphysical ideas began to get increasing attention from researchers of several and very distinct fields. Philosophers, artists, biologists, psychologists, information theorists, anthropologists, logicians, physicists and scientists of communication in general are today among those who explore its potentialities.

Peircean semiotic is nowadays the base for an interdisciplinary study that helped to produce, in the past decades, a new vision of the world, much more integrated and coherent than any other theory was ever capable of producing. After the progressive separation of sciences between "hard" and "soft", initiated in the Renascence and culminating in the empiricism and positivism of the beginning of the last century, we finally have the possibility of unifying our understanding of the world in order to fill the chasm created between the "two worlds" of Human and Exact Sciences, as P.C. Snow described in his famous essay *The Two Cultures and the Scientific Revolution* (1959). Only a realistic conception of Sign allows that, as we will see.

4. A huge jigsaw

Peirce was never able to finish a book, but published around ten thousand pages of technical articles about many different disciplines. He also wrote or edited over ten thousand entries for dictionaries and encyclopedias and produced hundreds of reviews for magazines and newspapers both scientific and for the general public. The biggest treasure left by him, however, was in boxes with more than eighty thousand of non-published manuscripts about Semiotic, the Existential Graphs and many other philosophical, mathematical and logical issues. It is from these drafts that the experts have been slowly extracting a general picture of his work – an image that resembles that enigmatic one described in the famous story ***The Figure in the Carpet***, written by Henry James, William James' brother and also Peirce's close friend.

The first scholars to deal with this palimpsest of thousands of original sheets in the first two decades after Peirce's death worked isolated and with limited resources. Without being able to glimpse the general picture of the Peircean system, but aware of being drinking from a precious source of ideas, they ended up putting aside the project of rebuilding and understanding Peirce's philosophy in order to pursue their own intellectual objectives, almost always inspired by the contact with those writings.

In the 1930's two young Harvard professors, Charles Hartshorne and Paul Weiss, were given the task of selecting and editing the first six volumes of Peirce's Collected Papers (hereon called CP). They began the work by adopting a hierarchical structure that started from the most general subjects (the philosophical texts about the three categories) and advanced to more specific ones, to finally reach Peirce's metaphysical considerations. With this method of organization, Hartshorne and Weiss mixed published texts and manuscripts without much concern about chronology. The final result, completed with two other volumes edited by Arthur W. Burks, is a patchwork of ideas that increased even more the fame of hermetism that weighed on Peirce when he lived.

For over half of a century, the CP remained as the main bibliographical source for the small community of researchers interested in Peirce's work. One side effect of this is that its distortions and mistakes were reproduced and even expanded in texts written by the commentators. Some of the past Peircean scholars that based their work on the reading of the CP even declared, after failing in the attempt to find a thread out of the maze of texts, that Peirce really wrote in a confusing manner, repeated the same ideas and constantly invented terms that were used to define different things. Reading the CP, one can see that Peirce frequently announces an important discovery, but it is hard to grasp the meaning and extension of his discovery through the excerpts from distinct epochs.

It is true that Peirce had an obsessive method of composition that influenced this style, as he himself admitted (cf. MS 311). After meditating extensively over a theme, he would write several versions trying to find the most precise vocabulary and the most appropriate syntactical construction to eliminate any dubiety of interpretation (even though this would result in strange phrases if compared to the daily usage of English language). In each of the versions, he would dedicate different spaces to the addressed subtopics, trying to find the structure that would best reflect the relation between the internal topics and the

general theme. He would seldom be satisfied with the result. After abandoning the text for some time, he would read it again and corrected it meticulously, rewriting to exhaustion the passages that would not seem sufficiently precise in his opinion.[5]

This same method of production was applied in the architecture of his theories. Peirce would never be completely satisfied (or, at least, not for too long) with any of the versions of his doctrines when expressed in common language. He would revisit and self-criticize continuously his texts in order to get more precise formulations. There is not a final version for pragmatism, as well as there is not a final version for semiotic, neither for his metaphysics nor his Existential Graphs. What we find in all of them is the testimony of his endless search. As Peirce defined himself, he had always been a man of articles, not of books. With this statement he emphasized that the continuous evolution of his thought would always hinder him from producing a finished and comprehensive work, although the desire that this would happen someday fed all of his production.

One of the effects of this search for ever-better versions of his theories is that they appear in the manuscripts formulated in very diverted ways, according to the phase of Peirce's life or to the philosophical point of view adopted by him. The terminology of the articles and manuscripts vary a lot and terms used in a particular version might reappear with a distinct meaning later on. Sometimes the theory is presented in logic apparel, but in phenomenological or mathematic clothing in another one. The reading of two different articles on semiotic, written in different periods of over 40 years he dedicated to the study of signs can reveal to the most vigilant readers a profusion of new ideas that separates the first from the latest formulations of his theory. This evolution obviously cannot be noticed by the way the Collected Papers were edited.

Yet the CP started the Peirce scholarship, allowing an increasing number of intellectuals throughout the world to have a direct contact with Peirce's ideas. One important effect of this popularization was the beginning of a fruitful dialog between the American and European traditions. One important example is the collaborative work done between Thomas Sebeok, from Indiana University, and the Italian semiotician and philosopher Umberto Eco. Born and raised in the best environment of the Old Continent intellectuality, Eco reverenced Peirce in his series of books starting in the 1960's, producing an original – although incomplete – synthesis of the most important semiotic

concepts in both sides of the Atlantic Ocean. However, Eco and his disciples criticize the idea of extending semiotic beyond the field of human culture. On the contrary, he establishes a semiotic threshold separating the cultural sign, from human production and therefore semiotic, from what would simply be signals of physical and biological nature.

For Peirce, however, the signs are in the universe as a whole and the existence of life on Earth – and the human culture as a particular kind of sign related to life – is a result of the action of signs, or semiosis, rather than the other way around. It would take a lot of discussions, raised mainly under the auspices of Thomas Sebeok and the inspiration of the work of biologist Jakob von Uexkull, for the new generation of semioticists to start to understand the depth of these ideas. Gradually, Peircean semiotic was expanded to new sub-disciplines such as the zoosemiosis, the phitosemiosis and finally the new frontier of physiosemiosis (cf. Deely, 1994). In other words, it was necessary to wait for almost a century for the original idea of a universe "perfused with signs if not composed exclusively of signs" (CP 5.449) to be taken seriously.

In the mid-1970's, Peirce's name started to be mentioned more often in articles and books about Philosophy and Semiotic, although many of these authors' works frequently had a troubled contact with the works of Peirce, for the originals were kept at Harvard with very restrict access. At the same time, a team of dedicated students would dive in the copies of manuscripts and published works trying to find no longer the reconstruction of the greatest philosophical building which Peirce had dreamed of, but restricting their research to the more central themes of Peirce's thought – the metaphysics based on three categories, Semiotic with Logic, the Pragmatism and the Scientific Method, for instance.

As a result, an increasing bibliography signed by Christopher Hookway, Thomas Sebeok, John Deely, Carl Hausman, Kenneth Ketner, Thomas Short, Joseph Ransdell and Nathan Houser, among others, considering each of these themes began to appear in bookstores and libraries. In Brazil, the Peircean semiotic studies were levered by the linguists and poets gathered in the movement of concretism, markedly Décio Pignatari and Haroldo de Campos. However, soon they awoke the interest of scholars of communication like Lúcia Santaella and J. Teixeira Coelho Neto, as well as philosophers Lauro Barbosa Silveira and Ivo Assad Ibri.

From the second half of the 1970's on, this small but increasing community of scholars interested in Peirce's work struggled in order to make his work published again, now taking into consideration the chronological aspects and the crossed references of his system neglected by the CP. Thus in 1976, the *Peirce Edition Project* was born, held at the Indiana University campus, Indianapolis, in the United States, currently under the direction of Nathan Houser.

The PEP projects the publication of about thirty volumes, occasionally in partnership with other publishing centers worldwide. The collection has been organized chronologically and with texts revised and commented by an international team of experts. However, only six volumes covering mainly the initial and intermediate phases of Peirce's philosophical production have been published until now. The texts considered important to the foundation of semiotic and its relation with the ideas of the mature phase of Peirce's thought still do not have prevision of publication – a frustrating perspective for those who would like to study the detailed evolution of Peirce's semiotic with all the existing material published. In order to fill this gap though the PEP published selections of the most important texts of Peirce's career, two volumes of *The Essential Peirce – Selected Philosophical Writings*, which today are considered indispensable sources to whoever intends to grasp the essence of the author's thought.

5. Peirce's place in the history of semiotic

Today it is known that Peirce was the creator of a formal theory of Signs simultaneously but independently from Swiss Ferdinand de Saussure. These two theories were not born *ab novo* nor are a coincidence that came to light at the same time – even though Saussure and Peirce had never known about each other's production. These theories are the result of a long process of systematization of the many previous contributions. They are ideas of the Sign and its practical dimension that remounts to at least the Plato's discussions regarding the problem of the representation and Aristotle's arguments on Rhetoric. After that, many philosophers retook and expanded these questions, producing not exactly theories, but yet "doctrines of the Sign" encrusted in the interior of the treatise of theology, psychology or phenomenology. Some, as the Portuguese Poinsot, advanced so

much in the theme of the Sign that they can well be considered semioticists *avant la lettre* (Noth, 1995, p. 20).

Both Peirce and Saussure were influenced by the Positivism of the beginning of the 20th century. This philosophical school tried to ground and to classify the sciences in general isolating their objects and submitting them to the experimental method of study. Both Peirce and Saussure intuited that the questions connected to the Sign should compound a body of concepts capable of being organized in a proper theory that could be scientifically tested. At the same time, they wanted to place this new field of research in the general board of Science, revealing the possible relations between the Theory of the Signs and its neighboring areas or fields. Here appears the first important conceptual difference between the two proposals: Peirce saw his **semiotic** as a synonym for the **science** of Logic, whereas Saussure placed his **semiology** as a subordinate **discipline** inside the science of Linguistics (Lizska, 1996, p. 15).

5.1 The dyadic model of Saussure

When he announced the birth of his semiology, Saussure affirmed that its role would be to research "the life of the signs in the heart of society", discovering what they are and the laws that rule them. Semiology would be then a branch of social psychology dedicated to study the sign as a product of human relations **and** in its contrast with nature (Deely, 1990, p. 114-115). This mentalism reveals the filiation of the Semiology of Saussure to the cartesianism or, more specifically, to the model of Sign conceived by the French school of Pot-Royal, follower of the theory of the innate ideas of Descartes and of the priority of the intellect over the experience (Noth, 1995, p. 43).

The mentalism of this proposal impedes whoever accepts it to consider the signs as mediators between the intellect and the reality external to it, that is, something that crosses both dimensions, putting them in contact. Besides that, when placing over his Semiology the halter of linguistics, Saussure affirms that the arbitrariness of the linguistic sign ought to be the leading principle to which Semiology should conform itself.

This arbitrariness of the sign is the basis for the dualistic relation between Signifier (the psychical impression or "acoustic image" produced in the mind by the Sign) and

Signified (the mental concept to which such image is linked by a rule purely arbitrary). The conception of Sign by Saussure not only states nothing regarding the Object of the Sign, but also does not contemplate the notion of the Interpretant, central to Peirce's semiotic because it enables the sign to slide its meaning towards a Final Interpretant – a property related to the finial process fundamental for the solution of the problem of the intentionality of the Sign.

5.2. Roots of Peircean semiotic

The development of Peirce's semiotic, as well as its implications for philosophy in general, has been explored in detail by the North-American philosopher and semiotician John Deely (1990, 2000, 2001). He surveys the history of the concept of Sign starting from Classic Antiquity and follows it up to the emergence of what is conventionalized to call Post-modernity, at the end of the 20th century. For Deely, if the beginning of Modernity is in the philosophy of Descartes, as it is commonly accepted, then the initial landmark of Post-modernity must be found in the philosophy and semiotic of Peirce. This is so because Peirce was the first philosopher to build a system in complete opposition to Descartes, making a great effort since his first writings to destroy the foundations of the Cartesian philosophy, such as the belief in the innate ideas and the grounding of knowledge in a artificial doubt, as it is the case of *Cogito*.

Santaella (1998, p. 115-116, *my translation*) agrees with Deely when she affirms that

> If there is a philosopher to whom Peirce was radically adverse, this philosopher was
> Descartes. Therefore, I normally say that if Descartes founded the modern philosophy,
> Peirce should probably have founded the post-modern philosophy. [6]

Deely argues that it is possible to tell the whole history of western philosophy from the way each period considered the sign. This history of semiotic is, for him,

first of all an achievement of semiotic consciousness and then the working out of the implications of that consciousness, so far as it is able to sustain itself systematically, in every sphere of knowledge and experience. In this way, it is a history that extends also into the future, and will never be completed while thought itself continues to grow (1990, p 107).

When summing up the evolution of philosophy through the eyes of semiotic in key words that capture the essence of each period, Deely affirms that we can say shortly that the Ancient Age discovered the **Substance** and the Latin Age, the **Being**. The philosophers of Modern Age did not continue the route opened by the ancient thinkers, but took the shortcut of **Ideas**, which brought us several sorts of idealism typical of modernity. At the dawn of Post-modernity, the period where we are now, the challenge for philosophy is to retake the route abandoned by modernity, recovering the concept of the sign of Latin Age and their scholastic heirs. Only that could put philosophy back on its track again – but that is exactly what Peirce intended to do. Let us see very briefly how the evolution of human consciousness about the Sign occurred and how Peirce could be placed in it.

5.3. Semiosis and Post-modernity

The Greeks took the first important step in the history of semiotic. Concerned above all about the idea of Substance, the Greek philosophers were interested in the sign (*semeîon*, in Greek) mainly as an emanation from the natural world. As it is evident in *Cratilus,* Plato (427-347) sees mental representations with suspicion and even disdain. He considers them imperfect and dangerous deceivers if compared with the direct knowledge of the world. Even Aristotle (384-322), despite his monumental contribution to Logic, Psychology and Epistemology, never extended the concept of *semeîon* to the mental phenomena. It is not a coincidence that one of the most important names of the doctrine of Sign in Antiquity was Galeno (139-199), a physician who first studied the signs, or symptoms, as elements for the diagnosis of diseases.

This panorama changed radically in the Latin Era, which started with Saint Augustine (354-430). He was the first to propose a "general" doctrine of signs embracing

not only the natural symptoms, but also the conventional signs. In his definition of the Sign, Augustine defended a necessary bond between the sensible element, considered as the vehicle of the sign, with a possibly immaterial content, that is, imperceptible, considered the meaning of the sign (Deely, 1990, p.111). In Augustine's words, " (the) sign is, therefore, something that beyond the impression that it produces in the senses, causes another thing to come to mind as a consequence of itself" (apud Noth, 1995, p. 34, *my translation*).

Although his concern with Signs was a consequence of the theological need to handle religious spheres of the semiotic phenomena, as the Christian sacraments, the generalization of the Sign proposed by Augustine for the first time allowed the application of the sign doctrine to all aspects of human nature and even beyond it, touching the biological, since he defines the mental Signs as those which " all living beings mutually exchange to demonstrate the feelings of the mind" (*apud* Noth, *ibidem, my translation*).

The highest point of Latin Era, nevertheless, was Saint Thomas Aquinas (1227-1274), whose philosophy tried to recover the legacy of Aristotle and adapt it to Christianity. In fact, the starting point of Aquinas' epistemology is the Aristotelian distinction between knowledge acquired through the senses and that acquired through intellectual labor. Furthermore, he establishes that the intellectual sphere depends on the one of the senses impressions. By producing the union of the Thomism and St. Augustine's sign theory, the medieval scholastic heirs of Aquinas maintained the opinion that the sign could be both natural and mental and that all mental cognitions depended on the perception of an external reality to the mind – what would become two important presuppositions of Peircean semiotic, as we will see.

Before Peirce came to scene, however, Portuguese Jean Poinsot (1589-1644, also known as fra John of St. Thomas) had the role of extracting important implications of the concept of the sign left by the scholastic tradition. He presented amidst a treatise that gathers and organizes all the knowledge related to the scholastic movement. Although Poinsot lived in the 17th century, when modern philosophy was taking its first steps, Fidalgo and Gradim (2004/2005, p. 48, *my translation*) affirm that "we can consider that

John of St. Thomas, who is a medieval in style, spirit and convictions, closes the debate about the sign as it was admitted by the scholastics".

Poisont was a student among the Conimbricensis, the name by which the Thomist jesuits of Coimbra University, based on Lisbon, are traditionally known. In his *Tractatus de Signis*, Poinsot demonstrates that the definition of sign does not demand that one makes an ontological choice between contents of the mind or external to the mind, but that it is possible to relate the real with the ideal without prejudice of any of them. His treatise already figured, although in scholastic and medieval terms, the triadicity of sign, which Poinsot describes as something virtually present in nature but really active in the experience, acting on the three levels of conscious life: sensation, perception and intellection (Deely, 1990, p.112-113).

Unfortunately, Poinsot's treatise remained unknown for over three centuries since he diligently included it as a part of a much broader course of philosophy, causing it to remain hidden to many researches, including Peirce. To worsen the situation, in the precise moment when the Latin tradition reached its highest analytical sophistication about the sign, this development was interrupted by the arrival of Cartesian gnosiology that ended up leading the western philosophy to the solipsism.

Although Peirce had not known Poinsot's work, he was able to drink from the same sources that fed the Lisbonese, as the Latin and scholastic philosophers. It is not a coincidence, then, that Peirce, just as Poinsot had done before, also transcends the distinction between real and mental signs, showing that these two instances are linked in the very concept of a Sign considered essentially triadic. Reasoning, considered by Peirce as semiosis - a network of signic relations evolving from the contact with reality – takes distance from mentalist idealism or Cartesianism when it grounds thought in perception, saving the realistic epistemology from nominalist excesses of Descartes, Hume, Kant and, indirectly, also from Derrida's skepticism.

Peirce's triadic Sign is anchored in the scholastic realism, in opposition to Cartesianism, to guarantee that thought does not happen inside a black box but emerges as a product of a continuous dialogue with a dynamic object external to the mind and also in continuous transformation. Besides, this dynamic object is seen through an amplified

ontology in order to extend it to all possible dimensions of reality, and from which the sign extracts the strength to its development. ***Semiosis*** might be considered, therefore, the key word to Post-modernity (Deely, 1990; Merrell, 1996).

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[1] See in Appendix II a short chronological biography of Peirce.

[2] According to Peirce, and as we will see shortly, every phenomena can be explained from the relation between three categories which he called simply Firstness (the universe of the qualities of feelings), Secondness (the universe of reaction, brute force and existence) and Thirdness (the universe of mediation, of the continuous, of the intelligence and the purpose).

[3] Peirce explained this, in part, by the fact of being a left-handed, which would give him an inclination to think lateral relations among the premises, while hampered him to write in a linear and hierarchical way.

[4] This happened probably through two indirect ways: from Wittgenstein's friend, the mathematician Frank Ramsey, an admirer of Peirce's logic; and from the book *The Meaning of Meaning* written by the two linguists Ogden and Richards, published in 1923 (Nubiola, 1996; Auspitz, 1994, p. 603).

[5] This method resembles the one Edgar Allan Poe introduced in his famous essay *The Philosophy of Composition*. Maybe this is not a coincidence since Peirce and Poe, both from the region of Boston and contemporaries, also show some similar personality traits. In addition, Peirce was a declared admirer of Poe and both were interested in semiotic and in the practical effects of the action of the sign.

[6] This statement is better explained in *O Método Anticartesiano de C.S. Peirce* (2004), where Santaella explains the importance Peirce recognized in the work of Descartes, to the point of choosing the French Philosopher as an interlocutor to contrast with his own theories.

II- PEIRCE'S SEMIOTIC STEP BY STEP

1. Scattered fragments

Peirce never wrote a treatise on semiotic. His ideas had to be collected from dozens of articles published throughout half a century of research, from manuscripts and notes in notebooks and from the letters he exchanged about the subject. A compilation of texts from very different sources and periods shows – as it could be expected when we talk about Peirce – a theory in constant evolution. There was not a single time in which, while working on his semiotic, Peirce failed to introduce new terms and interpretations. Besides that, in his large philosophical architecture, semiotic works like an amalgam capable of unifying several disciplines. It is mentioned and discussed in articles and letters about subjects as different as logic, mathematic and metaphysics. Peirce felt the obvious necessity of adapting the terminology and the notation according to the canons accepted by each of these sciences. As a result, charting the evolution of Peirce's semiotic demands knowledge in the various sciences it dialogues with, which was only possible to accomplish recently and yet in an incomplete way.

The initial question, which has produced a lot of controversy among Peircean scholars, is how we should picture the evolution of Peirce's thought. Some, like Ransdell (personal communication) argues that Peirce maintained throughout his career the essence of the arguments presented for the first time in the articles published in the 1860's. Murphey (1993, p.3), on the other hand, believes that Peirce's philosophical architecture is similar to a house whose interior is being continuously remodeled, although preserving most of its structure. Short (2004) affirms that Peirce abandoned many of his juvenile ideas. Savan (1977, p. 179) goes further to say that Peirce's mature Theory of Signs has little to do with his first formulation in 1860's. It is necessary, thus, to know a little about how these changes may have happened.

The study of the signs had been present in Peirce's intellectual life since at least the middle of 1860's, when he was still a college student at Harvard. In 1865, at the age of 26, Peirce made a series of conferences in Harvard about the logic of sciences wherein he proves to dominate Kant's transcendental philosophy, the foundations of logic and the theory of probability, as well as the problem of representation – or how the ideas appear in

the human mind (Queiroz, 2002, p. 61). This last one is an important logical problem, for the truth of any proposition analyzed depends on it. Throughout his intellectual life, Peirce tried to study this matter under all the possible points of view. He extracted lessons from philosophical texts since antiquity, such as Plato and Aristotle, going through medieval ones up to his contemporaries of the 19th century.

The closest we have to a systematic exhibit of his Theory of Signs, made by Peirce's own hands, is a brochure written to follow a series of lectures he gave at the Lowell Institute, in Cambridge, in October 1903, focused mainly on logic. This brochure is normally referred as *Syllabus* among the scholars, many of whom consider it the most finished version of his semiotic. In its pages appears the famous inverted triangle with ten genuine classes of signs created from three triadic divisions (or trichotomies). This is the classification found in most manuals and articles on Peircean semiotic.

However, Peirce never considered the version published in the *Syllabus* the final word on the problem of classification of signs. As we will see shortly, the 1903 classification, although important, represented the beginning of a new round of creative revisions of his semiotic, which went through the years of 1905 and 1906 and, actually, never ended. The number of trichotomies, which in the 1903 *Syllabus* was only three, from 1905 on came to be ten, with the daunting perspective that the classes of signs could be counted by thousands. Between 1907 and 1909, Peirce had taken his semiotic to such new directions in comparison with the past ones that the classification of the *Syllabus* was not even considered by him a starting point for his new classificatory exercises.

1.1. Synthesis of traditions

Peirce derived his conceptions of semiotic as logic probably from the reading of the British empiricist philosophers. In fact, Locke had already affirmed in 1690 the necessity of a new type of logic, which he named *Semeiotic*, explaining that it should be a doctrine about the signs the mind makes use for the understanding of things. Still in the British tradition, Peirce received an influence from the logic of Mill, as well as from the writings of Hamilton. The empiric tradition usual to the British philosophers emphasized the importance of the inductive inference and the related concepts of connotation (the predicable qualities of a term) and denotation (the things to which a term is applied) as

fundamental to logic. The British logicians considered these two quantities essential for the study and classification of inferences and they played an important role in the formulation of Peirce's semiotic, mostly in its initial phases.

Nevertheless, Peirce already writes in his first articles that these two quantities could handle a central phenomenon in logic, which is the growth or evolution of the meaning of terms and propositions. For that reason, Peirce expands the logical dichotomy denotation/connotation introducing a third element: information. Information is an idealistic component launched in the interior of the empiricist logic and its introduction would have important consequences for the future of his Theory of the Signs, mainly in his mature phase, when it embraced the reality of Thirdness. When semiotic mixes up indissolubly with metaphysics, the concept of information will be the foundation of Peirce's "idealistic realism", also called objective idealism (Ibri, 1992, p. 55 and *ss*), which attests that universal forms are the agents that determine the existence of objects.

One has to remember indeed that one of Peirce's greatest intellectual battles was to produce a philosophic synthesis that could extract the best from German and British traditions without losing sight of the latest scientific achievements. On the one hand, this concern drove him into the scholastic philosophy, where he tried to find the roots of the two traditions he had strived to unify. From the reading of Occam and Scotus, for example, Peirce reached the doctrine of signs devised by the stoics and, more importantly, the definition of the material implication accredited to Filo de Megara. On the other hand, this search for a philosophical synthesis made him read the greatest names of German school, as the transcendentalist Kant, the mathematical philosopher Leibniz and the idealists Hegel e Schilling (Esposito, 1999, L1).

Peirce's philosophy also had an important naturalistic side, linked to his work as a geodesic and metrologist responsible for drawing and performing practical experiments, which also had strong influence in his semiotic. In addition to all these influences, Peirce was also aware of the recent developments from the Theory of Evolution and impressed by the many advantages Mendeleev's classification of chemical elements according to its valences and possibilities of connection had brought to chemistry. Peirce also studied intensively the zoologic classification performed by Agassiz, of whom he was a direct

student in his youth (Esposito, 1999, L1). All this contact with empirical methods supplied ideas he would use and adapt when developing his semiotic.

Soon Peirce concluded that science should start with a genuine effort to reveal and cast the natural classes given to direct observation – i.e. its starting point should be phenomenology. Having identified and defined the classes by their typology, science should then proceed to their proper classification, i.e. the arrangement of the natural classes according to their relations and affinity. This procedure should produce an architectonic classification of all the possible sciences (current and future), wherein the most abstract, as mathematic, should offer subsidies to the most empirical ones.

The primacy of mathematic in the classificatory construction of sciences, as well as its role as provider of subsidies to the other sciences, instigated Peirce to maintain a restless research about the foundations of mathematic and its relation with other sciences, mostly with logic. It comes from mathematic, for instance, his terminology about the three categories (Firstness, Secondness and Thirdness). From his study about the relation between logic and mathematic, Peirce developed an algebraic logic independently from Frege. He also produced an axiomatization of natural numbers, and studied in detail the postulates and theorems of the Euclidian geometry, as well as the consequences of the new geometries proposed by Riemann e Lobatchevski. These studies also led him to research the notion of relation, of infinite and of continuum that he tried to apply to a special type of topology closely related to his semiotic and his graphical logic.

In his first attempts to classify the sciences, logic appeared as a subordinate ramification of semiotic. While the latter regards the signs in general, the former would be responsible for focusing its attention only on the symbols and the logic figures directly related to them, such as the term, the proposition and the argument (this last one also called syllogism or inference). That is why Peirce's first important contribution to logic, made in the 1860's, was the classification of the traditional Aristotelian syllogisms under the aegis of his three categories: the term is a First, the proposition, a Second and the Argument, a Third. Later, however, Peirce started to consider semiotic and logic as synonyms (Houser, 1992, p.xxx) – and a good part of his research was concentrated in the production of a definite classification for all the possible types of signs.

To this work of revealing typologies of signs and classifying them accordingly, Peirce gave the name of **Speculative Grammar**, which should be the first ramification of semiotic. The second ramification is **Critical Logic**, considered by him as the science about the truth of representations, i.e. the study of the possibility of a sign to truly represent its object. Finally, Peirce conceived the **Speculative Rhetoric** (also methodeutic or communication) as the third ramification of semiotic, defining it as the study of the effects produced by the action of the sign on its interpretants. Put in another way, Rhetoric is the study of how a "Form" can be transmitted from the object to the interpretant, being the sign the vehicle of such transmission.

It is under the point of view of Rhetoric that semiosis can be seen as communication oriented to a purpose. In his maturity, Peirce will emphasize that semiosis is not restricted to human minds but happens also in naturalized *quasi-minds*. It follows that communication is not necessarily intellectual, but can be considered an ontological process that produces the communion of minds of each person with the others and of all minds with the totality of a universal quasi-mind (cf. Murphey, 1993, p. 353).

In this chapter, we intend to aim at the evolution of Peirce's semiotic, but we cannot prevent from relating it to other fields of his philosophical interest such as cosmology and, specially, his Pragmatism. After all, a good part of Peirce's efforts to develop his sign theory, mostly after 1900, was due to his attempt of offering a strictly logical proof – or, at least, a philosophically consistent one – to his version of Pragmatism, that he sometimes called **Pragmaticism**. It is specially interesting to follow up how semiotic, although initially used by Peirce as an instrument of proof for his pragmatic method, grows slowly in importance to comprise the action of the sign in all possible instances of reality and not only in the clarification of concepts, as originally proposed by Pragmatism (Houser, 1992, p. xxxv).

Let us see briefly how this evolution occurred.

2. First phase: 1867 to 1883
The triadic sign and the denial of the Cartesian intuition

Peirce starts to develop his theory of Sign already in the first articles published by him, between 1867 and 1871. The first of them, which many scholars consider Peirce's most important contribution to occidental philosophy, is "On a New List of Categories" (1867), referred normally in the short form of *New List*. There Peirce revises the table of categories of both Aristotle and Kant, exposing for the first time his tripartite ontology. In the two following years (1868 and 1869), he publishes three other articles, today referred by the experts as the "cognition series". In these texts, he develops his concern about the origin of knowledge in our minds presenting an alternative for Cartesian gnosiology. Peirce strongly refutes the idea that knowledge is grounded on an artificial doubt, as it is the case of the *Cogito*. Contrary to Descartes, he defends that inquiry must begin with a genuine doubt, and that we must seek its answer not getting rid of pre-concepts but trying to correct and refine them throughout the process of inquiry.

The dispute between nominalism and realism is the background of these texts. The controversy is a derivation of the old "question about the universals" that has divided philosophers since Classic Antiquity. It may be put this way: is an idea a mere creation of our minds in order to give sense to the multitude of impressions, or does this idea really exist in the world and what we do is try to apprehend it the best we can with the limited powers of our intellect? Roughly speaking, whoever believes that the concepts are just names created by our minds to subsume the sense impressions is a nominalist. The realist, on the other hand, believes that general ideas, or universals, are in some way present in the reality, acting independently of whatever we may think of them. If nominalism is correct, Peirce argues, we are condemned to individualism, for each one of us will develop his own conceptions about the world; but if realism is correct, only the union of efforts of all intelligent minds may be able to form a true concept about reality. Nominalism leads to solipsism, but realism opens the doors to pragmatism as a method to clarify the ideas in the search for Truth.

Actually, both nominalism and realism had many ramifications in the history of philosophy, including doctrines that proposed an intermediate position between the extremes. Peirce, probably on Kant's track, was an assumed nominalist in his youth, but changed his mind and reached maturity proclaiming to be an extreme realist. The fact that Peirce had abandoned nominalism does not mean that he had become anti-idealist, however. As noticed when we mentioned his concept of information, while Peirce should be considered a realist regarding logic, he also proclaimed to believe in a kind of objective idealism when he talked about metaphysic. That is why some commentators prefer to say that Peirce developed a sort of *sui generis* idealism-realism.

The fact is that Peirce's inaugural article is markedly Kantian and nominalist. In the *New List*, the element that condenses the knowledge about the world is the **representation** – a mental manifestation that bridges between the world and the intellect. It all starts, Peirce describes, with the synthesis of the senses impressions, where the mind creates ideas or general concepts through a process of comparison. Peirce proposes that two major groups divide the categories present *a priori* in the mind during this task: Being and Substance. While Substance remains as something uncognizable, in the Kantian transcendental sense, Being manifests itself to mind in the three ways that reflect the three possible types of comparison: quality (when related to a ground), relation (when related to a correlate) and finally **representation** (when related to an interpretant).

Afterwards, Peirce applies a similar trichotomy to representation, originating what he called at that time Resemblances (later Icons), Indexes and Symbols. The word representation, then, as used in the "New List", equals what later Peirce would define as the genuine relation between sign, object and interpretant (S-O-I). There is, as we see, a triadic and indecomposable relation in the production of a sign: significance does not occur in the relation between the sign and its object only, as the majority of the previous theories of the signs affirmed, but it demands a third correlate. This new element is the interpretant, seen as the effect produced in the mind by the sign and, therefore, another sign. At this time, it must be clear, Peirce still saw representation as restricted to thought – a kind of internalized discourse inside the mind, based only on general concepts and very similar to the functioning of language (Short, 2004, p. 10).

In the three articles following the *New List*, dedicated specifically to the problem of cognition, Peirce eliminates the bipartition between Being and Substance, assuming the thesis that there is not such thing as the Kantian uncognizable object, but everything can be learned by experience. The central purpose of these articles is to defend the idea that human cognition is a dynamic process that does start with an artificial doubt, as proposed by Descartes, but happens *in media res*. We should start the inquiry with our preconceptions or imperfect ideas and only slowly, by a continuous process of inferences, improve them in the direction of Truth. Using hypothesis and their empirical tests against reality, we should be able to produce an argumentation not concatenated as a chain (that cannot be stronger than its weakest link), but weaved like a cable made of thin and subtle fibers, provided they are so numerous and intimately connected to guarantee its strength.

For the 1860's Peirce, the "train of thought" is a sequence of concepts without beginning or end. They all blend with each other the same way dots merge to create a line. A thought is a sign that represents a previous thought, which assumes the role of its object, and is interpreted by a subsequent thought, which assumes the role of its interpretant – and so on *ad infinitum* (Short, 2004, p.9). This mental semiosis assumes a fundamental role in the pragmatic search for Truth, which is expected as the result of the whole process. Although this is an infinite series, semiosis does not have to drag out forever because the inferences occur at infinitesimal intervals, which are agglutinated through the schema of time. Peirce resorts to the paradox of Zeno describing the race between Achilles and the tortoise to show that the idea of an infinite series of interpretants does not imply endless semiosis. As much as Achilles will eventually reach the tortoise, the infinite series of inferences will produce a cognitive result.

In a review dedicated to the re-edition of the works of bishop George Berkeley's (a well-known nominalist of the past), published in 1871, Peirce takes another step towards realism, although a type of realism still distant from the scholastic kind he would assume in the future. For example, the realism of this period still lacked a clear notion of Secondness as the expression of a reality that exists outside mind and independent of what we think of it. This is precisely the role the index will take in the years to come. Although Peirce had already divided the sign in Resemblances, Indexes and Symbols, they were still mental stuff. In addition, Peirce still holded that the logician should consider only the types of

representation derived from the symbol. Therefore, whatever is exterior to mind should not interest him/her.

This nominalist leftover lasted the whole 1870's and influenced the foundational text on Pragmatism, *How to Make Our Ideas Clear*, published in 1877. According to Houser (2002), this article intended to show "that the pragmatism were an improvement of the method of Descartes of classifying ideas through his test of clearness and distinction". This means that Peirce restricted his Pragmatism to a method to make clear concepts only, relating their meaning to the practical consequences implied in their acceptance. Peirce's inclination to nominalism is explicit, for example, when he writes that nothing forbids us from affirming that "all hard bodies remain remain perfectly soft until they are touched" (EP1: p. 132).

3. Second phase: 1883 to 1896

The discovery of quantification and the semiosis of the natural world

In the rest of the 1870's, Peirce abandoned temporarily the dispute nominalism-realism and made a great effort to promote his Pragmatism in the meetings at the Cambridge Metaphysical Club. Besides that, he was interested in developing an algebraic logic inspired in the recent works of Boole. He started to harvest what nearly ten years of studies had produced in 1883, when Peirce and his most brilliant student at Johns Hopkins, Oscar Mitchell, concluded that the logic needed Indexes to express the idea of quantification (Short, 2004, p.12). In other words, they discovered the need to use selectives such as "some" and "all" to indicate the subject of a predicate. They discovered quantification independently of Frege, who had come to the same idea of quantifiers but whose work remained unknown. At this same period, Peirce studied Cantor's ideas about the continuum (Houser, 1998, p.xxviii), which inspired him to develop his own hypothesis about what later would be called set theory.

These important advances led him to reformulate his philosophical system and had an important impact in semiotic too. The quantification through indexes, for example, led Peirce to recognize that the world exterior to mind possess an undeniable reality and that

logic had to incorporate this lesson in its notational system. In another important text about the algebra of logic, published in 1885, Peirce wrote that a complete logical notation should possess general or conventional signs (symbols), quantifiers or selectives of the same nature of demonstrative pronouns (indexes) and signs of resemblance. Peirce no longer considered the index a secondary element in the process of knowledge and representation.

One crucial effect related to the new place assumed by the index in Peirce's logic was the abandonment of the previous thesis that all cognition necessarily precedes another (the thesis of the "train of thought"). As one of these pins that we use to pinpoint an individual place on a world map board, the index selects a particular occurrence of a general concept, which then becomes the subject of a predicate. As a result, if an index is existentially connected to the subject that it denotes, then so is the proposition connected to the same subject. That means that cognitions do not have to be necessarily enchained one another, *ad infinitum*, but they may begin in perception.

With the new role reserved to the indexes, Peirce also refined the terminology of his semiotic. What was called "resemblances", "copies" and "images", then began to be called **icons**; and the hypothesis, which had been presented for the first time in articles about cognition, now received the name of **abduction** or, alternatively, **retroduction**.

At this same time, Peirce adopted the notion of degeneration, borrowed from projective geometry, and applied it to his logic of relations. Thus, now he explained icons, indexes and symbols as derivations from three different types of relation that a Sign could have with its object, according to the theory of categories. The icon relates in a monadic manner with is object, be it by resemblance (when sign and object share the same property) or by exemplification (when the object is a property the sign possesses). The index presents a dyadic relation with its object, for it has a real connection with it. Only the symbol possesses a genuine triadic and, therefore, intrinsically logic relation with its object, having the power to represent it by an arbitrary convention (CP 2.274).

While the bond between semiotic and categoriology had been tightened, in 1887, Peirce fostered a controversy against the mechanistic vision of the universe defended by Spencer (cf. CP 1.33). According to Peirce, a purely mechanical causation, such as the dyadic cause-effect, is not able to explain the phenomena of growth and development present in the universe. There was the need to assume, therefore, a third element considered

"virtual", in the sense of having a virtue that would be put into effect in the future. Peirce's universe is not mechanistic, but teleological and guided by purposes.

The conception of final causation was the first step towards the creation of a metaphysical semiotic, which semiosis considered as the teleological movement of a reality composed by signs – a vision that would only be put into effect two decades later. Around 1888, Peirce affirmed that there were only three active elements in the world: first, chance; second, law; and third, habit formation. Although there was still no explicit identification among these three ontological stages and the sign trichotomies, Peirce was walking rapidly in this direction.

Other important steps for the synthesis between metaphysics and semiotic occurred between 1892 and 1893, when Peirce formulated his doctrines of tychism (the existence of the absolute chance) and synechism (the existence of a profound connection among all things of the universe, expressed in the form of a continuum). In its exposition of tychism, chance (or spontaneity) is considered a creative element of a universe conceived as living mind. Matter is nothing but effete mind, whose creative power had been attenuated by habits in the form of laws of physics (CP 6.158).

In the mid-1890's, and as another consequence of his studies about the role of the index in logic, Peirce proclaimed his acceptance of what the medieval scholastic Duns Scouts defined as *haecceitas*, or a pure existent *hic et nunc*, without involving quality or generality (Houser, 1992, p. xxvii). This "outward clash" brings changes in his way of seeing the Pragmatism: reality is no longer considered what the last opinion of a process of inquiry will effectively reveal, but simply the hope of a final accordance that stimulates the community of inquirers to continue their search. In other words, reality starts to assume a conditional mode: it is what ***would be*** revealed if all the possible efforts of inquiry were performed while pure Secondness, taken as absolute chance, keeps adding creative novelty that continuously influence the evolutionary process.

Still between 1895 and 1896, Peirce wrote several drafts for a chapter of a book of logic that was never completed. In these manuscripts, he showed once again the intimate relations between logic and semiotic, explicitly comparing semiosis with mental reasoning. According to Peirce, a proposition, for instance, should always contain Icons and indexes. Besides, abduction is emphasized as the only kind of reasoning capable of offering new

knowledge and, therefore, essential for the developments of logic and sciences in general. Peirce explains abduction as a kind of instinct based on the affinity between our mind and nature. He concludes that the logic of Pragmatism is essentially abductive, attached to non rational and probably non conscious processes of the mind.

Finally, while his semiotic was continuously being enlarged to comprehend non rational phenomena, Peirce began to distinguish two senses for logic: a more traditional one, restricted to the forms of inference and their conditions of truth; and another much more comprehensive, in which he could glimpse a general Theory of Signs that exceeded the limits of traditional logic to comprise the vestibules of reason.

4. Third phase: 1896 to 1905
The studies of perception and the 1903 classification

The third phase starts when Peirce takes a further step towards a logical realism to accept, in 1896, the universe of the possibilities as ontologically present in the world (Short, 2004, p. 15). In 1897, Peirce advocates a kind of realism that resembles that of Aristotle, but with special emphasis on the *haecceitas* of Scotus. Peirce now considers the three categories – possibility, reaction and mediation – as complete and irreducible, finally naming them Firstness, Secondness and Thirdness, extracted from Mathematic. This new ontological vision led Peirce to retake his studies about cognition, conducted previously under strong Kantian and nominalistic influence, to present them in accordance to the new realistic clothing of his philosophy.

In 1898, William James, the old friend from the Metaphysical Club during the 1870's, and then considered one of the most outstanding North-american intellectuals, made public that Peirce was the creator of the philosophy of Pragmatism. The agitation that followed this announcement produced a double reaction in Peirce: on the one hand, he began to criticize openly and acidly all those who used the term pragmatism out of its logical range, without sparing even his friend and benefactor James, whom Peirce blamed of maculating Pragmatism with psychologisms. On the other hand, Peirce assumed the responsibility of revising the basis of the Pragmatism, offering to this doctrine a definite

logical proof. He hoped to accomplish that using the instruments and concepts in logic and semiotic he had implemented since the first formulation of the pragmatic maxim.

The beginning of the 1900's relit in Peirce the desire to write a book compiling the results obtained in his studies in logic, modality and topology, as well as the latest developments in the logical syntax of Existential Graphs. He came to produce a brief sketch of the themes he would tackle in such a book – considered today the best display of Peirce's logical architecture made by his own hands (cf. CP 4.227-322). However, his hope of systematizing his recent contributions was once again frustrated because he did not receive the financial support he expected to carry the project forward. While waiting for a grant that would never come, Peirce returned to his Theory of Sign in search for the desired proof of Pragmatism. At the same time, James invited Peirce for two series of conferences to be held in 1903: one in Harvard, dedicated to Pragmatism and the other at Lowell Institute, in Cambridge, directed to logic.

The consequence of this double stimulus – the search of a sound proof of Pragmatism and the preparation for the coming conferences – was a complete revision of his semiotic for it became clear to him that semiosis was linked to the laws of nature. In fact, in 1902 Peirce returned to his articles and manuscripts produced between 1891 and 1898, most of them dedicated to the discussion of the Theory of Evolution and its relations with the laws of Physics. Reading this old staff through the new metaphysical light, he concluded that the purpose that guides the evolution of the species and the laws of Universe cannot be based on consciousness but, on the contrary, it is consciousness that should be considered a sub-product of a telic movement towards a final purpose. This is, summing up, the Aristothelic thesis of the final cause and Peirce adopts as a fundamental component for the development of the sign, based on semiosis.

Peirce concluded that logic and semiotic should be considered synonyms for being animated by the same leading principle. Borrowing the medieval division of liberal arts in Grammar, Logic and Rhetoric, Peirce for the first time announced his famous division of Semiotic in Speculative Grammar, Critical and Speculative Rhetoric (or Methodeutic). Still in the ambit of the conferences about Pragmatism scheduled for 1903, there was the need of approaching once more the problem of the origin of knowledge. Peirce faces it under the phenomenological point of view of perception, taking advantage of his studies in

quantification and of the role of index in logic. Beginning in 1902, but carrying on for the next four years, Peirce developed a new theory of perception, destined to conjugate his logical realism with his falibilism, and which would have its first presentation in the lectures of Harvard in March 1903.

Peirce explains that our first logical premises are born from the contact with reality through the perceptive judgment. This does not mean that these judgments are inmanent intuitions about the real – which would mean his surrender to the Cartesian thesis he had so hardly combated in the articles about cognition and, therefore, fallible. It is impossible, thus, for us to know immediately the relations among things, although we can make suppositions about them that are blindly accepted until they are discarded or reformulated by subsequent judgments. With this ingenious thesis, Peirce gives an answer to the question of the first cognitions without having to resort to the endless train of thought. He did this without affecting his doctrine of falibilism, considered by him a fundamental pillar of Pragmatism (Short, 2004).

In some moment between the conference in Harvard and the writing of the Syllabus for the conferences at Lowell Institute, held in October 1903, Peirce had an insight that led to an important change in the structure of his classification of the Signs. According to Freadman (2004), this change is evident in the way the sign divisions complicate if we compare the ones Peirce had given before. For the first time, he presents the types of signs as composed by classes created by relations among **three** trichotomies. That is, for the first time appears what in the Syllabus he would call First Correlate, or the trichotomy of the Sign "itself", without any reference to its object or interpretant.

Peirce affirms that a class of sign is a relation of three correlates. In the first one, the sign can be a monad (qualisign), an object or singular event (a sinsign) or a type of law ruling its replicas (legisign). In the second correlate, which considers the relation of the sign and its object, the sign can be one of the already known icons, indexes and symbols. Finally, in the third correlate the sign can be a rheme (the generic sign for the logical terms), a dicisigns (the generic for propositions) or an argument (the generic for syllogisms or inferences). Following an order of material implication, wherein the first correlate determines the third by means of the second, Peirce comes then to ten classes of signs that he calls genuine and classify distributing them in an inverted pyramid.

After the presentation of ten genuine classes of signs, Peirce also shows some of their possible degenerations and their utility for logic. Given the audience of the Lowell Institute, there is no doubt that the *Syllabus* and its preparatory manuscripts reflect Peirce's concern in making explicit that his semiotic was a synonym for logic conceived according to sound mathematical principles. This focus on the entailment semiotic-logic seems to have produced a radical change in the way which Peirce conceived the signic relations. This is in accordance with the development Peirce gave to his Theory of Sign in the following years, which will no longer make use of the terms and concepts created before 1903, but actually emphasizes and unfolds the results of his studies in that year.

Another important event in Peirce's intellectual life, closely related to his semiotic, happened in 1903. It was the beginning of his correspondence with Victoria Lady Welby. She was a British woman who had been researching about the processes of meaning and interpretation. Peirce had reviewed favorably Welby's book ***What Is Meaning?,*** opening the door for a fruitful exchange of letters that lasted until 1911, one year before Welby's death. These letters are a precious source for those interested in following the huge transformations Peirce applied to his theory in the final period of his life. Some scholars even believe that Welby had a decisive influence in this phase. This would explain, at least in part, why Peirce dedicated such an effort to unveil the types of interpretants – sharing with Welby the same field of inquiry.

After grounding knowledge on perception and developing a sign taxonomy that seemed acceptable to deal with most logical problems, Peirce moved his attention to the third ramification of semiotic, the Speculative Rhetoric. His intention was to approach once again the effects produced by the action of the Sign over its interpretant, but now seeing these effects from the results obtained in the former years. In 1904, for example, Peirce came to affirm that the representation had the power of causing real facts (EP: 300), and that the interpretant of the sign did not need to be necessarily a concept, as professed his intellectualist version of his first formulation of Pragmatism. They could be feeling and physical effects, too. Through that, Peirce anticipates the ontological division of interpretants in emotional, energetic and logic that he would make explicit in 1907, taking his Theory of Signs to a new level of complexity.

5. Fourth phase: 1905 to 1914

The multiplication of trichotomies and the notion of ultimate interpretant

The last phase of Peirce's semiotic is the least known and understood. This is due to, in part, the fact that it represents a revolution in the way Peirce understood his theory, probably motivated once again by his concern to link semiotic with Pragmatism as well as with his metaphysical cosmology. While he smoothed over the matters in order to adjust one discipline to another, Peirce would make constant alterations in the sign classification, most of them tentatively. The pages of his logical notebooks written in this period are full of sketches of classifications, introductions of new terms, a profusion of triadic divisions and many geometric drawings, mainly triangles, used heuristically to explore and make evident the relations among the elements of the classes of the Signs. Many of these drawings are contradictory and although most of them are dated, Peirce did not authorize us to simply consider the posterior versions as improvements from the previous ones. Whenever Peirce came to an impasse in the research, he would frequently return to the old classifications, sometimes created many years ago, dismissing as incorrect the recent attempts.

In 1905, Peirce demonstrated to have adopted a realistic notion of Thirdness, that he interpreted as a kind of conditional future, a *would be* that could not be reduced to any series of instances. Consequently, he then explicitly corrected his 1878 opinion about the hardness of the object being a matter of subjective opinion and declared that it depended on Pragmatism to insist about the reality of general potentialities in nature (Short, 2004, p. 15). The acceptance of the reality of the laws of nature, considered then as habits analogous to the beliefs of the mind, stimulated Peirce to approximate semiotic a bit more (which had already been extended to comprise symptoms and physical signals) to this ever more realistic Pragmatism. After all, the pragmatic kernell was precisely the notion of the habit of conduct. Habit became a keyword linking semiotic and Pragmatism.

In a series of articles written for the philosophical magazine ***The Monist*** during that period, Peirce made the first attempts to extract from semiotic a definite proof of Pragmatism or, more appropriately, ***Pragmaticism***, as he started to call his philosophy in an attempt to dissociate it from the version popularized by James and his disciples.[1] In order to

fight the nominalism that infected these popular versions of Pragmatism, Peirce emphasized that his proof should also be a proof of realism, in which the truth must be considered as what *would* appear in the final opinion of the research made by a community ideally infinite and honestly dedicated to this search. Note, however, that he still considers the **summum bonum** of Pragmaticism as being a concept, i.e. reality is still what will appear in a **symbol** synthesized by an ideal mind summing up the minds of all members of a community of researchers.

In the course of these researches, Peirce discovered that his logic, seen already as identical to semiotic, could be expressed through a visual syntax based on graphics – named Existential Graphs by Peirce – capable of performing the manipulation of the logical signs in a much better and more concise way. Although Peirce presented two quite developed versions of this graphical system, he would not complete them the way he had wished, probably barred by difficulties to represent the idea of continuum. However, his research about the Existential Graphs triggered a new branch of logic that has been producing promising results in the more recent years.

As Peirce himself points in a letter to Lady Welby, between 1905 and 1906 he worked intensively over his classification of signs. This new round of inquiries convinced him that a complete classification of all possible signs would demand at least 10 trichotomies that, if freely combined, could result in an astonishing figure of 59,049 Classes of Signs (CP 1.291). Nevertheless, Peirce explains, if we impose some logical mathematical limitations, the total number of classes would be restricted to only 66. Peirce also affirms that he had found the need to distinguish between two semiotic objects (the immediate, present inside the Sign, and the dynamic, which always remains out of the sign) and three types of interpretants that he names as intentional, effective and communicational – but which later would be called immediate, dynamic and final.

Thomas Short (2004) states – and we agree – that the introduction of these three interpretants does not substitute the trichotomization made in 1904, when he divided the interpretant in emotional, energetic or logic. The trichotomy immediate, dynamic and logical pertains to the sign considered as a system of relations in evolution or, in other words, as a Class of Sign. The division in emotional, energetic and logic expresses the ontological status that each one of the interpretants (immediate, dynamic or logical) can

assume. When the sign is analyzed in its elements and relations, the first division occupies a horizontal axis; the second, a vertical axis. The result of the combination of both of them is that the process of interpretation always occurs in three types of interpretants chosen among nine possibilities.[2]

There is no doubt that this proliferation of interpretants reflects Peirce's increasing concern with the third branch of semiotic, *trivium*. Nevertheless, he does not see Rhetoric as identical to Methodeutic – the science that studies the methods to be applied in the scientific inquiry. He now sees Methodeutic as Rhetoric in the narrow sense (Bergman, 2000, pp.246-247) while Rhetoric in the broad sense must consider semiosis in all possible dimensions. Deducing the implications of increasingly panpsychist cosmology, Peirce concludes that the process of interpretation does not happen only in human minds. On the contrary, it is the existence of interpretation of signs in the world that explains the emergency of human intelligence. As we have already seen, the universe is a quasi-mind perfused with signs. Trying to discover the "real thing" behind the veil of signs is a foolish illusion for, as Peirce writes in 1906 (*apud* Brent, 1993, p.300):

"... these signs are the very thing. Reals are signs. To try to peel off signs & get down to the real thing is like trying to peel an onion and get down to [the] onion itself, ... If not consciousness then sciousness, is the very being of things; and consciousness is their co-being...

This vision of the universe as quasi-mind leads Peirce to introduce, still in 1906, the idea of **commens** or co-mind, a kind of mental substratum that permeates and shapes the reality. Now Peirce considers the co-mind as a necessary pre-supposed so that the sign can transfer the shape of the object to the interpretant in the communication process (Houser, 1998, p. xxx). Note that the co-mind is neither the fusion of two human minds that communicate, nor just the fusion of minds of a finite community of people, such as a group or society dividing beliefs and common purposes, as preached by his former versions of Pragmatism. The co-mind is, generically, the fusion of Object, Interpretant and Sign (O-I-S) at the very moment of communication, when information is transmitted from the Object to Interpretant having the sign as a *medium*. If we parallel this process with communication, the object assumes the position of an emitter (*utterer*) and the interpretant, a receptor

(*interpreter*). The sign is the *medium* and, finally, the message is the Form or Idea (information) transmitted by the sign.

With the introduction of the concept of co-mind, Peirce was very close to a complete fusion between his Theory of Sign and Pragmatism. The last step would be the elimination of the intellectualist anchor he had placed over his philosophy when he affirmed that the final interpretant of a concept could only be another concept, i.e. a symbol. This barrier is finally overcome in 1907, when Peirce develops the concept of **ultimate** logic interpretant. According to Peirce, the **ultimal** instance of interpretation cannot be a symbol, a concept or a thought because this would cause it to be interpreted in further thoughts *ad infinitum* – as it had already been affirmed in the 1860's in his articles about cognition. In order to avoid the infinite progression, Peirce gave to the ultimate logic interpretant the status of a habit or, when the occasion made it necessary, the effect of a change of habit produced by any intelligent mind – not necessarily human.

In 1909, while Peirce drafted *A System of Logic, considered as Semiotic*, he affirmed that the ultimate interpretant was not the way a finite group of minds effectively act under the influence of a concept, but as any mind, in the general sense of the word, **would act** under its effect. This is an important modulation because it harmonizes the general term of logic and semiotic with his idea of Thirdness present in nature, as he had announced in 1906. The conditional future, the habit that does not exhausts itself by any number of occurrences, or better saying, the very change of habit towards the full reasonability is now considered as the **ultimate** purpose of his Pragmatism.

The scholars disagree about the exact place of the ultimate interpretant in the semiotical classification. Savan (*apud* Santaella, 2004, pp 78-87) believes that it is the highest degree of Thirdness applied to the Dynamic Interpretant because it is the Dynamic Interpretant the one that refers to the effects produced in the mind of the interpreter and capable of generating deliberate conduct, including a change of habit. The other two interpretants, Immediate and Final, are not that crucial for the pragmatic method. In our opinion, though, it is up to semiotic, as the General Theory of the Signs, to consider the ultimate instance in the Immediate and Final interpretants as well. When the **ultimal** instance occurs in the Immediate Interpretant, we have a habitualized interpretability; when

it occurs in the ambit of the Final Interpretant, we have the very sign assuming a habitual purpose, i.e. becoming a legisign.

If on the one hand semiotic and Pragmatism now appear hand in hand by the concept of habit, on the other hand this union obliged Peirce to review the strength of the pragmatic maxim because the habit is not sustained by logical considerations only, but it demands ethical and aestheticals ones too. No wonder thus, that Peirce started to place ethics and aesthetics as normative sciences responsible, together with logic, for controlling the human conduct. The Pragmatism (or Pragmaticism), set mainly over the deductive logic, becomes limited – not to say diminished – in this new configuration. In fact, in October 1913, a few months before his death and while writing his last article, Peirce shows uncertainty about the validity of the Pragmatism, for his method of clearing up ideas might have been too clung to the analytical deduction while despised the creative power of abduction, or uberty (EP2, p.463 e ss).

If Pragmatism is kept restricted to intellectual minds, semiotic does not suffer from this limitation and spreads out through all possible fields of phenomena. When searching in his Theory of Sign for a definite proof of his Pragmaticism, Peirce ended up taking semiotic to the maximum degree of the transdisciplinarity. Semiotic is so general that might even be able to compete with mathematic as the science of the first universal principles. If the universe is made of signs, and semiosis is another name for communication, as Peirce seems to sustain in the final phase of his intellectual life, then a unified theory of reality seen as a process of development of information, if we should be able to conceive it someday, it will necessarily involve semiotic.

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[1] The truth is, though, that the odd term Pragmaticism was never truly accepted, and Peirce himself would again call his doctrine Pragmatism in the following years

[2] However, Short's opinion is not unanimously accepted. See in Liszka (1996, pp.120-123) a discussion about this problem and alternative visions for that of Short.

III – PERCEPTION: A SEMIOTIC THRESHOLD?

1. Perception and signification

Peirce's Theory of Perception, developed mostly between 1902 and 1906, is important to our study about the Classes of Signs for two reasons. The first and most evident one is the clear affinity linking perception and semiosis. In fact, both processes are based on logical inferences and can have the same elements analyzed, as immediate object, dynamic object, immediate interpretant and abduction. This proximity feeds the hope that a better comprehension of the perceptive process may illuminate some of the obscure points about semiosis. Eco (1997, p.110, *my translation*), for example, says that there are so many similarities that it becomes "embarrassing to differentiate perception from signification".

Eco reminds us that Husserl had already discussed this point. For this philosopher coeval of Peirce, both processes actually happen in a "unity of act". Husserl gives us as an example the fact that a red object is at the same time recognized and named red by an interpreter. Analyzing Husserl's opinion, Eco (*Idem*, p.79, *my translation*) agrees that:

> After all *to denominate as red* – in the sense of the current denomination, which presupposes the lower intuition of the denominated – and *recognize it as red* are expressions of identical meaning.

Nevertheless, Eco also notes that the semiosis of signs occurs on a higher level of complexity in relation to the perception because it also involves the representation of something that is not the sign itself. The "perceptive semiosis" (if we can name it so) remains as the inference over the object itself, without taking into account if this perceived object *stands for* something else, being then a sign:

> It is obvious that when we say that the smoke is a sign of fire, that smoke we perceive is not a sign yet; (…) the smoke becomes a sign of fire not at the moment we perceive it, but at the moment in which we decide that *it is for* something else, and to get to this moment we must leave the proximity of the perception and translate our experience in propositional terms, making it the antecedent of a semiosic inference. (…) The perceptive semiosis, on

the contrary, does not happen when *something is for something else*, but when from something we come by inferential process to pronounce a perceptual judgment *about that something*, and not about any other thing. (p. 110-111*, my translation*).

The second reason for us to linger on the Theory of Perception before we go deeper into the minuteness of semiotic is that it was designed at the same time Peirce increased the number of trichotomies of the sign to three (around 1902-1903), and then to ten (after 1905). Certainly there is no coincidence in that. Until the beginning of the 1900's, Peirce saw phaneroscopy and semiotic as distinct sciences, each one occupying its place in his classification of science. From 1906 on, however, Peirce seems to have concluded that there is no sharp demarcation separating semiotic from phenomenology and his research with signs assumed increasing phenomenological hues (Savan *apud* Liszka, 1996, p.126).

It is legitimate to conjecture, then, that the results of his research with the perception made the limits between Phenomenology and Semiotic attenuate until it practically vanished. As Santaella (1998, p. 51) points out, "the perception has a hybrid nature between phenomenology and semiotic. We can say that it occupies the exact point in which these two realms cross". Santaella also says (*Idem*, p. 38, *my translation*) that:

> Not only Semiotic or the realm of thirdness come straight from phenomenology, but phenomenology is reinvested within the Semiotic, from what emerges a doctrine of the signs radically original, anti-rationalist, but not irrationalist, that allows us to think from a mere sigh, a shout, a song, a theorem, a score, a book to all the more complex phenomena we can think of, including our own imagination of them, all of them in their signic functioning, that is, as the language they are.

Very much symptomatically, Peirce interrupted his writings about perception at the moment he deepened in the phenomenology of semiosis, maybe already accepting that semiosis should embrace perception. For Peircean scholars, thus, the challenge is to find the correct correspondence between the terms of the Theory of Perception and those usual in the Theory of Sign, in a way that one might fit in the other. Almender (1970), Bernstein (1964), Hausman (1990, 2006) and, as we have already mentioned, Santaella (1998) are some of the authors that made important studies trying to find the correspondence.

We are not going to expose in detail the conclusions reached by each one of these authors, who diverge on some central points (for a presentation of the differences among them, see Santaella, *op. cit.*), but we want to present here an original contribution, based on our proposal of classification and making good use of *insights* produced in the past (Romanini, 2001), but now presenting them in a quite reformulated way.

2. Perception and continuity

Perception is the *continuum* of existence. All beings are linked to their environment and from this linkage a mental universe appears in each individual, formed by impressions accumulated by experience. We are constantly being bombarded by percepts, which reach us going through our sensorial channels in a way coherent with our physiology. It is thanks to perception, Peirce explains, "... that whatever the underlying psychical process may be, we seem to perceive a genuine flow of time, such that instants melt into one another without separate individuality" (CP 5.205).

This same *continuum* also allows us to perceive reality as something having a certain stability and insistence over our senses. Besides that, the perceptive *continuum* offers us the proof of our own existence, so long as we can perceive ourselves within a regularity of time and space, which enables us to synthesize a judgment about our own identity or "self" (cf. Colapietro, 1989; Wiley, 1996).

Peirce had no doubts that perception is the only possibility we have of obtaining new information from reality, as he enunciates in the first of the three cotary propositions he created in order to sharpen the Pragmatic maxim: *Nihil est in intellectus quod non prius fuerit in sensu* (CP 5.181). By taking this phrase from Aristotle, Peirce repels once again the Cartesian gnosiology and establishes as a corollary that the sense perceptions are the front door of all knowledge, whereas the self-controlled action is its exit.

If it is so, says Peirce, the perception should offer the first impressions that will debouche in a judgment, beginning the chain that would lead us to propositions and logical arguments that base our conduct. The perceptual synthesis, which welds the sense impressions in an image that enables us to create perceptual judgments, Peirce defines as abduction in his third cotary proposition: "An abductive inference becomes the perceptual judgment without having a clear line of limitation between them" (CP 5.181).

Peirce also says that the time taken by the transformation process of a percept into a perceptual judgment must be infinitesimal and non-conscious – therefore completely out of any possible rational control. This last hypothesis was confirmed by more recent studies in the field of cognitive sciences. In fact, Hintikka and Hintikka (*in* Eco e Sebeok, 1991, p. 181, *my translation*), for example, affirm that the supposed chain of reasoning that goes from the background information and up to the premises and the intermediate conclusions can be completely unconscious:

> What we should question is if the so-called unconscious phases of reasoning are surpassed so quickly as to escape our active attention or if they are, sometimes, truly inaccessible to the conscious reflection and built directly from the non-edited sense impressions of the subject. The answers that we have from psychologist such as J.J. Gibson and David Katz confirm the latter alternative.

A century before psychology investigated the process of perception, Peirce had already offered as example of this non-conscious edification of percepts to build premises the famous Zeno's sophism about the chase of the tortoise by Achilles (CP 5. 181):

> ... the perceptual judgment is the result of a process, although of a process not sufficiently conscious to be controlled, or, to state it more truly, not controllable and therefore not fully conscious. If we were to subject this subconscious process to logical analysis, we should find that it terminated in what that analysis would represent as an abductive *inference* (...). This analysis would be precisely analogous to that which the sophism of Achilles and the Tortoise applies to the chase of the Tortoise by Achilles, and it would fail to represent the real process for the same reason. Namely, just as Achilles does not have to make the series of distinct endeavors which he is represented as making, so this process of forming the perceptual judgment, because it is sub-conscious and so not amenable to logical criticism, does not have to make separate acts of inference, but perform its act in one continuous process.

3. Giving Peirce a voice

How would an interview with Peirce on his Theory of Perception be like if we could visit him in his studio at Arisbe, say, in 1905? This was the exercise we proposed to

ourselves when producing the text below, created by patching fragments from articles and manuscripts written from 1902 to 1906.

As Eco has pointed, Peirce seems to hold that perception is a process that remains beneath the signification – if we consider signification as strictly belonging to the realm of Thirdness. In the Theory of Perception he struggles to produce, the sign appears only in the clothing of representation given by the perceptual judgment (cf. Santaella, 1998). The logical function of the perceptual judgment, it seems, is to cover the perceptual universe made of percepts with a "signic blanket", transforming it into a sign of the perceived object.

Nevertheless, as already noted, Peirce applies over his Theory of Perception the same analytical battery he uses to explain the sign. This suggests that maybe the percept *is* a sign after all or, at least, a ***quasi-sign*** (cf. CP 5.473). Through the imaginary questions I pose to Peirce I sometimes present my interpretations over the prior "answers" given by Peirce, trying to produce a line of thought that simulates a conversation. In some of Peirce's answers, I occasionally use simple connecting expressions in order to enhance the dialogue effect (in such case the letters appear in bold and italics).

This imaginary interview is, obviously, an edition made by myself to base my vision of the Peirce's Theory of Perception, and it should not be read as the "final word" about the matter – since it is possible to find passages in which Peirce seems to contradict some of the statements collected here. I believe, however, I have captured the essence of his theory in its most coherent form. Let us see how this interview would be:

Interviewer: There is still much disagreement about the definition and function of each of the elements of your Theory of Perception. Maybe we can eliminate some doubts with an example of how you think perception works.
Peirce: *Let's start with a well known one*. "I see an inkstand on the table: that is a percept. Moving my head, I get a different percept of the inkstand. It coalesces with the other. What I call the inkstand is a generalized percept, a quasi-inference from percepts, perhaps I might say a composite-photograph of percepts. In this psychical product is involved an element of resistance to me, which I am obscurely conscious of from the first. Subsequently, when I accept the hypothesis of an inward subject for my thoughts, I yield to that consciousness of resistance and admit the inkstand to the standing of an external object. Still later, I may call

this in question. But as soon as I do that, I find that the inkstand appears there in spite of me. If I turn away my eyes, other witnesses will tell me that it still remains. If we all leave the room and dismiss the matter from our thoughts, still a photographic camera would show the inkstand still there, with the same roundness, polish and transparency, and with the same opaque liquid within. Thus, or otherwise, I confirm myself in the opinion that its characters are what they are, and persist at every opportunity in revealing themselves, regardless of what you, or I, or any man, or generation of men, may think that they are. That conclusion to which I find myself driven, struggle against it as I may, I briefly express by saying that the inkstand is a real thing. Of course, in being real and external, it does not in the least cease to be a purely psychical product, a generalized percept, like everything of which I can take any sort of cognizance (CP 8.144).

I would like to understand better the element that originates the whole process, the percept. In your example, you seem to exclude from it any element of generality.
Correct. The "percept is a single event happening *hic et nunc*. It cannot be generalized without losing its essential character" (CP 2.146).

Nevertheless, you insist that the percept starts the process of knowledge, working as the first brick of the building of the logical thinking.
In fact, "(t)he real thinking-process presumably begins at the very percepts. But a percept cannot be represented in words, and consequently, the first part of the thinking cannot be represented by any logical form of argument. Our logical account of the matter has to start from a perceptual fact, or proposition resulting from thought about a percept" (CP 2.27).

What is exactly this perceptual fact?
We can say that "(a) perceptual fact is a memory hardly yet separated from the very percept... (CP 2.146) (...) "is therefore an abstract affair. Each such fact covers only certain features of the percept. I look at an object and think that it seems white. That is my judgment of the object perceived, or my judgment concerning the percept, but not the percept itself" (CP 7.198).

Can you give an example to help us distinguish the percept from the perceptual fact?

Sure. "A blow is passed, so to say. Generalize the fact that you get hit in the eye, and all that distinguishes the actual fact, the shock, the pain, the inflammation, is gone. It is anti-general. The memory preserves this character, only slightly modified. The actual shock, etc., are no longer there, the quality of the event has associated itself in the mind with similar past experiences. It is a little generalized in the perceptual fact" (CP 2.146).

Your distinction between percept and perceptual fact seems to have a parallel with the pragmatic distinction between reality and logical truth. The reality being what is indifferent to one or all minds can think about it, while the truth being the *summum bonum* towards which semiosis tends.

"With regard to perceptual facts, or the immediate judgments we make concerning our single percepts, the same distinction is plain. The percept is the reality. It is not in propositional form. But the most immediate judgment concerning it is abstract. It is therefore essentially unlike the reality, although it must be accepted as true to that reality. Its truth consists in the fact that it is impossible to correct it, and in the fact that it only professes to consider one aspect of the percept" (CP 5.568).

This seems to bring into scene the concepts of habit and final causation, since the perceptual judgment is based on the acceptance of a state of things of a perceptual universe. It is purely hypothetical or a conditional future – a "would be", as you many times prefer to say – which teleologically guides the whole process of perceptual inference. The perceptual fact would be, then, a fallible proposition, subject to the logical scrutiny, about the perceptive universe created in the perceptual judgment?

Correct, "a complex of percepts yields a picture of a perceptual universe. Without reflection, that universe is taken to be the cause of such objects as are represented in a percept. Though each percept is vague, as it is recognized that its object is the result of the action of the universe on the perceiver, it is so far clear." (CP 4.539 Fn 2)

Somehow, then, the vagueness of the individual percept is complemented by the reactive insistence of the perceptual universe on the perceiver's mind, producing

maybe a dynamic interpretant?

Yes, "while the Immediate Object of a percept is excessively vague, yet natural thought makes up for that lack (as it almost amounts to), as follows. A late Dynamical Interpretant of the whole complex of Percepts is the Seme of a Perceptual Universe that is represented in instinctive thought as determining the original Immediate Object of every percept (CP 4.539) (...) *Now, the question to be answered is*: "How is it that the percept, which is a Seme, has for its direct Dynamical Interpretant the perceptual judgment, which is a Pheme? (...) "My opinion is that a pure perceptual Icon (...) could not have a Pheme for its direct Dynamical Interpretant. (CP 4.540)

I understand your concern. This impossibility is a logical outcome of the material implication that rules the categories, that is: Firstness cannot have Secondness or Thirdness as its interpretant. However, somehow the perceptual judgment seems to be able to represent the percept no longer as an icon, but as a sign which also has existential characteristics, which means Secondness.

Note that "existence means precisely the exercise of compulsion. Consequently, whatever feature of the percept is brought into relief by some association and thus attains a logical position like that of the observational premiss of an explaining Abduction, the attribution of Existence to it in the perceptual judgment is virtually and in an extended sense, a logical abductive Inference nearly approximating to necessary inference" (CP 4.541).

If this imputation of Secondness to the percept occurs in the abduction, it is hypothetical and of course fallible. This means that maybe the percept does not really exist. What seems important, though, is the fact that this imputation is compulsive and cannot be analyzed at the very moment it happens.

In fact, "it is idle to attempt to criticize by any logic that part of the performance of the intellect which draws that judgment from the percept, for the excellent reason that it is involuntary and cannot be prevented or corrected" (CP 7.198).

Is it for this reason that you identify the perceptual judgment with abduction?

Yes. "If the percept or perceptual judgment were of a nature entirely unrelated to abduction,

one would expect that the percept would be entirely free from any characters that are proper to interpretations, while it can hardly fail to have such characters if it be merely a continuous series of what, discretely and consciously performed, would be abductions" (CP 5.184).

It remains to be answered, then, how the perceptual judgment represents the percept existentially, that is, as the object of a proposition.
"There remains but one way in which it can represent the percept; namely, as an index, or true symptom, just as a weather-cock indicates the direction of the wind or a thermometer the temperature (...). (W)hat is an index, or true symptom? It is something which, without any rational necessitation, is forced by blind fact to correspond to its object. To say, then, that the perceptual judgment is an infallible symptom of the character of the percept means only that in some unaccountable manner we find ourselves impotent to refuse our assent to it in the presence of the percept, and that there is no appeal from it" (CP 7.628).

If I understood correctly, when the immediate interpretant of the perceptual judgment – which is the perceptive fact – appears in the form of a proposition, it carries with it an index representing the percept, which assumes the role of the Dynamic Object of such index. That's how the first premiss of logic arises.
In other words, "a percept is a Seme, while a fact of Immediate Perception or rather the perceptual judgment of which such fact is the Immediate Interpretant, is a Pheme that is the direct Dynamical Interpretant of the percept, and of which the percept is the Dynamical Object". (CP 4.539)

The percept is the dynamic object of every logical proposition but, before occupying that position, it must be the immediate object of the perceptual judgment, right?
That´s why I say that "the Immediate Object of all knowledge and all thought is, in the last analysis, the percept" (CP 4.539).

We can infer that when the percept assumes the position of the dynamic object, we leave the ambit of immediate perception and enter the ground of the sign properly.

Yes, "every concept and every thought beyond immediate perception is a sign (EP: xxxv)**.**

The perceptual judgment can be considered, then, a threshold between perceptive and signic semiosis. Whatever is before it does not have full representative capacity and cannot work as a mental sign, but whatever is beyond it must be necessarily a sign?
It is so because, as we already know, "a percept contains only two kinds of elements, those of firstness and those of secondness, then the great overshadowing point of difference is that the perceptual judgment professes to represent something, and thereby does represent something, whether truly or falsely. This is a very important difference, since the idea of representation is essentially what may be termed an element of "Thirdness," that is, involves the idea of determining one thing to refer to another. The element of secondness in the percept consists in one part being relative to another. But the percept presents itself ready-made, and contains no idea of any state of things being brought about" (CP 7.625).

To sum up, your Theory of Perception is based on two closely linked elements: the percept and the perceptual judgment that, so to say, wraps the percept with a blanket of Thirdness to produce the full-fledged sign.
"Perhaps I might be permitted to invent the term *percipuum* to include both percept and perceptual judgment (CP 7.629). The *percipuum*, then, is what forces itself upon your acknowledgment, without any why or wherefore, so that if anybody asks you why you should regard it as appearing so and so, all you can say is, 'I can't help it. That is how I see it." (CP 7.643)

The *percipuum* would be, then, what we imagine to remember of the percept that reached us, the vague idea given in the immediate object?
Exactly. "The *percipuum* is a recognition of the character of what is past, the percept which we think we remember. The interpretation is forced upon us; but no reason for it can be given" (CP 7.677).

This lead us to recognize that a percept can never be false and that, on the other hand, a *percipuum* always carries with it the possibility of being a mistake that should be

corrected throughout the continuing process of perception.

"It is obvious that a percept cannot be false, since it makes no assertion and is not a proposition, whether indicative, interrogative, optative, imperative, or in any mood whatever (CP 7.658) (...) *On the other side,* "there is no *percipuum* so absolute as not to be subject to possible error (CP 7.676) *In fact*, "in regards to their relation to knowledge and belief, the *percipuum* is nothing but an extreme case of the fancy" (CP 7.646).

But what happens in the case of a dream or hallucination? Is it still always true?

"Even a hallucination is not false (CP 7.658). There is no difference between a real perception and a hallucination, taken in themselves; or if there be, it is altogether inconsiderable. The difference is that rational predictions based upon the hallucination will be apt to be falsified, -- as for example, if the person having the hallucination expects another person to see the same thing; while truly sound predictions based on real perceptions are supposed never to be falsified, although we have no positive reason for assuming so much as that. But this difference between hallucinations and real perceptions is a difference in respect to the relations of the two cases to other perceptions: it is not a difference in the presentations themselves" (CP 7.644).

The truth of perception relates with the continuity of time, then? Does the flow of time provide the scheme that transforms possibilities into necessities, as Kant affirmed?

Exactly. "(C)ontinuity is given in perception; that is, that whatever the underlying psychical process may be, we seem to perceive a genuine flow of time, such that instants melt into one another without separate individuality"(CP 5.205). "We apprehend our own ideas only as flowing in time (CP 1.3) In the flow of time in the mind, the past appears to act directly upon the future, its effect being called memory, while the future only acts upon the past through the medium of thirds" (CP 1.325).

You defend the idea that a continuous time is constituted by infinitesimal intervals. How does this conception relate to your Theory of Perception?

My opinion about the flux of time is that "(t)he future is an object that we may hope to influence, but which cannot affect us except through our anticipations, and that the present

is a moment immeasurably small through which, as their limit, past and future can alone act upon one another". (8.113) ***Now, relating all that with immediate perception, we can say that*** "(i)n an infinitesimal interval we directly perceive the temporal sequence of its beginning, middle, and end – not, of course, in the way of recognition, for recognition is only of the past, but in the way of immediate feeling. Now upon this interval follows another, whose beginning is the middle of the former, and whose middle is the end of the former. Here, we have an immediate perception of the temporal sequence of its beginning, middle, and end, or say of the second, third, and fourth instants. From these two immediate perceptions, we gain a mediate, or inferential, perception of the relation of all four instants. This mediate perception is objectively, or as to the object represented, spread over the four instants; but subjectively, or as itself the subject of duration, it is completely embraced in the second moment" (CP 6.111).

This principle guarantees that a series of percepts will continuously weld in the perceptual judgment.

In fact, "it is a difficult question whether the serial principle permits us to draw sharp lines of demarcation between the percept and the near anticipation, or say the antecept, and between the percept and the recent memory (may I be permitted to call this the ponecept ...?), or whether the percept is at once but an extreme case of an antecept and an extreme case of a ponecept. Or rather, - I beg (...) pardon for my awkwardness of statement, -- the precise question is not about percept, antecept, and ponecept, but about *percipuum*, *antecipuum*, and *ponecipuum*, the direct and uncontrollable interpretations of percept, antecept, and ponecept" (CP 7.648).

If I understood well, the sequence can be represented this way:

1	2	3	4
ponecipuum	*percipuum*	*antecipuum*	
	ponecipuum	*percipuum*	*antecipuum*

In this scheme, in each moment, the *percipuum* occurs in the confluence of the *ponecipuum* and the *antecipuum*, in such way that the *percipuum* always contains a

portion of *ponecipuum* (its immediate memory), but also a portion of antecipuum, which is its immediate anticipation. We can then transform the four steps described above in only three:

1	2	3
	antecipuum	
ponecipuum	*percipuum*	*antecipuum*
	ponecipuum	
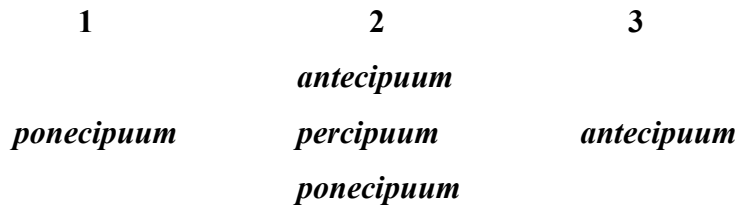
"Such [*is*] the nature of the real, since the *percipuum* confesses itself to contain a *soupçon* of memory, - that is, of conjecture, - as well as a *soupçon* of onsight, or watching to see if the future comes as expected, it must be confessed that according to the *percipuum*'s own account of itself, not only may this or that *percipuum* be false, - and should be so regarded in the case of blunders, if not of hallucinations, - but it is even conceivable that all *percipua* should contain a false element, perpetually refuted by oncoming fresh *percipua*, although these fresh *percipua* perpetually introduce the like falsity anew" (CP 7.670).

It calls my attention the fact that the antecept, as anticipation, seems to relate with the idea of habit, that is, of final causation and Thirdness. This perceptual anticipation may help us understand why we are so easily mistaken by certain visual illusions such as those geometrical figures that seem to change their faces in space.
"In all such visual illusions (...) the most striking thing is that a certain theory of interpretation of the figure has all the appearance of being given in perception. The first time it is shown to us, it seems as completely beyond the control of rational criticism as any percept is; but after many repetitions of the now familiar experiment, the illusion wears off, becoming first less decided, and ultimately ceasing completely. This shows that these phenomena are true connecting links between abductions and perceptions" (CP 5.183).

And when does the illusion disappear? What kind of inference allows us to eliminate the false perceptual judgments and verify which hypothesis is the correct one?
"When we get to the inductive stage what we are about is finding out how much like the truth our hypothesis is, that is, what proportion of its anticipations will be verified" (CP

2.756).

Your theory does not seem to make a clear distinction between perception and reasoning.

In fact, "(if) every time a present sign suggests an absent reality to our mind, we make an inference; and if every time we make an inference, we reason, then perception is undoubtedly reasoning" (CP 8.65).

Even abstract forms of reasoning, as in the case of Mathematics, have connections with the perceptual judgment?

Sure. "This indefensible compulsiveness of the perceptual judgment is precisely what constitutes the cogency of mathematical demonstration. One may be surprised that I should pigeon-hole mathematical demonstration with things unreasonably compulsory. But it is the truth that the *nodus* of any mathematical proof consists precisely in a judgment in every respect similar to the perceptual judgment except only that instead of referring to a percept forced upon our perception, it refers to an imagination of our creation" (CP 7.659).

Deduction would involve, then, the same abductive and inductive elements present in Perception, with the difference that in deduction, the matter of thought is taken as the percept?

"Deduction is really a matter of perception and of experimentation, just as induction and hypothetic inference are; only, the perception and experimentation are concerned with imaginary objects instead of with real ones. The operations of perception and of experimentation are subject to error, and therefore it is only in a Pickwickian sense that mathematical reasoning can be said to be perfectly certain." (CP 6.595).

This brings me a doubt that, probably, has connection with your Pragmaticism. How can the percept, the dynamic object of the perceptual judgment and, therefore, of the sign, assure its reality to us or, at least, assure that it points to a universe that is real?

"We must enter for a few moments into the field of metaphysics. For we are inquiring how things really are whatever we may think. What is reality? There would not be any such

thing as truth unless there were something which is as it is independently of how we may think it to be. That is the reality, and we have to inquire what its nature is. We speak of hard facts. We wish our knowledge to conform to hard facts. Now, the "hardness" of fact lies in the insistency of the percept, its entirely irrational insistency, -- the element of Secondness in it. That is a very important factor of reality" (CP 7.659).

This seems to be related to your pragmatic interpretation of the medieval realism.
Yes, you know that "I am myself a scholastic realist of a somewhat extreme stripe" (CP 5.470). And "the realist will hold that the very same objects which are immediately present in our minds in experience really exist just as they are experienced out of the mind; that is, he will maintain a doctrine of immediate perception"(CP 8.16). Of course, this doctrine of immediate perception is a corollary from the corollary of pragmaticism that the object perceived is the immediate object of the destined ultimate opinion, -- not of course, identical as a psychological phenomenon, for there never will be a necessarily ultimate opinion as a psychological phenomenon, but identical logically and metaphysically (CP 8.261) (...) *The* "realist defends his position only by assuming that the immediate object of thought in a true judgment is real" (CP 8.17).

I see. The final opinion is true because it conforms to the dynamic object of a thought-proposition. This dynamic object is the percept. And the reality of the percept, the guarantee of its Truth, relies on the fact that it is represented as an index materially connected to the immediate object of the perceptual judgment. If the immediate object is true, then the thought-proposition will be true as well. This makes the perception a process that rises, feeds and corrects itself through the contact with reality. The intentionality of the mind, its capacity to represent an object exterior to it, is guaranteed pragmatically without the need to abandon realism or surrender to the Cartesian institutionalism.

4. From the percept to the diagram

What we have learned above allows us to extract a basic scheme for the perceptive process as we see it. We are not going to discuss in detail each of the conclusions now, but

hope that will be gradually clarified as we are penetrating the labyrinth of semiotic in the next chapters. First of all, let us expose how we understand the main elements of Peirce's Theory of Perception if we were to consider semiotic in its broadest sense as to make the percept a quasi-sign in a universe made of signs:

- Every sign that possess only Firstness and Secondness is a percept (we may call it quasi-sign).

- Every sign that possess Thirdness is either a *percipuum* or involves one. Only full-fledge signs are or involve *percipua*.

- The *percipuum* always relates to the perceptual universe, which is a ***general*** immediate object: an "idea" in the platonic sense.

- The general immediate object is the ***predicate*** of the perceptual fact.

- The general immediate object is always a fiction. This fiction is a metaphor about the dynamic object.

- The general immediate object will be, later in the process, the Ground of a full-fledge sign (a proposition, for example).

- Therefore, the Ground of the sign, its predicate, either is or involves a metaphor (the *percipuum*)

- The perceptual fact is the syntax or perceptual ***locution*** based on this predicate.

- The index is a hipostatization of the *percipuum*, an imputation of the Secondness to the perceptual universe. This is done by the perceptual judgment.

- The perceptual judgment is an unconscious abduction.

- A cognition is the reapplication of the predicate over the index, producing a metonym: a sign based on the material contiguity between the singular (index) and the whole (general immediate object, Ground, methaphor or predicate)

From the elements above, it is possible to make an abridged scheme for the perceptive process, as we understand it:

1. An isolated percept is only a possibility. The percept always occurs in serial sequences that involve recent memories and future anticipations called respectively ponecepts and antecepts.

2. No percept enters in our mind without being unconsciously compared to previous contents of memory. On the other hand, no mind is a *tabula rasa* that does not contain in its memory interpretative possibilities, or latent interpretabilities, accumulated by collateral experience. These interpretabilities are **expectations**, **anticipations**, pre-existent conjectures that will put into movement the process of perception. This means that perception does not have a definite initial point, but it is a process that always occurs *in media res.*

3. Similar percepts come and coalesce in the mind to form the perceptual universe, a kind of mental image. It is an idea that is the *Ground* of the perceptual judgment. This idea is a metaphor. The *percipuum*, thus, is the percept as represented in the perceptual judgment. It is a fiction, a hypothesis, as the *ponecipuum* and the *antecipuum* are, too.

4. The perceptual universe, as metaphor over the series of percepts, is, from the logical point of view, a general predicate that resists and remains in time, producing a seed of a habit that manifests itself as a conditional future. This habit is a possible general law.

5. When lasting in time indifferently from the will of the percipient, the perceptual universe receives, in the perceptual judgment, an element of Secondness. This causes the metaphor to be interpreted as an index (hipostatization).

6. This hipostatization is fallible. That is, maybe the percept, although an index, does not exist at all. Nevertheless, it is impossible to criticize this attribution of Secondness because it happens unconsciously. The perceptual judgment is, thus, an unconscious abductive inference.

7. The perceptual judgment represents its dynamic interpretant as a perceptual fact, which is a perceptual *syntax*. This syntax is a ***locution*** analogous to an unconscious

assertion over the reality of the percept. The repetition of a series of perceptual assertions will form the proposition of the thought, giving birth to logical thinking.

8. In logical thinking, as in mathematics, the metaphor (the sign that represents the perceptual universe, general immediate object, *Ground* or predicate) assumes the form of a diagram, which will originate deductions, such as the mathematical ones.

IV – THE LABYRINTH OF SEMIOTIC

1. Searching for the natural classes

In his first attempts to make an analysis of the representation in general, in 1867, Peirce relied on the Kantian method of transcendental deduction. Throughout the more than 40 years devoted to the question, however, Peirce abandoned many philosophical presuppositions that had inspired his first attempt. In the early 1900's, he was interested in researching the sign not only through aprioristic categories, but also through the observation of phenomena of reality and the concrete situations of conversations – such as the effective usages we make of the signs to reach our communicational goals.

The sign was no longer the fundamental subject matter of his semiotic and **semiosis**, the action of the sign, seemed to assume this place. Abandoning the Kantian deduction of categories, now seen as artificial and intellectualistic in the light of his realism, Peirce began to use the inductive method, typical of sciences of discoveries, to research those general characteristics that defined each class of sign. They were longer thought as creations of the mind (*ens rationis*), but as universals effectively present in reality (cf. CP 1.227).

In addition, we must take into consideration that, at that same time, Peirce's research on the classification of signs relates to a much larger project of classification of the sciences. Peirce wanted to produce a classificatory scheme based on the regularities present in nature, relating each particular scientific branch to each one of these natural patterns. Using this method, he thought, it would be possible to create a classification of the sciences so broaden and well-founded that it would be able to comprise not only the past and present sciences, but it would also leave branches open to be filled by the new sciences of the future.

Good examples of this kind of natural classifications are the zoological taxonomy of Louiz Agassiz and the Periodic Table of the Chemical Elements of Dimitri Mendeleev, both Peirce's contemporaries and whose work had enormous influence on his research. In the two examples mentioned before, the classifications seem to possess both a power of prevision and openness to accommodate new discoveries that make them eternally valid.

The reason for this quality, according to Peirce, is that they are not nominalistic creations but relate to real natural classes, which effectively exist as real final causes. For Peirce:

> All classification, whether artificial or natural, is the arrangement of objects according to ideas. A natural classification is the arrangement of them according to those ideas from which their existence results. No greater merit can a taxonomist have than that of having his eyes open to the ideas in nature; no more deplorable blindness can afflict him than that of not seeing that there are ideas in nature which determine the existence of objects. The definitions of Agassiz will, at least, do us the service of directing our attention to the supreme importance of bearing in mind the final cause of objects in finding out their own natural classifications (CP. 1.231).

For Peirce, therefore, a natural classification differs significantly from any other produced *ad hoc*, which only raises the relations of an aggregate of things in order to place them in a circumstantial arrangement. Peirce saw in the natural classes active principles of organization. They are general patterns working as final causes capable of submitting all phenomena to their regulation, so that a classification made using these principles would never attend to a mere momentary whim (an alphabetic classification of all objects in a supermarket shelf, for example), but would reveal the permanent relations among the general phenomena of nature. Hulswitt (2002, p. xviii), sums up the peircean conception of natural classes by saying that:

> all things belong to a particular class do so in virtue of some 'essence' and some additional class properties. Thus, for instance, the class of chairs is a natural class because they share an essence that consists in their being for the sake of 'being sat upon', while the property of 'having legs' is a class property. The 'essence', therefore, is a general principle in virtue of which the members of the class have the same final cause, which is implied in their tendency to behave themselves in a specific manner.

As it would be expected, this general principle was given by Peirce's three cenopitagoric categories, which are reiteratedly unfolded to indicate the relations among the sciences. The first division opposes theoretical and practical sciences, which anticipates the current discussion between scientific research and technological development. For Peirce,

they are carried out by two very distinct kinds of minds: while practical sciences account for the functioning of life in society, moved by interests and momentary needs, theoretical sciences should pursue the Truth without being tied to any disposition that is not the one of the common, or communitarian search of such Truth.

The second partition we are interested in divides the theoretical sciences in those of the discovery (or heuristics) and those of revision. While the first ones dedicate their efforts to pure research, the second ones systematize and divulge the results. Semiotic, as logic, is placed in the roll of the theoretical sciences of discovery, hierarchically below philosophy and mathematics. Being placed below does not mean, however, being submitted to those above, but only looking for its fundamental principles in those higher in the classification.

In the following scheme, it is possible to follow how the three categories structure the divisions of the sciences "of discovery" until the tripartition of semiotic:

1) Mathematics
2) Philosophy
    2.1) Phenomenology
    2.2) Normative Sciences
        2.2.1) Aesthetics
        2.2.2) Ethics
        2.2.3) Semiotic
            2.2.3.1) Speculative Grammar
            2.2.3.2) Critical Logic
            2.2.3.3) Universal Rhetoric
    2.3) Metaphysics
3) Special Sciences

Notice that in this system, developed around 1902, semiotic appears as a normative science and, therefore, formal and structured from the principles extracted from the more abstract sciences, mostly mathematics and phenomenology (Liszka, 1996, 1-8). But semiotic also appears as the third division inside the normative sciences, after aesthetics and ethics. If we follow the general precept that regulates the trichotomic divisions, we should assume that the first correlate is that which has a certain power of determination over the others, i.e. logic (or semiotic) must be determined by ethical and aesthetical grounds.

This "submission" of semiotic to the other two normative sciences reflects a profound revision in the fundaments of the Peircean logic, which suits precisely his greater interest in the iconic, or ideoscopic, aspects of reality and his efforts to produce a diagrammatic system of logic. In a letter to James (CP 8.255 *apud* Santaella, 2004, p. 236) about the Normative Sciences, dated November 1902, Peirce believed himself to be

> the sole depositary at present of the completely developed system, which all hangs together and cannot receive any proper presentation in fragments. My own view in 1877 was crude. Even when I gave my Cambridge lectures I had not really got to the bottom of it or seen the unity of the whole thing. It was not until after that that I obtained the proof that logic must be founded on ethics, of which it is a higher development. Even then, I was for some time so stupid as not to see that ethics rests in the same manner on a foundation of esthetics (...).

We should admit the same relation of material implication inside semiotic. That is, the advances of Speculative Grammar, which is the first branch of semiotic, determine the advances of both Critical Logic and Methodeutic – the posterior branches. That explains why Peirce dedicated a good part of his studies in semiotic to reach a classification of signs sufficiently exhaustive and clear as to allow the advance of the other two subdivisions.

Nevertheless, we should not conclude that Peirce found Speculative Grammar more important than the other two semiotical branches, or that semiotic could be regarded fundamentally as the study of the grammar of the signs. Actually, what he says is exactly the opposite: Rhetoric, the third division of semiotic, is the most vivid branch and the one capable of leading us to the most important philosophical conclusions (Liszka, 1996, p. 78).

2. The grammatical aims

As the first branch of semiotic, Speculative Grammar accounts for (1) offering a detailed analysis of the necessary conditions for something to work as a sign, (2) presenting an exhaustive list of all possible types of signs and their internal constitution, that is, their constituent characters and finally, (3) and offering a classification of these types of signs inside classes conceived as a system of relations.

According to Peirce, in order to achieve these essentially taxonomic goals, the semiotician should place himself in the position of a zoologist who intends to discover, for

example, what is the true meaning of "fish" as to be able to affirm that fish is one of the classes of vertebrates (CP 8.332 *apud* Short, 1981, p. 197).

2.1. The vestibule of the labyrinth

A formal science does not aim to fall in the trap of a sterile formalism. An extensive classification of signs should answer also to practical – or better saying, pragmatic – needs as a way to eliminate ambiguities (cf. Houser, 1992, p. xxxv-xxxvi) that usually appear when we try to classify signic phenomena from a reduced cast of classes.

While a reduced classification, achieved through the basic elements of sign, object and interpretant, can be enough for most needs of a particular state of development of thought and culture, an exhaustive classification becomes imperative when we cross the boundaries of the animated to discover the classes of signs present even in physiosemiosis.

That is why researches like Merrell (1996), Vieira (2003), Collier (1999, 2003) and Brier (2006), among others, attempt to bind semiosis to Systems Theory, approximating the terminology of semiotic to expressions like entropy, symmetry break, dissipation, emergency of properties and *autopoiesis*. As semiotic widens its field of interest, a complete classification of all possible signs becomes of fundamental importance.

Moved by this conviction, a small but growing group of semioticians have dived in the branch of Speculative Grammar announced by Peirce to try to complete the classification of the signs and propose models for the functioning of semiosis. The first attempt was made by two of the editors of the Collected Papers, Weiss e Burks (1945), who published the first work about the order of the ten trichotomies proposed by Peirce. Subsequently, other scholars as Lieb (1953), Sanders (1970), Savan (1977, 1987-1988), Marty (1982), Jappy (1984), Balat (1990), De Tienne (1992), Merrell (1995) and more recently Farias and Queiroz (2000 a and b)[1], presented and discussed their proposals.

In spite of sometimes presenting their models in a fancy way, using even modern computing and graphical technologies, the truth is these commentators usually repeat the classes Peirce had already discovered, rarely daring to go beyond the territory explored and signaled by Peirce himself. Facing difficulties to find a *rationale* good enough to justify one order over all possible others, Sanders (*op. cit.*) has even come to affirm that it might be ill-advised to try to distinguish the sixty-six classes of signs Peirce conjectured.

The classification we propose in this dissertation, although consistent with Peirce`s classificatory principles, crosses the frontier of the known and penetrates a region of the forest of signs that Short warns as being completely virgin – an "immense, obscure, densely tangled and never crossed before" zone (Short, 1982, p. 285).

Short's words echo those Peirce himself wrote when he drafted, between 1902 and 1903, a prospect for the book "Minute Logic", that should summarize the contributions reached throughout his career. In the first chapter, while presenting the possible forms of inferences derived from the categories, Peirce warns that "we find ourselves in the vestibule of the labyrinth. Yes, The Labyrinth – in the Vestibule only, but yet in that tremendous, only Labyrinth" (CP 2.79). The risk of getting lost is huge but, as Short also admits (*Ibidem*, 306), the only way to advance in semiotic is taking the risks.

3. Peirce's razor

Our first steps on the way to the solution of the enigma of the classes of signs, still in the entrance of the labyrinth, must cross phenomenology or, using the term invented by Peirce, phanerscopy. He defines it as:

> that study which, supported by the direct observation of phanerons and generalizing its observations, signalizes several very broad classes of phanerons; describes the features of each; shows that although they are so inextricably mixed together that no one can be isolated, yet it is manifest that their characters are quite disparate; then proves, beyond question, that a certain very short list comprises all of these broadest categories of phanerons there are; and finally proceeds to the laborious and difficult task of enumerating the principal subdivisions of those categories" (CP. 1,286)

Peirce starts this task taking into account the two most influent lists of categories in the history of philosophy: Aristotle's, with its table of ten predicates, and Kant's, which enumerated twelve basic categories. Peirce noticed that these two lists shared a similar internal pattern: they always suggested triadic ramifications among their elements. This insight was enough for him to develop his fundamental list of three categories, which in the *New List* are called quality, relation and representation.

In the following figure, we present Peirce's first list of categories in a triangular scheme, which allows us to visualize the relations among them.
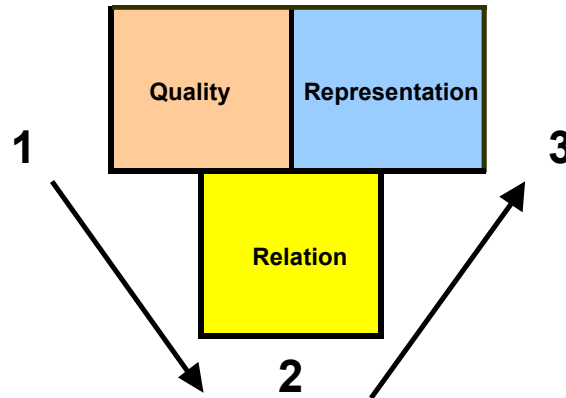
Peirce tried other words to summarize his categories, but remained unsatisfied because none seemed to be able to capture the deepness of their meaning. On the contrary, the choice of terms from common language or extracted from classic Greek or Latin vocabulary only worsened the confusion because they sometimes carried along meanings that had little to do with those he wished to express. In order to prevent contamination of his three categories with the rancidity accumulated by the philosophical terms of the past, Peirce resorted to mathematics. He finally decided to call them Firstness, Secondness and Thirdness and made a great effort to prove that they were universal, complete and irreducible (CP 8.328; 6.342-343).

3.1. The categories and their degenerations

Peirce's first formulation of the categories was born under the aegis of his juvenile nominalism. When he started his way towards realism, he felt the necessity of revising them. That happened in 1885, when in the article *One, Two, Three: Fundamental Categories of Thought and of Nature* Peirce presented his categories no longer using the traditional logic of subject and predicate, but from the point of view of the logic of relations (Murphey, *1993, p.303*).

The result of his continuing research on the essence of the categories debouched, in 1903, on the third conference he gave in Harvard in April 1903, *The Categories Continued*, when Peirce introduced the concept of **degeneration** of the relations. He was then convinced that the more complex categories (Secondness and Thirdness) could suffer what he called degeneration: a reduction of their ontological state. Thus, while Firstness cannot suffer degeneration, Secondness can degenerate towards Firstness; Thirdness, in its turn, can suffer two degrees of degeneration, becoming initially Secondness and, in a subsequent degeneration, Firstness. When not degenerated, the categories are called **genuine** (CP 5.66).

During the fourth of his conferences in Harvard, *The Seven Systems of Metaphysics*, Peirce presented the diagram below, showing the possible ways of combining the categories and their degenerations and how each combination origins a different philosophic system. In this figure drawn by Peirce, each category is represented by a correspondent number of traces (cf. EP:180):
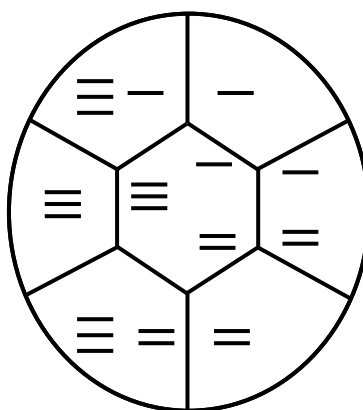
3.2. From the Categories to the Predicaments

In another version of Peirce's original diagram, a little modified, it is possible to notice more clearly how the categories and their degenerations relate to one another. We have created a specific notation to facilitate its visualization: we will use an apostrophe (') to indicate one degree of degeneration and two apostrophes ('') to indicate two degrees of degeneration. The three fundamental categories occupy the central hexagon of the figure, but their expansion (through degenerations) intersperses their own degenerated stages among themselves, as it can be seen in the figure below:
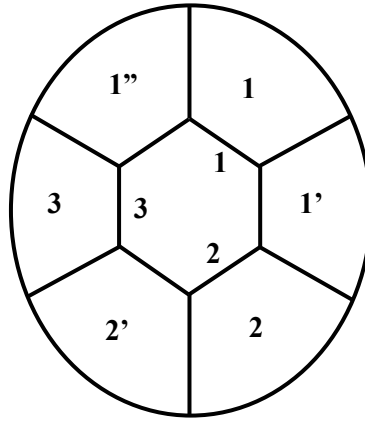
The more extermal part of the figure corresponds to the three cenopitagoric categories as they really appear in the phaneron. By maintaining the term Categories for the elements of the internal part, we will use **Predicaments** for the more external ones. The predicaments are rhemes or predicates that represent the fundamental categories for an interpretant mind. By mind we mean not only human minds nor minds of living beings, but the peircean notion of mind as a property of the whole Universe. Next we will analyze briefly the meaning of each of these six fundamental predicaments:

(1) Firstness

It corresponds to anything that is immediately positive in itself, without any relation or necessity of representation. They are the pure qualities (as they in themselves and not as something represented in the mind). The pure Firstness is present in all things, for it is the primitive source, necessarily incorporated in everything that either exists or is distributed. It is indefinite, fresh, original, spontaneous, free and vivid (Murphey, *op. cit., p.303*).

(1') Firstness of Secondness

It corresponds to the existence taken in itself, the feeling of **alterity** that invades our minds when we face existence. It is mere fluctuation, instability and irritation. In Peirce's cosmology, this predicament can be related to the state of pure chaos, the *tohu bohu* or primeval chaos described in the biblical Genesis, in which the existence pops in flashes by mere chance, without any relation nor permanence in time. This is the central idea of the Tychtism, the peircean doctrine that affirms the reality of chance (CP 6.322).

(2) Secondness

It is any non rational experience of the world, in which an object presents itself in a pungent way, without considering our will or expectation. It is pure shock (the "outward clash", cf. CP 8.4), an "it" without qualification, pure individuality. Pure Secondness always involves resistence, reaction, brutal force, compulsion, interruption, intrusion (Murphey, 1993, p.310). In 1885, Peirce found its better definition of genuine Secondness in the scholatic philosophy of Duns Scouts, who defines the *haeceitas* as a "here and now" (*hic et nunc*) of the experience, an isolated point or instance, pure discontinuity.

(1") Firstness of Thirdness

The Firstness of Thirdness correspond to the "flavor or color of the mediation", or the mentalistic primitive aspects that permeates the universe (CP 1.533; CP 6.301). The Firstness of Thirdness would correspond to the maximum state of entropy of a system (cf. Prigogine, 1996, p. 68). It seems also to correspond to the subtle bonds of mediation of the doctrine of the Synechism (CP 5.4), in which idealistic elements produce the continuum that permeates the whole universe. This continuuum, however, is not Cantor's, but one that posses the property Peirce calls kanticity (there is always a point between two points of a series) and aristotelicity (the totality of the multitude of a series is contained in any of its infinite possible divisions) (cf. CP 6.122; NEM 4:343). We propose to call it ***Holicity***.

(2') Secondness of Thirdness

It corresponds to any fact or object that occupies a portion of space and which remains in time. It can be an instance of a general law, a case, an example, a sample, an occurrence (replica) of any kind, a particularity of a class. It is every concrete application of a rule, an action that repeats a habit.

(3) Thirdness

Thirdness initially comprised the concepts of representation, mediation, order, generality, law, habit, necessity and intelligence. It corresponded to the type, the general class or universal. From 1907 on, however, Thirdness began to involve also the teleological

component of Peirce's mature metaphysics (Short, 2004, p.16). It began to be understood as a habit in the conditional future, a "would be" that becomes effective in case some determined conditions are present. The laws of nature, essentially probabilistic, become manifestations of the general tendency of the universe to develop by the embodiment of new habits. Thirdness is a law of probability (CP 6.91), whose major expression is a superorder or a super-habit ruling the evolution of the universe (CP 6.490).

3.3. Universal Predicaments

We claim that the categories and their degenerations can be arranged in a table of fundamental ontological properties, as we do below. In our opinion, the categorical degenerations suggested by Peirce are neither marginal phenomena nor extravagant refinements of his metaphysics. On the contrary, they reveal what we will call "Universal Predicaments" that can be organized in a triangle as below:
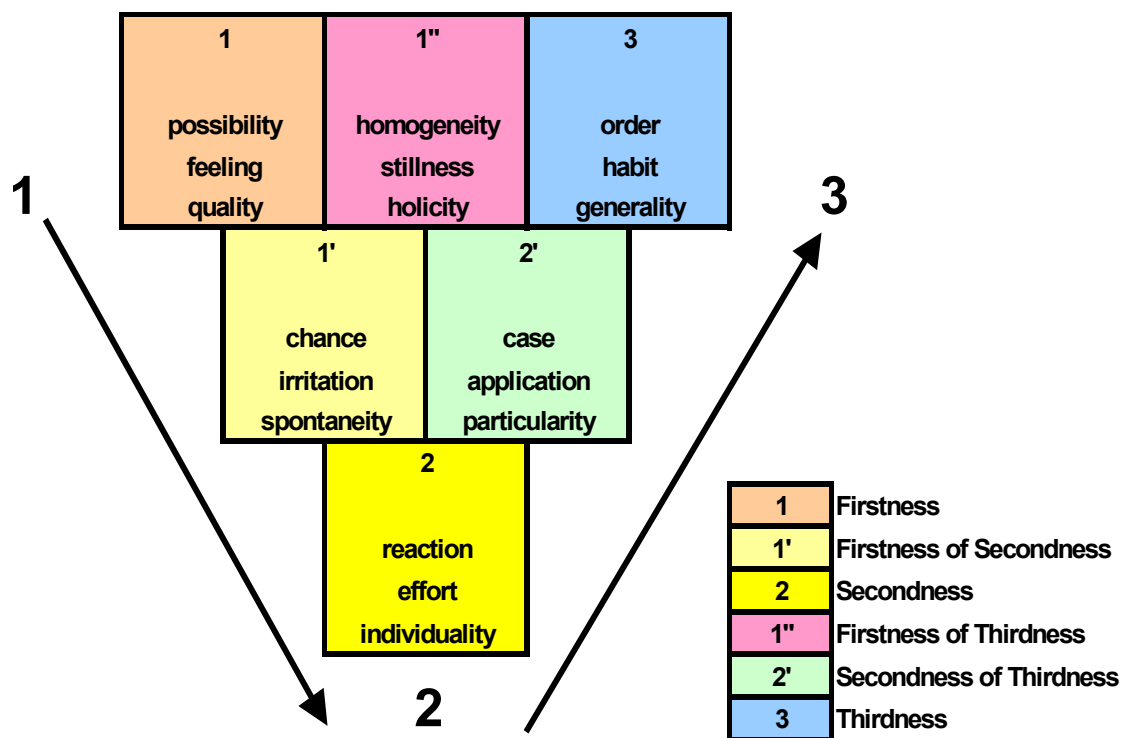
The arrows that go from 1 to 2, and then from 2 to 3, mean **material implication** or **illation**. This is the implicative movement that produces the most fundamental rule of logic, the guiding-principle that Aristotle called *nota notae*, from the latim *nota notae est nota rei ipsius* or "the predicate of a predicate is also the predicate of the subject of the predicate" (Lizska, 1996, p.58). Peirce used several symbols to express this logical relation, but the one seeming more appropriated to him was ">-", certainly because it expresses an inequality useful to the numerical treatment he was applying to his Categories.

The arrow that goes from 1 to 2, taken separately, means involvement, in such a way that we can say, applying the *nota notae* principle, that:

1) quality is involved in spontaneity
2) spontaneity is involved in individuality
3) quality is involved in individuality

The inversion in the direction of this arrow produces dissolution.

The arrow that goes from 2 to 3, taken separately, means abstraction, in such a way that we can say, applying once again the *nota notae* principle, that:

1) particularity is an abstraction from individuality
2) generality is an abstraction from particularity
3) generality is an abstraction from individuality

The inversion of the direction of this arrow produces instantiation.

The movement from 1 to 3 described by the arrows causes semiosis to develop, in such a way that a state in which there is little variety of properties of few things develops continuously into a state of many properties involved in many things, generating increase of information. In fact, in 1893 Peirce affirmed that:

> Analogous to increase of information in us, there is a phenomenon of nature--development--by which a multitude of things come to have a multitude of characters, which have been involved in few characters in few things (CP 2.419).

4. Uncertainty in the predicaments

The analysis of the diagram of the relations among the universal predicaments reveals that, apart from a clear general tendency towards the increase of information, there is a principle of uncertainty between conjugated pairs of predicaments, here algebraically expressed by the sign of multiplication. According to this principle, in any state of information there will always be an entanglement between opposed pairs of predicaments, in such a way that we will never be able to distill them until their purity. The correlation happens as the table below exposes:

Firstness (1) ⟷ *(2') Secondness of Thirdness*

Firstness of Secondness (1´) ⟷ **(3) Thirdness**

Secondness (2) ⟶ **(1") Firstness of Thirdness**
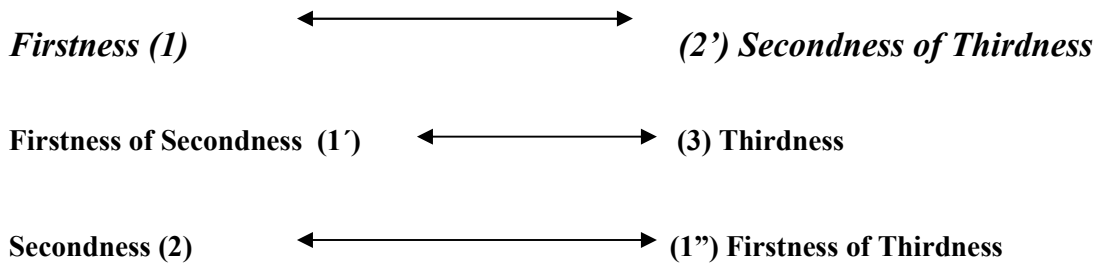
The relations above can be better represented in the following figure:
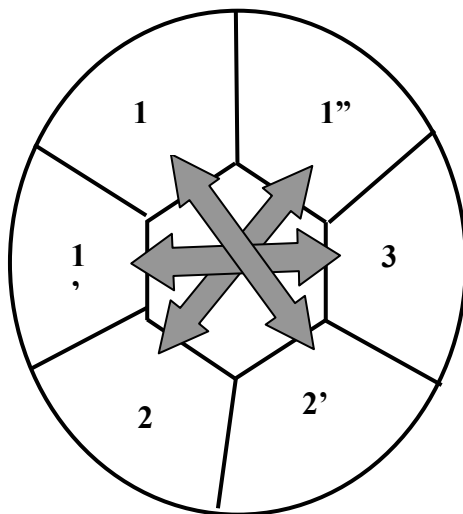
Let us explore a little more the meaning of this principle:

a) Quality x Particularity

Quality is pure intensity and originality, but these characteristics will fade when appearing replicated. On the other hand, a Particular is a replication of a model, and qualitative variations disturb its aimed fidelity to the norm expressed by the model. An artist, for instance, a painter, uses a qualitative strategy, while the graphic technician responsible for reproducing the painting on a printed poster uses the replicative strategy. For the first one, the loss of originality decreases the value of his work whereas, for the second, the occurrence of originality in the copies is considered a mistake to be eliminated. In fact, since Benjamin (1980), much has been said about the relations between quality and particularity in the work of art submitted to processes of replication, which tend to consume, to a certain degree, its qualitative or original "aura".

b) Chaos X Order

Chaos and order are closely related (Prigogine, 1996), as well as their derivations in the form of spontaneity x necessity, irritation x habit. Although there is a teleological movement conducting the reality to the strengthening of law and to the crystallization of habit, the principle of uncertainty affirms that, in any given state of information, chaos and order appear in varied tinges, without ever allowing one to eliminate completely the other. There are neither laws so rigid that cannot suffer exceptions, nor such absolute chaos that does not contain in its interior a seed of order.

c) Individuality X Holicity

An individual only exists as a fracture in the continuum, whereas the continuum only exists as the suppression of individuality. For this reason, one depends on the other. Actually, they co-exist so that every individual has idealized limits and every continuum can be thought as an individual (cf. CP 4.172). The Principle of Uncertainty of Heisenberg and its derivations in the form of oppositions like particle x wave type, locality x non-locality, discrete universe x holographic universe seem to be born from this correlation.

Peirce's categoriology, with its predicaments and relations of uncertainty, form the continuous substratum that allows the action of sign. Therefore, semiosis should also be considered as a continuous phenomenon subject to the same relations of uncertainty,

although also describable through general classes capable of grouping the signs according to their most remarkable features. As Mihai Nadin affirms (1983, p.163 *apud* Santaella and Nöth, 2004, p. 258):

> The typology of the sign classes (the ten, the 28, the 66), as confirmed by the mathematical theory of categories should be understood as a network of fundamental reference points in the generalized semiotic field. Whenever this typology is transformed into an end in itself, it leads only to formalistic semiotic. To give a name to a sign (to identify it) does not solve the problem of the way it functions in the semiotic field. The sign can be conceived and interpreted only within the framework of the logic of vagueness and with the participation of the doctrine of the continuum. Fuzzy categories, the extension of the mathematical concept of category, fulfill this desideratum and perfect Peirce's table of fundamental signs by realizing the image of the continuum, hence also the dynamics of sign processes.

Having acquired Ariadne's thread of the Categories and their degenerations, we can finally venture in the ways of Peirce's semiotical labyrinth.

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[1] In Queiroz (2004) one can find a panoramic summary of the contributions of the quoted authors.

V – THE SEMIOTIC OF THE THREE CORRELATES

1. The elements of the sign

In this chapter, we will see how the categoriologic conceptions, when applied to logic, enabled Peirce to build his first classificatory system upon three Correlates, destined to the audience of the lectures that he gave in Lowell Institute, in 1903, and printed in the Syllabus. Let us begin by a brief description of the basic elements of the Sign:

1.1. Sign

The sign is the "object" of semiotic – or the subject matter that semiotic, as science, intends to truly represent. However, the representations semiotic offers of its object are always abstract and imperfect[1]. That is why, as affirmed by Deely (1990, p.105), we can tell only the history of semiotic (or the sign as immediate object) because a history of the semiosis (the action of the sign as dynamic object) would coincide with the own history of the Universe (1990, p.105). Let us analyze these two ways of seeing the sign:

1.1.2. Sign in semiosis

It is the sign operating in the world, impregnated of life and in continuous development. It is, therefore, the sign in motion, immersed in the historical process, ***hegelized*** (Colapietro, 2004, p.39). In real life, the sign always appears as a mixture, a composed substance. It is always "dirty" by the involvement of other signs that fuse to its essence. It is impossible to find in reality a pure and static sign to be analyzed without ambiguities. The dynamism of the sign, its action in the world, is what we call **semiosis**.

1.1.3. Sign as Class of Sign

As a Class of Sign, the sign is an *ens rationis*, an "idea" that seeks to approximate to the true nature of the dynamic sign. One can find it in the opinion people have about the

sign on the streets, in the mind of the semioticians and as definitions in manuals of semiotic. It comprises, therefore, all the concepts that we have of them, their verbal definitions, the diagrams we make trying to describe their correlation with object and interpretant, all their typologies and classificatory tables.

The definitions given by the ancient *avant la lettre* semioticians, those provided by Peirce, Saussure and many other modern theorists of the sign (including those we will give in this work) are all attempts of capturing the true essence of the sign, which however insists on not letting itself be entirely understood. The dynamic sign remains out of semiotic, acting in the world indifferently from what we can think or say about it.

1.1.4. Definitions of the sign

In his relentless search for a precise definition of sign, Peirce produced at least 76 attempts (Marty). The proof that he did not succeed in any of them is given by the number of attempts and also by the fact that he came to the end of his life declaring himself unsatisfied with all of them, while continuing to produce new versions (MS 339D: 662-665).

Peirce sometimes defines the sign from its **presentative** nature, i.e. from its own materiality, which involves its *ground*. Other times, he defines the sign from its **representative** function, when the sign relates to its object; even other definitions focus on the **communicative** function of the sign, taken as a means for the transmission of a Form of the object to an interpreter, producing an effect that is the result of the process of Communication. Some of his definitions are brief and select just the triadic basic characteristic of the sign; others try to open the range of the components in order to study its fine granulation. Compare, for example, these two attempts:

> 1) I define a Sign as anything which is so determined by something else, called its Object, and so determines an effect upon a person, which effect I call its Interpretant, that the latter is thereby mediately determined by the former. My insertion of "upon a person" is a sop to Cerberus, because I despair of making my own broader conception understood (SS 80-81, 1908 *apud* Marty).

2) [A] Sign may be defined as a Medium for the communication of a Form. It is not logically necessary that anything possessing consciousness, that is, feeling of the peculiar common quality of all our feeling should be concerned. But it is necessary that there should be two, if not three, *quasi-minds*, meaning things capable of varied determination as to the forms communicated. As a *medium*, the Sign is essentially in a triadic relation, to its Object which determines it, and to its Interpretant which it determines [...] That which is communicated from the Object through the Sign to the Interpretant is a Form; that is to say, it is nothing like an existent, but is a power, is the fact that something would happen under certain conditions. This Form is really embodied in the object, meaning that the conditional relation which constitutes the form is *true* of the form as it is in the Object. In the Sign it is embodied only in a *representative* sense, meaning that whether by virtue of some real modification of the Sign, or otherwise, the Sign becomes endowed with the power of communicating it to an interpretant (EP 2:544, c.1905, *apud* Bergman, 2000, p. 230-231).

This last one, quite more complex than the first one, emphasizes the communicative properties of the sign, seeing it as the means for the transmission of a Form from the object to the interpretant. Note, however, that it was written three years before the first one, which mentions just the triadic relation necessary among the sign, object and interpretant. After formulating it in a letter to Lady Welby, around 1905, Peirce rushes to complete that he had written "a person" with the same intention of someone who gives a "soup to Cerberus", the guardian dog of the Greek hell. That is, did it just to cross the hell of incomprehension, for its interpretant does not restrain himself/herself from the effect in a human mind. It can also be found in co-minds or *commens* formed by the fusion of two or more minds in communication; or in natural quasi-minds whether bees, microorganisms or even crystals (CP 4.551).

The verb "determine", used in both definitions, also needs to be well understood. It does not mean a dyadic action, of the "cause and effect" kind, in which the object acts first over the sign and, in the sequence, another dyadic action causes the sign to act producing an interpretant – as it happens with billiards balls that, being hit, bounce transferring momentum and energy from one another on a linear way. Peirce conceives the verb "determine" as being genuinely triadic. It has the same nature of the verb "give". The act of giving demands that (1) someone gives, (2) something is given and (3) someone receives

what is being given. They all happen simultaneously. Similarly, "determine" means the indecomposable synthesis among the object that determines sign and interpretant through its form, (2) the sign that is the carrier of this form, (3) and the interpretant that is the effect of the transmission of this form.

This special kind of determination does not demand that the object have a delimited physical time-spatial reality either. The process of causation that Peirce defends is, as we know, essentially teleological, for it implies final causes capable of acting efficiently. In order for an object to determine an interpretant through a sign, it suffices that this object incorporate any number of general predicates, or laws in the conditional state (*would be's*). A hygrometer can predict a storm because the dynamic object "storm" has certain general predicates such as "decrease of atmospheric pressure" and "increase of air humidity" that precedes it. These predicates comprise the Form or Information concerning the climatic phenomenon "storm". A hygrometer indicates the imminence of a storm because this Form acts over the instrument producing an index (a needle that moves, a color that appears, etc.) This index, on the other hand, determines an interpretant so long as there is, on the interpreting part of the process, a familiarity with the functioning of the hygrometer. This familiarity, acquired by collateral experience, is capable of transforming the index into a metonymy (which is, as we will see further, a **cognition**). The Form would be, then, transmitted from the object to the interpretant by the sign (this example was given by Peirce himself in a letter to James; cf. EP2: 497).

We have also seen that, throughout the 1900's, Peirce enlarged the scope of his Semiotic in order to comprise the natural Signs. In 1903 he recovered the term *representamen*, used in the *New List* (1867), to express the generalized idea of sign, present in all minds capable of learning by experience (CP 2.229). The term sign was then restricted to *representamina* present in human minds, always Thirdness and, therefore, general (of course in spite of being able to suffer degenerations and to approximate to the Categories of Firstness and Secondness).

The distinction between sign and *representamen* would make the latter the true object of semiotic. The sign would be a its special case, linked with processes of representation of second order (conscious reflection of human mind, for example). Peirce did not maintain this distinction for long though, preferring later to adopt the term sign in

order to cover both senses (Short, 1981, p. 198). This decision was probably due to the new proximity between metaphysics and semiotic and Piece's conception of a mentalist universe, which would hinder any rigid distinction between sign and *representamen*.

1.2. Object

The object is what the sign professes to represent but can only do in an imperfect way. The relation with its object seems to be the main *raison d'etre* of any sign, for its first task is precisely to put itself in the place of the object it professes to represent, incorporate its form, and then transmit it to the interpretant. The object always remains out of the sign.

The reference to an object has always been the privileged property in the definitions of the sign before Peirce. In the Latin Era, for example, the sign was defined simply as *aliquid stat pro aliquo* - something that stands for another thing.

Traditionally, this property of "having an object" is called intentionality (Short, 1981; Liszka, 1996, pp. 111-116). Some logicians, mostly from the positivist tradition, believe that every sign must have a referent in the physical reality, but Peirce's semiotic admits a much wider ontology for the object. Everything that can be represented by a sign immediately assumes the semiotic place of its object, including thoughts, dreams, fictions, emotions, qualities, expectation, possibilities, relations and virtualities (Liszka, *Ibidem*).

If I go to a fortuneteller or astrologer, for instance, the dynamic object of the prediction is my future or "destiny"; if I am sick and go to the doctor, the dynamic object of the medical diagnosis is the disease that it professes to represent. Both prediction and diagnosis are signs that have dynamic objects, so long as they are signs of *something*, although the first one constitutes a Metaphor over a ***possible*** future and the second one a Metonym of an existent phenomenon.[2]

1.2.1. The *Ground*

The sign does not represent its dynamic object thoroughly, but it selects some characters that allow for a partial representation of it. A painting, for instance, selects from its object predominantly qualitative characters, a footprint on the sand selects

predominantly existential characters and a word, or any other kind of conventional sign, selects from the dynamic object a certain regularity, the law that rules the occurrence of object and that is represented by a sign of habit.

The set of attributes selected by the sign Peirce is initially called ***ground***, a term that already appears in the *New List*. Later, however, Peirce explains that *ground* corresponds to an "idea" in the platonic sense, that is, something that is in someone's mind and that can be transmitted to another person (CP 2.228).

The *ground* is, therefore, the Form (a conjecture, hypothesis, fiction, possible image) that allows the **comparison** between the contents in the mind (predicates) and the stimulus produced from the object (or subject) (EP1: 2). This comparison unites subject and predicate in a unity that is analogous to a logical proposition, producing **information**.

1.3. Interpretant

The need of an interpretant is the great difference of the Peircean semiotic when compared to other theories that take into consideration only the relation sign-object. For Peirce, it is not possible to have meaning without the production by the sign of an interpretant that presents itself as *another* sign resulting from the action of the first. In other words, the object determines the interpretant only through the sign, but the sign has the power of determining the interpretant directly. The interpretation is an essential property of semiosis, for the succession of interpretants guarantees the evolution of the sign towards a final truth, which is the movement of *information* and *signification.*

2. The three correlates of the sign

Between 1902 and 1903, in the same period Peirce intensified his studies about Perception, he understood that a complete description of the sign should take into account not only its representative and interpretative aspects, but also the material or presentative ones too. Something is a Sign only if it is interpreted as such by something or someone.

This is the presentative dimension that, added to the other two, will form the three correlates of the 1903 3-trichotomic classification (based on three trichotomies):

2.1. First Correlate (FC)

It corresponds to the **presentative** character of the sign, or the manner as it presents itself to an interpreter, regardless of the object that it professes to represent or the effect that it produces. It is the sign itself (S), whose signic capacity is due to its *ground* – the universe of possibilities of representation that, when an occasion occurs, will enable it to be taken as a sign of its object. Due to the rule of material implication among the correlates, the First Correlate is the one that determines the others, which can only be Thirdness if the First Correlate is too.

2.2. Second Correlate (SC)

It corresponds to the **representative** character of the sign, or the manner the sign represents its object to an interpretant, regardless of the effect this representation is apt to produce. It is, therefore, the relation between sign and object (S-O). The Second Correlate is determined by the first and, in its turn, determines the third.

2.3. Third Correlate (TC)

It corresponds to the **interpretative** character of the sign, or the effect that the sign produces on an interpretant mind thanks to its power of representing its object. It corresponds, therefore, to the effect of the triadic relation among sign, object and interpretant (S-O-I). The two previous correlates determine the third one.

The relations among the three correlates can be represented by Peirce's symbol of illation enchaining the three of them: **FC -< SC -< TC**.

3. The Table of the Ten Classes of Signs

The crossing of the three ontological Categories (Firstness, Secondness and Thirdness), with three Correlates of the Sign (FC, SC and TC), produces the following Table of Signs (the terminology is the same used by Peirce in 1903):

TABLE OF GENUINE TYPES OF SIGN

CATEGORIES	First Correlate (S)	Second Correlate (S-DO)	Third Correlate (S- DO-I)
Firstness (1)	Qualisign	Icon	Rhema
Secondness (2)	Sinsign	Index	Dicisign
Thirdness (3)	Legisign	Symbol	Argument

Having this list of nine genuine types of signs (that is, constituted without any ontological degenerations) in hand, we can relate the three Correlates using the same rule of **material implication** we already discussed when we saw the universal predicaments.

By the principle of the ***nota notae***, the Third Correlate can be a Quality in any situation, for this predicament is always present in all three Correlates, whether in its pure form or involved in Existence or Law. The Third Correlate can be an Existent only if the two others are **at least** Existents too. And it can be a Law only if the two others are **necessarily** Laws. Similar restrictions occur between the First and Second Correlates.

When we apply this rule to explore the possible combinations among the genuine types of signs distributed in the three correlates, we have the formation of ten Genuine Classes of Signs:

TABLE OF THE TEN GENUINE CLASSES OF SIGNS

FC	SC	TC
Qualisign	Icon	Rhema
Sinsign	Icon	Rhema
Sinsign	Icon	Rhema
Sinsign	Index	Dicisign

Legisign	Icon	Rhema
Legisign	Index	Rhema
Legisign	Index	Dicisign
Legisign	Symbol	Rhema
Legisign	Symbol	Dicisign
Legisign	Symbol	Argument

The above Classes of Signs can be arranged triangularly to form the famous figure Peirce made of them in the *Syllabus*:

1

1 1 1	311	331	333
Rhema Icon Quali-signo (I)	Rhema Icon Legisign (V)	Rhema Symbol Legisign (VIII)	Argument Symbol Legisign (X)
	211 Rhema Icon Sing-signo (II)	321 Rhema Index Legisign (VI)	332 Dicisign Symbol Legisign (XIX)
		221 Rhema Index Sinsign (III)	322 Dicisign Index Legisign (VII)
			2 2 2 Dicisign Index Sinsign (IV)

3

2
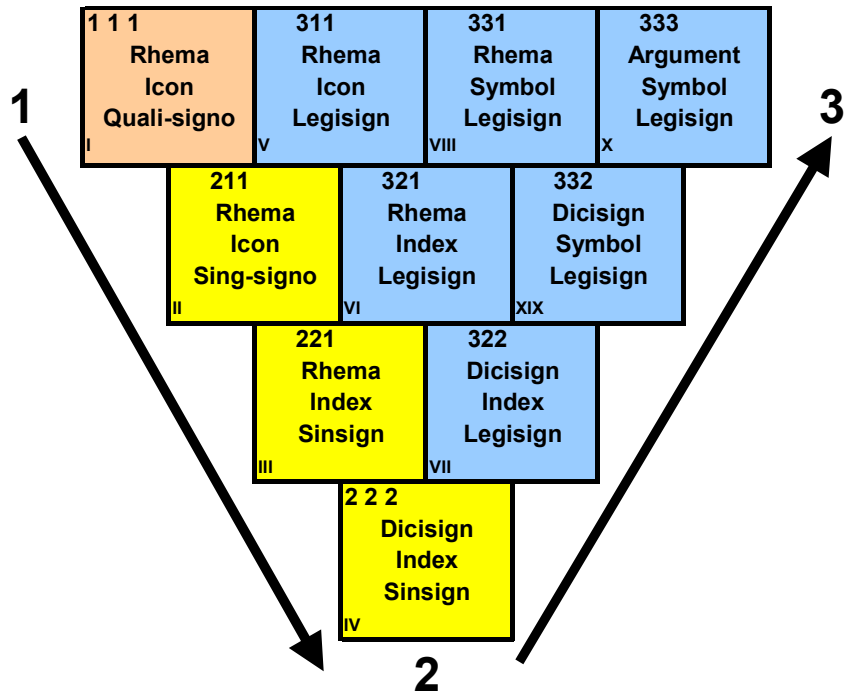
The arrows that go from 1 to 2 and from 2 to 3 fulfill the same functions we saw in the discussion about the predicaments: involvement and abstraction when the movement is crescent; and instantiation and dissolution when the movement is the inverse.

4. The degeneration of the types of signs

As we did when deriving six universal predicaments from three Categories, we are going to apply the notation of an apostrophe (') to indicate a degree of degeneration, and two apostrophes (") to indicate double degeneration. This way, a genuine Secondness can degenerate in Firstness of Secondness (1') and a genuine Thirdness can degenerate either in a Secondness of Thirdness (2') or in a Firstness of Thirdness (1").

In the table below, I present the genuine signs and their possible ontological degenerations the way I conceive them:

TABLE OF TYPES OF GENUINE AND DEGENERATED SIGNS

	FIRST CORRELATE	SECOND CORRELATE	THIRD CORRELATE
Firstness (1)	Qualisign	Icon	Rhema
Firstness of the Secondness (1')	Altersign	Idoseme	Syntax
Secondness (2)	Sinsign	Index	Dicisign
Firstness of Thirdness (1")	Holosign	Metaphor	Abduction
Secondness of Thirdness (2')	Replica	Metonymy	Induction
Thirdness (3)	Legisign	Symbol	Argument

Some of the terms above, as Syntax, Metaphor and Idoseme were created or discussed by Peirce in his articles and manuscripts. In this case, my concern was to try to respect the meaning intended by Peirce, although using it in favor of the theoretical board that I am assembling. Metonymy has an already established meaning in semiotic and Theory of Language, pairing with Metaphor - what I found interesting and promising for the research on the relations between semiotic and cognitive sciences in general. Altersign and Holosign[3] are my introductions. They were made, however, trying to respect the rule of composition adopted by Peirce when inventing Qualisign, Sinsign and Legisign, in which the prefix denotes the main property of each type of sign.

5. Description of the types of signs

5.1. Types of First Correlate

5.1.1. Firstness (1): Qualisign

Peirce defines it as a Sign of pure quality, a monad, something that exists positively in itself, pure *suchness* (CP 7.630). The Qualisign is a possibility that must be incorporated in an existent to be knowable. For example, a color, a musical chord or a scent – not the material stimulus of these sensations but the qualities they bring in themselves, independently from being noticed by someone.

5.1.2. Firstness of Secondness (1'): Altersign

We propose to call Altersign the Firstness of Secondness in the First Correlate. This sign mixes quality and existence without ever consubstantiating itself as full Secondness. Our inspiration was the term *altersense*, which Peirce uses as consciousness of alterity (CP 7.551). The Altersign is the Secondness *in posse*, a quality of "otherness" intrinsically present in all things before they manifest themselves to our senses as insistent reagents.

5.1.3. Secondness (2): Sinsign

According to Peirce, the Sinsign is a pure existent, something that occurs "here and now", *hic et nunc* (CP 1.458). Its characteristic is to force its way into the world (CP 1.21), oppose itself to a prior state of things and exist independently of the will of any interpreter. It is, therefore, a dyad (CP1.456) – a reaction of one thing against another, insistence without reason. It is what Duns Scotus has called *haecceitas* (CP 6.318). A Sinsign presents itself as something existing without the instantiation of any general property.

5.1.4. Firstness of Thirdness (1"): Holosign

We propose to call Holosign the Firstness of Thirdness in the First Correlate. It is a Thirdness doubly degenerated, the character of generality intrinsic to the Legisign, independently of being interpreted as such. The Holosign is, therefore, the sign considered

as general Form, pure mentality tending towards the future, or ***expectation,*** that every mental sign must possess in order to function as such.

5.1.5. Secondness of Thirdness (2'): Replica

It is a degenerated Thirdness, the kind of existence a Legisign assumes in our daily experience. In fact, according to Peirce, a Replica is an individual instance of a Legisign, its application or space-time occurrence. The typographic example that Peirce frequently used is quite clear: a letter or word (the article "the", for example) printed on any page is an instance of an abstract and conventional entity whose reality is that of a law (CP 2.246).

5.1.6. Thirdness (3): Legisign

In Peirce's definition, it is a sign that is a law, rule or convention (not necessarily a product of the human mind, though). It can be a concept in the mind of a human being but also a habit that regulates conventional behaviors of many living species. A Legisign is a general, a universal that acts in the reality, a *would be* whose strength is never depleted by any finite series of its individual instances.

5.2. Types of Second Correlate

5.2.1. Firstness (1): Icon

The Icon represents its object thanks to a communion of qualities that produces a resemblance among them. Actually, a pure Icon does not make any distinction between the object and itself (CP 5.74), in such way that the essence of one fuses into the other's. A pure Icon cannot exist properly, since existence presupposes Secondness. The Icon is an important conveyer, yet passive, of the Form of the object – and, consequently, of the information that will be derived from such Form.

5.2.2. Firstness of Secondness (1'): Idoseme

We propose to call Idoseme the Firstness of Secondness in the Second Correlate, or degenerated Index. This sign has a double nature, being Firstness and Secondness at the

same time. Although it is materially linked to the object that it represents, the Idoseme also represents immediately the Form of this same object. In 1909, Peirce called Idoseme the "iconic Index" and gave the photography as an example. Being a luminous kind of printing carried out by photons coming directly from the photographed object, the photograph has an indexical character. However, it also brings the Form of its object to the interpretant, therefore having an iconic character too. Peirce gives us a visual example, but the Idoseme enters through every perceptive organ and is certainly the first brick of our cognitive building. The Idoseme has the property of showing directly its signification, interpreted as incorporated in its own object (MS 277: 80).

5.2.3. Secondness (2): Index

The Index is the sign that represents its object by being materially connected to it. A pure Index can only make the existence of its object known to an interpreter, producing denotation (EP 2:460-461). In other words, the Index represents its object by blindly pointing to its existence. In fact, a finger pointing to something is a classic example of an Index. A pure Index does not bring any cognitive information about the Form of its object and, therefore, is not cognition (Short, 2004, p.12). In logic, it can only be a *Selective* (CP 2.296), or directions to find the Object of the proposition (CP 8.181).

5.2.4. Firstness of Thirdness (1"): Metaphor

Thirdness doubly degenerated in the Second Correlate originates the Metaphor. All types of mental association, as comparisons, are Metaphors. These signs are, therefore, the first moment of any mental representation, since pure Icons and Indexes can only exist in reference to their ground but never in reference to a correlate. In fact, in the *New List* Peirce affirms, "the occasion of the reference to a Correlate is obviously by comparison"[4] (EP1: 5). Metaphors play a much more important role in logic than it is normally supposed. Maybe they could even be considered the lost bond between semiotic and phenomenology, capable of unifying both of them. This seemed to be Peirce's opinion when he insisted on the metaphoric aspects grounding semiosis (MS 283):

Metaphysics has been said contemptuously to be a fabric of metaphors. But not only metaphysics, but logical and phaneroscopical concepts need to be clothed in such garments. For a pure idea without metaphor or other significant clothing is an onion without a peel.

The Metaphor divides its nature between the Symbol and the Icon. On the one hand, it depends on a habit, familiarity or conventionality (brought by the Symbol) and, on the other hand, depends on a qualitative representation of the object (brought by the Icon). Hence, a Metaphor is the quality or *possibility* of a general predicate. The Metaphor delivers to the Interpreter possible **Information** in the form of **Connotation**.

This is Peirce's mature definition for **Diagram**[5], too: a hypothetical or merely **possible** representation of general relations present among objects of a proposition. Metaphors, Diagrams and Images are fundamentally the same thing – associative representations - and Peirce came to group them under the term Hypoicons (CP 2.277). Metaphors enable abductive inferences and have an important role in the Perception, for they participate in the synthesis of the multitude of perceptive impressions into an idea. They are, in fact, the "image" created by the Perceptual Universe (CP 4.539 Fn 2) that we have already discussed in the chapter about the Theory of Perception. Modern theorists as Debatin (1995) emphasize the role of Metaphor in Perception:

> Based on its particular power of synthesis, metaphor can **bridge the gaps** between experience and thought, between imagination and concept, and between the new and the known. The central moment of this synthetic power is the **iconicity** of metaphor, which selectively evokes sensory perceptions and integrates them into meaningful constellations. Through this selective process, metaphor makes possible not only the conceptualization of experience but also the linkage of new to prior experience.

Note that the Symbol degenerated in a Metaphor does not have to be necessarily a conscious convention; it can be any law of probability of the nature or a conditional future that does not deplete in any of its instances. Lakoff and Johnson (1980, p.3) have also shown that our conceptual systems, in terms of what we think and act, including those of the formal and mathematical type, are all fundamentally of metaphoric nature.

Peirce, when discussing the hypostatization of the ideas in the mind, had already anticipated this (CP 1.383):

The most elevated type of synthesis is the one that the mind is compelled to perform not by the interior attractions of the own feelings or representations, nor by a transcendental force of necessity but, yet, in the interest of the intelligibility, that is, in the interest of the own "I think" synthesizer; and this the mind does by the introduction of an idea that is not contained in the data and that produces connections that these data, in other way, would not have. This type of synthesis has not been sufficiently studied, and in special way the intimate relationship of its different variety has not been properly considered. The work of the poet or novelist is not so deeply different of the work of the man of science. The artist introduces a fiction, however not an arbitrary fiction; this fiction demonstrates certain affinities to which the mind attributes a certain approval when declare them pretty, what, if does not correspond exactly to say that the synthesis is true, it is something of the same general type. The geometer draws a Diagram, which is not exactly a fiction, but that is at least a creation, and by the observation of this Diagram it is capable of synthesize and show relations among elements that before seemed not to have any necessary connection.

As a Diagram, the Metaphor originates logical and mathematical deduction, which is fundamentally the procedure of extracting from the Diagrams their observable consequences. According to Peirce:

The Mathematics, for example, does not deal with other thing but hypothetical states of things, which much more frequently than the contrary, are known either as false or extremely dubious. And the foundation, mother and essence of the possibility is subjective, in us, dreams (NEM 3, p.875 *apud* Santaella, 2004, p.263).

5.2.5. Secondness of Thirdness (2'): Metonymy

Secondness of Thirdness in the Second Correlate originates what we will call Metonymy. This sign is the instantiation of a Symbol. It possesses, therefore, a divided nature between the indexical and the symbolic. The Metonymy is the connection of an Index that is the Subject of a Proposition, to a Metaphor, which is its General Predicate. Therefore, the Metonymy is essentially *cognition*, an **existent Information** produced by

means of **Denotation**. The Metonymy is an association by contiguity (cf. CP 3.419) between the Index and a representation of a General Object already present in the mind of the interpreter, that is, of an Idea or General Predicate. Examples of Metonymies are proper names, personal or relative pronouns, common or abstract names, demonstrative pronouns and symptoms. When interpreted as Rhemas, Peirce calls them *Cyrioids* (CP 8.181).

The double nature of these signs, made by the union of Index and Symbol, attracted the attention of Barthes (1985, pp. 25-26), who calls them *shifters*:

"The most accessible example of *shifter* is given by personal pronouns (*I, You*), 'Indexical symbol' that unites the conventional bond and the existential bond: *I*, effectively, can only represent its Object by a conventional rule (which causes *I* to become *ego* in Latin; *ich* in German etc.) (...) The personal pronouns constitute the last acquisition of the infantile language and the first loss of the aphasia: they are terms of transference difficult to handle. The theory of the *shifters* seems still little explored; (...) maybe (and here goes only a working hypothesis) it would be around the *shifters* (....) that one should search the semiologic definition of some messages that are at the borderline of language, mostly certain forms of literary speech".[6]

Note that the General Predicate, of which the Metonymy is a specialization, must already be in the mind of the interpreter. It should have been formed by ***collateral experience***, which is a process of familiarization with the Object, given in Perception, which enables us to create an "image" of the Perceptual Universe.

The Metonymy is, in fact, the only way to internalize Information, for it is the measure of the Predication. Even the *weathercock* indicating the direction of the wind, for long sustained by Peirce as a perfect example of an Index (CP 2.286) is actually a Metonymy. The *weathercock* can only play its informative role if there is, from the Interpreter' part, a previous familiarity with its mechanism. Without this collateral experience, it is not possible for the Interpreter to know what the weathercock is doing when it points mechanically to this or that direction, as explains Esposito (L6):

(...) in MS 318 Peirce observes that "the whole significance of a sign depends upon

collateral observations". So even a weathercock "having been devised as everyone knows to

show which way the wind blows" could not be simply an indexical sign as he noted in the 1867 "New List" paper and for years after without the collateral observations about how it is created and what it is designed to do. In this case the inventor is the utterer and the weathercock is a sign of the inventor's thoughts, and since we know from collateral observations what the function of a weathercock is and how it has been constructed, it's variable motion is not only a sign of the direction of the wind but also, Peirce notes, a sign to us that it is not jammed by rust (Esposito, L6).

Every medical symptom is a Metonymy, too for it is an Index materially connected to the disease it represents. In addition, it appears in the body of the patient with habitual characteristics already consolidated by the medical knowledge and expressed by the manuals of medical symptomatology – possessing, therefore, a General Predicate. The meteorological symptoms are also good examples of Metonymies. As in Metaphor's case, the Symbol that contributes to the Metonymy must not be necessarily conventional. It can be a *would-be*, a Symbol whose general Form grows and develops in time (cf. CP 5.432). It is this material connection between the current Index and the future conditional of the Symbol that animates what we call final causation, or intelligent Purpose.

In logic, every ***conditional*** proposition uses Metonymies to represent its object, as these signs express the relation of Philonian material implication, or ***consequentia de inesse*** (CP 3.442), between the Subject (Index) and the Form of the General Predicate. Actually, every proposition that is not merely indexical, but professes to represent cognition is, in its essence, conditional – including those that logic traditionally calls categorical proposition (CP 3.440; cf. Short, 2004, p. 13). We will discuss this issue a little more when we describe the 66 Classes of Signs.

5.2.6. Thirdness (3): Symbol

Symbols are habits, normally established conventionally (EP 2: 460-461) by a mind or community. A word, a text, a book, an entire library, all the content of the Internet or any other cultural manifestation based on representations by convention are Symbols (CP 4.447). Peirce goes further, however, and affirms that man himself is a Symbol, since the mental habits and dispositions that guide him are not different, in the essence, from those guiding the evolution of the meaning of any particular word. Both men and words are

always in evolution by experience or usage, incorporating new qualities, developing its potentialities of expression and information and, occasionally, dying (CP 7.591). If we accept Peirce's metaphysical supposition that the universe is mind, then we can affirm, on a quite generic way, that Symbols feed everything that exists and remains in time and space.

The Symbol is not necessarily a sign frozen by habit, although we can find Symbols almost crystallized by laws that have depleted them from their evolutional possibilities. In most cases, however, the Symbol is alive and in continuous development, fed mainly by chance present in the objects they profess to represent. Their force to determine their Replicas is in a conditional mood, usually expressed by a law of probability: given certain conditions, we expect with some degree of certainty that an event will occur.

5.2.6.1. Symbolic information

The Symbol is the sign directly related to the concept of **Information**. It has **virtual Information** that is conditionally expressed and becomes existent only at the moment of the Denotation, that is, when the Symbol connects to an Index to produce a Metonymy that is, as we have seen, cognition. If the Symbol unites to an Icon, the originated Information will be only possible – that is, a Metaphor or Connotation.

When treating these concepts in the ambit of logic, Peirce uses many times the idea of **Informed Area** as synonym of Information, **Extension (**or **Breadth)** as synonym for Denotation and **Comprehension (**or **Depth**) as synonym for Connotation. There is a relation of uncertainty among these three quantities, expressed by the formula: Area = Extension X Comprehension or, if we prefer, **Area = Breadth X Depth.**

Since all knowledge is born in Perception and, as we have seen, it always depends on the Metaphor to represent the Perceptual Universe as a mental image, Comprehension (Depth or Connotation) must be taken as the first step in the informative movement of the Symbol. While in usage, the Symbol continues to receive, via collateral experience, the addition of new connotative information that slowly changes its meaning. Peirce called Signification this process of development of the Information carried by Symbol.

It is on the telic axis of the Signification, therefore, that the flux of information passes. This flux has an idealized starting point, where the Information is the minimum, and an equally idealized arrival point, where Information is at its maximum. Of course, these

extremes are never verified in reality, for every real Symbol is in an intermediate state between them (CP 2.409 - 2.415).

It is important to understand that the Information of the Symbol is always in a **virtual state**, that is, its reality is in the future. Peirce explains this property as follows:

> Now if you inform me of any truth, and I know it already, there is no information. If it is something that I shall never have any further reason to believe, you are speaking of a universe with which I have no concern, and what you say signifies nothing to me. If it is genuine information, it must amount to this, that whenever and wherever in the future such and such circumstances may occur, then I shall experience something. I beg you to notice that any information which ostensibly relates to the present condition of things really signifies what the person addressed will experience provided an opportunity occurs (Peirce *apud* De Tienne, 2005, p. 159).

5.3. Types of Third Correlate

5.3.1. Firstness (1): Rhema

The Rhema is a merely qualitative interpretant, i.e. it selects from the relation Sign-Object only what it has of essential. A Rhema cannot be affirmed nor denied because it cannot be judged as true or false. It is, therefore, a sign of vagueness and indetermination. The Rhema simply incorporates the Information transmitted by the sign when it relates to its Object, without producing in the interpreter's mind either an energetic or a logical effect. It is therefore pure possibility of interpretation.

5.3.2. Firstness of Secondness (1'): Syntax

The Syntax is the possible effect produced on the interpreter by the connection between Subject and Predicate, as to generate information. Note, however, that this information remains as Firstness. Hence, Peirce affirms that the Syntax is the Dicisign considered as a First (CP 2.320) and, therefore, the **Fact** that concerns the Dicisign. Traditionally, in logic, the Syntax is called Copula. Sometimes it is even considered the third necessary element in every Proposition. Peirce shows, however, that this is due to an accident of the western languages (CP 2.319).

Peirce considers the Syntax the most peculiar of the Signs and a fundamental one to enable any kind of Communication (CP 3.621). It is the Syntax that expresses, for example, the factual **information** produced in the Perceptual Judgment – which is the first stage of every logical and communicational process. In Perception, the Syntax is the ***Perceptual Fact,*** a generalization of the percept by means of its coalescence in the Perceptive Universe expressed by the Metaphor.

5.3.3. Secondness (2): Dicisign

The Dicisign is the Sign that incorporates the *meaning* expressed by the Syntax, i.e. the effect in the Interpreter's mind of the copula between the Index and the Universe which this Index refers to. If this Universe is **not** a General Predicate, the Dicisign will be indexical and the effect on the interpreter will be just to call his attention to "something" that remains opaque. It is for this reason that we say that the Index points "blindly". If the Universe is a General Predicate (a Metaphor), the copula will produce a Metonymy which is cognition. In this case, we will have an informative Proposition.

Note that the Dicisign is not the Syntax, but the result or final effect of the copula. It occurs, therefore, on the axis of the Signification, where the flux of Information of Semiosis passes. A Proposition means a "state of things" that can be expressed in many different modes: affirmative, negative, interrogative, conditional etc without the Proposition ever suffering any type of alteration in the Information it carries, as Peirce explains:

> I find convenient to use the term proposition to denote that meaning of a sentence which not only remains the same in whatever language it is expressed, but is also the same whether it is believed or doubted, asserted ... commanded ... or put as a question ..(MS L 75.396 *apud* Short, 1984, p. 24; Brock, 1981, p.322-323).

Every Dicisign is the instantiation of an Induction and, therefore, exists in the interior of the *leading principle* that rules the Inductions in direction to the final Argument.

5.3.4. Firstness of Thirdness (1"): Abduction

Abduction is an ampliative inference that produces a **hypothesis**, conjecture or supposition based on a qualitative fact (a "feeling") or a novelty (some unusual fact).

According to Peirce, Abduction is a kind of "instinct of reason", that is born from the "hope that there is sufficient affinity between the reasoner's mind and nature's to render guessing not altogether hopeless" (CP 1.121).

This affinity can be of the nature of **resemblance** or **contiguity**. Abduction is the weakest and most fallible of all forms of inferences, but also the only one capable of leading us to true discoveries. In fact, hints, presages, hunches, divinations, instinct and hypotheses are all types of Abductions. In addition, as we have already seen, the perceptual judgment has an abductive nature too.

5.3.5. Secondness of Thirdness (2'): Induction

Induction is a synonym for the attention, abstraction and generalization: when we note that a sample of a class of elements has some determined property, we can generalize affirming that the whole class from which the sample was originated has this same property (CP 2.624). Induction is an essentially denotative inference, for it is based on the fact that the premise is associated with its conclusion through a relation of contiguity.

If the Abduction produces hypothesis, the Induction produces **beliefs** or mental habits that will guide our conducts. Every change of habit, of belief or conduct is, therefore, the effect of Induction over a new cognition. As in the case of the Dicisign, the belief produced by Induction can be denied, affirmed, doubted etc, and it will continue to be the same belief. As in the case of the Dicisign too, the Induction exists in the axis of the Signification, the same where the flux of information runs.

5.3.6. Thirdness (3): Argument

The Argument is a logical sign formed by the union of premises around the fundamental leading principle of logic: the **nota notae** or *consequentia de inesse* (CP 2.462-465, 2.588). This principle has the capacity to orchestrate the chaining of these premises as to produce a synthetic inference. The Argument poses the conclusion as necessary because so the information contained in the premises demands.

The Argument is, therefore, a kind of superorder (CP 6.490) that coordinates the synthetic process of semiosis in its production of meanings (in the form of Propositions) and habits (in the form Inductions), causing Information to increase as time goes by.

5.4. Deduction, a special case

Deduction cannot be considered a pure Class of Sign but an analytical method that makes a special use of other signs, mainly Abduction and Induction (cf. CP 5.581). The role of Deduction is to build a Metaphor in the form of a Diagram that represents hypothetically the relations among the general predicates involved in a determined state of information. In such Diagram, Metonymies are applied to indicate the Subjects (Objects) of the diagrammatic relations.

Once this is done, it is possible to observe, by a strictly inductive procedure, relations that had not been noticed before – although they were already apparent in the Diagram. To this Deduction, result of a simple attention paid by the interpreter, Peirce gives the name of Corollarial. Relations that are not "easily at sight" can still be revealed by the introduction (hypothetically) of some new relations on the original Diagram. The result of this manipulation is a newly and purely abductive hypothesis, which now must be tested by Induction to be proven correct. Peirce calls Theorematic (EP 2:502) this second and more complex type of Deduction. In the words of Peirce:

> Deduction is really a matter of perception and of experimentation, just as induction and hypothetic inference are; only, the perception and experimentation are concerned with imaginary objects instead of with real ones. The operations of perception and of experimentation are subject to error, and therefore it is only in a Pickwickian sense that mathematical reasoning can be said to be perfectly certain. It is so only under the condition that no error creeps into it; yet, after all, it is susceptible of attaining a practical certainty. So, for that matter, is scientific reasoning; but not so readily. Again, mathematics brings to light results as truly occult and unexpected as those of chemistry; only they are results dependent upon the action of reason in the depths of our own consciousness, instead of being dependent, like those of chemistry, upon the action of Cosmical Reason, or Law. Or, stating the matter under another aspect, analytical reasoning depends upon associations of similarity, synthetical reasoning upon associations of contiguity (CP 6.595).

A great example of Deduction can be found in Peirce's Existential Graphs (EG), an essentially graphic system of logical notation, based on the manipulation of Diagrams that Peirce did not hesitate to describe as his intellectual "chef d'oeuvre" (CP 4.347).

6. The Linear Table of 66 Classes of Signs

Now, we will apply the principle of material implication among the Correlates (FC-<SC-<TC), taking into account the types of genuine and degenerated signs that we have described before. The result is the arrangement of 66 Classes of Signs in a crescent order that we had already presented elsewhere (Romanini, 2001, p. 45-60), although with some differences of terminology.

LINEAR TABLE OF THE 66 CLASSES OF SIGNS

	FC	SC	TC	FC	SC	TC
If the First Correlate is a Firstness (1)						
	FC	SC	TC	FC	SC	TC
1	1	1	1	Qualisign	Icon	Rhema
2	1	1'	1	Qualisign	Idoseme	Rhema
3	1	1'	1'	Qualisign	Idoseme	Syntax
4	1	1"	1	Qualisign	Metaphor	Rhema
5	1	1"	1'	Qualisign	Metaphor	Syntax
6	1	1"	1"	Qualisign	Metaphor	Abduction
If the First Correlate is a Firstness of Secondness (1')						
	FC	SC	TC	FC	SC	TC
7	1'	1	1	Altersign	Icon	Rhema
8	1'	1'	1	Altersign	Idoseme	Rhema
9	1'	1'	1'	Altersign	Idoseme	Syntax
10	1'	1"	1	Altersign	Metaphor	Rhema
11	1'	1"	1'	Altersign	Metaphor	Syntax
12	1'	1"	1"	Altersign	Metaphor	Abduction
If the First Correlate is a Secondness (2)						
	FC	SC	TC	FC	SC	TC
13	2	1	1	Sinsign	Icon	Rhema
14	2	1'	1	Sinsign	Idoseme	Rhema
15	2	1'	1'	Sinsign	Idoseme	Syntax
16	2	1"	1	Sinsign	Metaphor	Rhema
17	2	1"	1'	Sinsign	Metaphor	Syntax
18	2	1"	1"	Sinsign	Metaphor	Abduction
19	2	2	1	Sinsign	Index	Rhema
20	2	2	1'	Sinsign	Index	Syntax

	FC	SC	TC		FC	SC	TC
21	2	2	2		Sinsign	Index	Dicisign
22	2	2'	1		Sinsign	Metonymy	Rhema
23	2	2'	1'		Sinsign	Metonymy	Syntax
24	2	2'	2		Sinsign	Metonymy	Dicisign
25	2	2'	1"		Sinsign	Metonymy	Abduction
26	2	2'	2'		Sinsign	Metonymy	Induction
	If the First Correlate is a Firstness of Thirdness (1")						
	FC	SC	TC		FC	SC	TC
27	1"	1	1		Holosign	Icon	Rhema
28	1"	1'	1		Holosign	Idoseme	Rhema
29	1"	1'	1'		Holosign	Idoseme	Syntax
30	1"	1"	1		Holosign	Metaphor	Rhema
31	1"	1"	1'		Holosign	Metaphor	Syntax
32	1"	1"	1"		Holosign	Metaphor	Abduction
	If the First Correlate is a Secondness of Thirdness (2´)						
	FC	SC	TC		FC	SC	TC
33	2'	1	1		Replica	Icon	Rhema
34	2'	1'	1		Replica	Idoseme	Rhema
35	2'	1'	1'		Replica	Idoseme	Syntax
36	2'	1"	1		Replica	Metaphor	Rhema
37	2'	1"	1'		Replica	Metaphor	Syntax
38	2'	1"	1"		Replica	Metaphor	Abduction
39	2'	2	1		Replica	Index	Rhema
40	2'	2	1'		Replica	Index	Syntax
41	2'	2	2		Replica	Index	Dicisign
42	2'	2'	1		Replica	Metonymy	Rhema
43	2'	2'	1'		Replica	Metonymy	Syntax
44	2'	2'	2		Replica	Metonymy	Dicisign
45	2'	2'	1"		Replica	Metonymy	Abduction
46	2'	2'	2'		Replica	Metonymy	Induction
	If the First Correlate is a Thirdness (3)						
	FC	SC	TC		FC	SC	TC
47	3	1	1		Legisign	Icon	Rhema
48	3	1'	1		Legisign	Idoseme	Rhema
49	3	1'	1'		Legisign	Idoseme	Syntax
50	3	1"	1		Legisign	Metaphor	Rhema
51	3	1"	1'		Legisign	Metaphor	Syntax
52	3	1"	1"		Legisign	Metaphor	Abduction
53	3	2	1		Legisign	Index	Rhema
54	3	2	1'		Legisign	Index	Syntax
55	3	2	2		Legisign	Index	Dicisign
56	3	2'	1		Legisign	Metonymy	Rhema
57	3	2'	1'		Legisign	Metonymy	Syntax
58	3	2'	2		Legisign	Metonymy	Dicisign

59	3	2'	1"		Legisign	Metonymy	Abduction
60	3	2'	2'		Legisign	Metonymy	Induction
61	3	3	1		Legisign	Symbol	Rhema
62	3	3	1'		Legisign	Symbol	Syntax
63	3	3	2		Legisign	Symbol	Dicisign
64	3	3	1"		Legisign	Symbol	Abduction
65	3	3	2'		Legisign	Symbol	Induction
66	3	3	3		Legisign	Symbol	Argument

7. The Table of 66 Classes of Signs from the three Correlates

The above 66 Classes of Signs can be arranged into a triangular figure that preserves the same relations of involvement and generalization we had noticed in our discussion about the Predicaments and in the presentation Peirce made of the ten Classes of Genuine Signs.

The following triangle is clearly an expansion from the triangle presented by Peirce in the *Syllabus* and discussed at the beginning of this chapter. In fact, the ten genuine classes of signs appear distributed throughout the triangle of the 66 classes (they are represented in gray color) maintaining the same logical relations of implication and involvement they have in the 10-class triangle. The twelve voids, represented by black holes, appear by a mathematical necessity linked to the number of possible degenerations in each of the three vertexes: the pole of Thirdness may degenerate twice, the one of Secondness just once and the one of Firstness does not suffer any degeneration.

When we order the Classes of Signs according to their categoriologic value, we produce a distortion that originates the empty spaces observed in black color. This is a basic problem of the Cartesian geometry, the same world map charters face when they struggle to represent the surface of the Earth (a three-dimensional object) on a bi-dimensional sheet of paper: they must choose between distorting the representation of the territories closer to the poles or, otherwise, leaving empty spaces.

TABLE OF THE 66 CLASSES OF SIGNS

1 1 1 1	4 1 1" 1	6 1 1" 1"	27 1" 1 1	30 1" 1" 1	32 1" 1" 1"	47 3 1 1	50 3 1" 1	52 3 1" 1"	61 3 3 1	64 3 3 1"	66 3 3 3
2 1 1' 1	5 1 1" 1'	■	28 1" 1' 1	31 1" 1" 1'	■	48 3 1' 1	51 3 1" 1'	■	62 3 3 1'	65 3 3 2'	
3 1 1' 1'	■	29 1" 1' 1'	■	49 3 1' 1'	56 3 2' 1	59 3 2' 1"	63 3 3 2				
7 1' 1 1	10 1' 1" 1	12 1' 1" 1"	33 2' 1 1	36 2' 1" 1	38 2' 1" 1"	53 3 2 1	57 3 2' 1'	60 3 2' 2'			
8 1' 1' 1	11 1' 1" 1'	■	34 2' 1' 1	37 2' 1" 1'	■	54 3 2 1'	58 3 2' 2				
9 1' 1' 1'	■	35 2' 1' 1'	42 2' 2' 1	45 2' 2' 1"	55 3 2 2						
13 2 1 1	16 2 1" 1	18 2 1" 1"	39 2' 2 1	43 2' 2' 1'	46 2' 2' 2'						
14 2 1' 1	17 2 1" 1'	■	40 2' 2 1'	44 2' 2' 2							
15 2 1' 1'	22 2 2' 1	25 2 2' 1"	41 2' 2 2								
19 2 2 1	23 2 2' 1'	26 2 2' 2'									
20 2 2 1'	24 2 2' 2										
21 2 2 2											

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[1] This is the distinction between immediate and dynamic object, as we will see in the next chapter.

[2] On conjectures and guesses seen from the semiotical point of view, see the already classic essay by Ginzburg (*in* Eco and Sebeok, 1991)

[3] *Holosign* has been previously used by *Sungchul Ji*, pharmacoligist from University of New Jersey, to describe holistic properties of information related to triadic signs (personal communication). This is very similar to the use I am proposing here.

[4] The occasion of reference to a correlate is obviously by comparison.

[5] A diagram is an icon or schematic image embodying the meaning of a general predicate; and from the observation of this icon we are supposed to construct a new general predicate (MS 517 in Eisele,Vol. 4, p. 238). Compare, also: " . . . the Iconic Diagram and its Initial Symbolic Interpretant taken together constitute what we shall not too much wrench terms in calling a schema, which is on the one side an object capable of being observed while on the other side it is general. (MS 293, pp. 11f).

[6] In fact, Caprettini (*in* Eco and Sebeok, p.149) demonstrates that indexes and symptoms sustain narrative.

VI – THE FAN OF ELEVEN FOLDINGS

1. Relations between the two classifications

Peirce never declared what relation he imagined to exist among the 3-trichotomic classification, based on three correlates and published in the *Syllabus*, in 1903, and his later attempts based on ten trichotomies. Some commentators affirm that the 10-tricotomic classification supplanted the previous ones (and, consequently, the early versions should be discarded). Others, in agreement to our opinion, suggest that the two classifications may have an illative relation: the 10-tricotomic must be considered a detailed development of the 3-tricotomic one, which remains valid to the analysis of less complex phenomena.

We think that the introduction of the new trichotomies opens the fan of the three correlates to show their minute constitution, revealing the detailed constitutive characters of each class of sign. In fact, the classification based on the three correlates seems to be rougher, while the 10-trichotomic presents a thinner grain of salt. Maybe that is why the idea of degeneration and its associated concepts, such as the Hypoicons, Hyposemes and Sub-indexes, all treated with some importance until 1903, disappear after 1905, probably turning out to be unnecessary thanks to the distinctions enabled by the new trichotomies.

The proposal of classification we will offer next is based on the distinction of **eleven** (and not ten) essential characters of the sign, their ordering according to the rule of material implication, the trichotomic division of each one of the eleven characters according to the ontological categories and, finally, on what we believe is the dynamic movement that enlivens semiosis. Our starting point will be the list of 10 trichotomies Peirce presents in his manuscripts and some of the letters he exchanged with Lady Welby (CP 8.342 and ff; EP2: 477-491) after 1905.

There are many similarities between our proposal and Peirce's late attempts, but there are also many important differences. Although it is possible to overlap mine and Peirce's classification to some degree, the fact is that the introduction of the eleventh trichotomy blocks any possibility of correspondence point by point between them. In addition, we should not forget that Peirce did not explain in detail many of his new trichotomies, which would make the comparison even more difficult. We opted therefore

for an analysis of our eleven trichotomies respecting the internal logic of **our** system, hoping the *rationale* we are using to construct the 66 classes of signs is sound.

2. The expansion of the trichotomies

As we have seen in Chapter II, after 1905 Peirce saw the need to expand his semiotic in order to handle the results he had obtained in studies such as the Theory of Perception. In addition, he hoped to extract from an enlarged semiotic his longed-for proof of Pragmatism. His studies in phenomenology led him to distinguish between the two types of objects: the **dynamic**, which is the object that determines the sign and always remains out of it; and the **immediate**, which is the object represented inside the sign.

In this same period Peirce also started to distinguish three types of interpretants, named by him, most of the times, immediate, dynamic and final (CP 4.536). Actually, this terminology varied quite much between 1905 and 1908, the period he was dedicating much attention to the division of interpretants, probably influenced, as we have seen, by the exchange of letters with Lady Welby. In total, therefore, Peirce's mature semiotic counts six elementary trichotomies, which can be arranged this way:

1)   **Sign (S)**

2.1)   **Immediate Object (IO)**
2.2)   **Dynamic Object (DO)**

3.1)   **Immediate Interpretant (II)**
3.2)   **Dynamic Interpretant (DI)**
3.3)   **Final Interpretant (FI)**

In the previous chapters, we have already described the sign, the dynamic object (then considered as the only object) and the final interpretant (then considered the only interpretant in the process of semiosis). We are now going to describe the new added elements, trying to understand what refinements they produce in the Theory of Signs.

2.1) Immediate Object (IO)

From 1905 on, Peirce abandoned the term *ground*, probably replacing it by the immediate object. Roughly speaking, therefore, the immediate object is the Form of the dynamic object that the sign apprehends in order to transmit to the interpreter.

However, the meanings of *ground* and immediate object do not coincide completely. The concept of *ground* enabled Peirce to explain how representation works in the human mind, but was useless to explain how the natural semiosis does not. The *ground* was born in the bulge of a mentalistic semiotic of a Peirce still tied in the web of the nominalism and Kantism. Although being a quality (cf. CP 1.551), the *ground* is always general and considered as present in the **human** mind. In this work, I will consider *ground* in the original sense applied by Peirce in the *New List*: as a kind of metaphor or "mental image" as we have already had the opportunity of discussing in the previous chapter.

When it incorporates only Firstness and/or Secondness, the immediate object is the "ground" of a **percept** (cf. CP 4.539). When it incorporates an aspect of Thirdness, the immediate object can fairly be exchanged by the *percipuum* of the Perceptual Judgment or, in case the percept is a sign (a word, a symptom, an image, etc), by the *ground* of this very sign. We see, therefore, that the *ground* stands for the "signic semiosis" as the *percipuum* stands for the "perceptive semiosis". In this later case, it is a Form created in the mind by the coalescence of a series of percepts and expressed by a metaphor. Nevertheless, both are expressions of the immediate object.

2.2. The question of the Interpretants

Peirce clearly distinguishes three types of interpretants, but there is a lot of controversy about their internal divisions. Some commentators, such as Fitzgerald (1966, p. 78), claim that only the dynamic interpretant should be trichotomized into emotional, energetic or logic. Short (1981, p. 213) believes that each of the three interpretants must be divided according to the three categories, producing a set of nine subtypes. Liszka (1996, p. 120), in his turn, affirms that the division emotional/energetic/logic is merely a terminological variation from immediate/dynamic/final and, therefore, the total number of possible interpretants of the sign should be kept to three.

Our position aligns with Short's because his proposal seems to us closer to Peirce's own vision. In his late classificatory exercises, Peirce always put the three stages of interpretants (immediate, dynamic and final) among the ten trichotomies. In other words, Peirce always left implicit that each of the three interpretants should suffer internal triadic divisions. In fact, it would not be mathematically possible to come to 66 classes of signs using ten aspects and a rule or material implication if the three interpretants were not counted as aspects divisible as trichotomies according to the three categories

2.2.1) Immediate Interpretant (II)

The immediate interpretant is the *significance* of the sign, a kind of "interpretative atmosphere" the interpreter attributes to the sign, an interpretability that exists only *in posse* and dependent on a dynamic interpretant to be manifested. The immediate interpretant is the immediate object's other side of the coin (Short, 1981, p. 215). As this last one, thus, the immediate interpretant exists only internally to the sign.

In perception, the same way the immediate object is converted first into a *percipuum* and then into the *ground* of the sign when it gains generality, the immediate interpretant, when it gains generality, is converted from perceptual fact to perceptual judgment. This transformation is the borderline indicating the presence of a full-fledged sign (cf. Santaella, 1998, pp 108-112). Thirdness occurring in the ambit of the immediate interpretant represents the passage from a merely perceptive semiosis to one much more complex that keeps the perceptive semiosis at a lower hierarchical level while the signic semiosis runs in the higher level of the semiotical system.

Following the trichotomic division of the categories, the immediate interpretant can be emotional (the possibility of interpreting the sign emotively), energetic (the possibility of interpreting the sign effectively) or logical (the possibility of interpreting the sign as habit or as conventional).

2.2.2. Dynamic Interpretant (DI)

The dynamic interpretant is the effect produced indeed in the mind of an interpreter by the action of the sign. In other words, it is the upgrading of one of the many latent possibilities living as immediate interpretants. When the immediate interpretant is a

possibility, the dynamic interpretant will necessarily be possible too. If the immediate interpretant is an existent, the dynamic interpretant might have the nature of a possibility or of an energetic reaction (as a thoughtless response to a stimulus).

Only when the immediate interpretant is Thirdness – that is, when it is presented as *grounded interpretability* – the dynamic interpretant might be, in addition to the two previous possibilities, also a behavioral habit, a *manner* of effectively interpreting a sign to achieve a desired purpose, which will be the final interpretant of the sign.

Thirdness in the dynamic interpretant is the first manifestation of an **intelligent behavior**, for it indicates the presence of a purpose or intentionality guiding the actions of the interpreter of the sign. This can be observed in the simplest forms of life. Peirce, in fact, saw intelligence even in the behavior of microorganisms:

> ...when a microscopist is in doubt whether a motion of an animalcule is guided by intelligence, of however low an order, the test he always used to apply... is to ascertain whether event, A, produces a second event, B, as a means to the production of a third event, C, or not. That is, he asks whether B will be produced if it will produce or is likely to produce C in its turn, but will not be produced if it will not produce C in its turn nor is likely to do so (CP 5.473 *apud* Short, 1981, p. 205).

In the example above, A is a sign "pregnant" of grounded interpretability, B is a habitual dynamic interpretant instantiated as an effective reaction and C, the purpose that guides the production of B (cf. Short, *Idem*, p. 207). Thus, when a paramecium in a solution notices the presence of a substance that its species usually interprets as a sign of food (A), this paramecium will tend to slowly approach this same substance (B) in order to feed itself and guarantee its survival (C) (Short, *Ibidem*).

2.2.3) Final Interpretant (FI)

The final interpretant is "the manner in which the sign tends to represent it to be related to its Object" (CP 4.536), that is, it is the sign itself projected in that future. It is that thing the sign will be transformed into in the final opinion. In other words, it is the purpose the sign should fulfill through its long way, (Johansen *apud* Santaella, 2000, p. 85).

That is the reason for placing the final interpretant on the telic axis of the **Signification** – and not on the axis of the **Interpretation** – as in the case of the immediate and dynamic interpretants. Many commentators have disregarded this aspect. They affirm that the final interpretant is the end to which a series of dynamic interpretants tend. But this is an undue reduction of the conditional (and inexhaustible) characteristic of the final interpretant to a finite number of dynamic interpretants.

Actually, Peirce himself confessed that his conception of the third interpretant "was not completely free from mist" (CP 4.536). Nevertheless, in a letter to Welby of 1909, he affirms emphatically the conditional nature of the final interpretant:

> My Final Interpretant is the one Interpretative result to which every Interpreter is destined to come if the sign is sufficiently considered. (....) The Final Interpretant is that towards which the actual tends (SS, p. 111 *apud* Santaella, 2000, p. 74).

As the other two interpretants, the final interpretant can be trichotomized too; it may be a destined quality (Emotional Final Interpretant), a destined existent (Energetic Final Interpretant) or a destined law (Logics Final Interpretant). If it is a quality, the sign will be a pure quality or some form of degenerated quality in the final opinion; if it is an existent, the sign will be either a sinsign or a degeneration of a symbol into a replica. If it is a law, then the sign will necessary be a legisign.

3) The baby is crying

Let us go to a concrete example. The first sign we send to the world when we are born is, almost always, a cry. Although it is a primitive vocalization, the cry is also a sign full of meaning. The act of crying was selected during the evolution of our species for an important reason: the communication between parents and baby in the long period of immaturity that follows the birth of a child. The human being is the primate that takes the longest to achieve the adult maturity. For a long and delicate period, when the life of the baby is in its parents' hands, behaviors like crying and laughing are important signs to communicate discomfort or satisfaction (Morris, 2003). Thus, the cry is a sign that has a naturalized interpretability, defined on the level of human species.

Borrowing the terminology from Austin's Speech Act Theory, the cry is a performative act of the baby, although it does not do it with a conscious intentionality. Its locutionary dimension rises from a habituation acquired in the process of evolution of our species, in which certain behaviors were grammaticalized in order to mean. Its illocutionary power is certain for the child's mother, who understands immediately that her child is feeling discomfort and needs help once she hears the cry. The locutionary and illocutionary forces exist because they received, in the evolutionary process of our species, a habitual (logical) immediate object and immediate interpretant (respectively *ground* and *grounded interpretability*), which created on the cry-sign an "aura" of *significance*.

This *grounded interpretability*, in its turn, grants to the cry-sign a potentiality for producing dynamic interpretants in the mind of the child's mother (although cultural development has transferred this interpretability to other close people as well, such as the grandmother or the nanny). In fact, if the mother sees her child crying, the maternal "instinct" (or the habit of dynamic interpretation) makes her speculate about the reason of her child's discomfort and the ways of relieving the baby from suffering.

Semiotically, thus, the cry is a sign, the motive or the efficient cause of the cry (hunger? pain?) is its dynamic object, the conjectures created in the mother' mind as she tries to represent the dynamic object are the immediate objects of the cry-sign, and the attitude she takes to interpret correctly this sign is its dynamic interpretants. The sign's final interpretant is that proper attitude that the mother should take in order to make her baby stop feeling the discomfort and, also, to quit her own affliction.

The baby will stop crying only when the immediate object produced in the mother's mind conforms to the dynamic object. On a first attempt, the mother breast feeds thinking the baby is hungry, but it still cries. The act of giving her child the breast is a dynamic interpretant that gives effectiveness to one of many possible immediate interpretants. After all, the child being hungry is part of the interpretability of the cry-sign. Next, the mother checks the diapers (another dynamic interpretant bringing up another possibility), but the baby still cries. As another attempt, the mother massages the baby's belly, who finally stops crying.

Gases provoked the cry. At this moment, the immediate object produced by the mother (expressed on the conjecture "it might be gases") conformed to the actual dynamic

object of the cry-sign (the real pain caused to the child by the gases), generating an energetic dynamic interpretant (the massage on the belly), which in its turn created an emotional final interpretant: the return of both baby and the mother to an original state of peaceful and happy communion – which is, according to the Freudian psychoanalysis, the final interpretant pursued by all of us.

Well, the baby certainly loved the caress of its mother on the belly, which not only relieved its pain but also gave it supplementary information: that the mommy's massage is a source of pleasure. This is a **collateral** observation or **experience** (cf. CP 8.178): the progressive familiarization with the object of the sign so that to "correct, refine or supplement" the dynamic interpretant (Short, 1982, p.286). This familiarization must necessarily be produced in perception, which is the only door we have to acquire new cognitions. The role of collateral experience is, thus, to transform immediate objects of Firstness and Secondness (the percepts), into immediate objects of Thirdness (*percipuua* and *grounds*), creating the necessary grounding for the sign to better represent its object. It is this very process that creates the *umwelten* of all species, the "bubbles" of signs involving them (Uexkull, 1992) as they evolve in relation to their environment.

In fact, if situations similar to the cry provoked by gases repeat in the future (and it is almost certain that they will repeat several times a day), we should not be surprised if the baby starts to relate its crying act to the reward of the mother's caress. Thanks to its innate intelligence, the baby possesses the capacity of relating a concrete fact of the reality (an existent as the crying act is) to a *future* expectation, as the *habit* of the mother to rub its belly when it cries. This relation is a ***cognition*** that brings new information to the mind (CP 1.537), increasing the knowledge the baby has of the world.

Through collateral experience, the baby will learn to be "whining", which is a quite sophisticated ***perlocutionary*** behavior, based on an intentionality capable of predicting future experiences from present ones. In fact, Austin defines a perlocutionary act as "certain consequential effects upon the feeling, thoughts or acts of the audience, or of the speaker, or of other persons: and it may be done the design, intention or purpose of producing them" (*apud* Marcondes, 2005, p. 19). As we see, every perlocutionary act requires the presence of information conditioning its realization. In addition, one does not need to know how to speak to carry out a speech act. Babies and animals do it all the time.

In the continuation of this example, we are particularly interested in the fact that the baby's whining begins to exist when the final interpretant of the cry-sign is no longer merely emotional. While whining, the baby applies the cry-sign intentionally. It is no longer a sinsign, a *hic et nunc* without rules in its background but a ***replica*** destined to produce an energetic final interpretant (the mother's caress). The baby will do this sometimes before the final interpretant finally becomes a full habit. In fact, the mother will tend to invert the order of her actions (to breast feed, check the diapers, etc) and will begin to **first** rub the baby's belly. When that happens, the final interpretant will be transformed into a habit, a usual conduct, and the cry-sign assumes the garment of a **legisign**: a conventional or habitual sign that exists to be used, applied. The whining is its application.

It is also worthwhile noting that the grounded interpretability for the cry-sign corresponds to the emergency of what Peirce called, in 1906, *Cominterpretant* or ***Commens***. He explains that it corresponds to "a determination of that mind into which the mind of utterer and interpreter have to be fused in order that any communication should take place", consisting "of all that is, and must be, well understood between utterer and interpreter at the outset, in order that the sign in question should fulfill its function" (SS: 196-97 *apud* Santaella, 204, p. 163).

A Theory of Communication based on the Peircean triadic semiotic must necessarily incorporate these metaphysical and teleological elements. There is no room for simplistic linear schemes, in which the transmission happens as a simple enchainment of dyadic reactions of the cause-effect kind. Communication is a process of sharing meanings, of information, between the utterer's and the interpreter's mind so that, in the very act of this sharing, the two must fuse into one. It is a circular feed-back process in which the protagonist is not one or other minds that participates, but the own semiosis that lead both of them in the process of information. Semiosis is the conductor that orchestrates the harmonization between the shared meanings to produce **understanding**, which represents the summit of the whole the process (Liszka, 1996, p. 81).

4. Peirce's ten trichotomies

In the letters sent to Welby in 1908, Peirce worked with the hypothesis that the sign could be analyzed in ten trichotomies or ten aspects (CP 8.344 apud Santaella, 2000, p. 93) he listed this way:

1st, According to the Mode of Apprehension of the sign itself,

2nd, According to the Mode of Presentation of the Immediate Object,

3rd, According to the Mode of Being of the Dynamical Object,

4th, According to the Relation of the sign to its Dynamical Object,

5th, According to the Mode of Presentation of the Immediate Interpretant,

6th, According to the Mode of Being of the Dynamical Interpretant,

7th, According to the Relation of the sign to the Dynamical Interpretant,

8th, According to the Nature of the Normal Interpretant,

9th, According to the Relation of the sign to the Normal Interpretant,

10th, According to the Triadic Relation of the sign to its Dynamical Object and to its Normal Interpretant.

The result of the trichotomization of these ten aspects, including the names that Peirce suggested for each of the internal divisions in different moments, can be summarized in a table as Queiroz (2004, p. 101) did:

1st, according to the mode of apprehension of the sign	sign itself	S	1. qualisign *(tone, mark, potisign)* 2. sinsign (*token, actisign*, replica) 3. legisign (*type*, famisign)
2nd, according to the mode of presentation of the immediate object	immediate object (degenerated)	Io	1. descriptive 2. denominative (designative) 3. distributive (copulative, copulant)
3rd, according to the mode of being of the dynamic object	dynamic object (external, dynamic, *dynamoid*)	Do	1. abstractive (possible) 2. concretive (occurrences) 3. collective (collection)
4th, according to the relation of the sign to its dynamic object	relation of the sign to the dynamic object	S-Do	1. icon 2. index 3. symbol
5th, according to the mode of presentation of the immediate interpretant	immediate interpretant (*felt*, doubled degenerated, *destinate*, emotional)	Ii	1. hypothetical (ejaculative) 2. categoric (singular, imperative) 3. relative (significative)
6th, according to the mode of being of the dynamic interpretant	dynamic interpretant (singularly degenerated, effective, energetic)	Di	1. sympathetic (*congruentive*) 2. percursive 3. usual
7th, according to the	relation of the sign to the	S-Di	1. suggestive (*ejaculatum*)

relation of the sign to the dynamic interpretant	dynamic interpretant (mode of appealing to the dynamic interpretant)		2. imperative (interrogative) 3. indicative (cognificative)
8th, according to the nature of the normal interpretant	final interpretant (explicit, logic, logical, normal, occasional)	Fi	1. gratific 2. *practical* (produce action) 3. pragmatistic (produce self-control)
9th, according to the relation of the sign to the normal interpretant	relation of the sign to the normal interpretant (nature of the influence of the sign)	S-Fi	1. rhema (seme, term, sumisign) 2. dicent sign (feme, proposition) 3. argument (*deloma, suadisign*)
10th, according to the triadic relation of the sign to the dynamic object for the normal interpretant	triadic relation of the sign to the dynamic object for the final interpretant (nature of the guarantee of the declaration, relation of the logic interpretant or final with the object)	S-Do-Fi *(sic)*[1]	1. instinctive (guaranteed by [of] instinct) 2. experiencial (guaranteed by [of] experience) 3. habitual (guaranteed by [of] form)

Scholars like Savan (1988, p. 55-59) and Liszka (1996, p. 127-131) have important studies, although not conclusive, about Peirce's late semiotic. We will not discuss here the details and questions raised by these commentators, but what is common in these studies is that the number of trichotomies (ten) has been taken in almost a dogmatic fashion.

It is true that Marty (1982) produced a rigid logic-mathematical scheme, based on the phaneroscopic relations, that needs only six trichotomies considering the others superfluous. However, I do not know any classificatory exercise which applies more than ten trichotomies. Nevertheless, in a manuscript of 1909 Peirce himself opens a possibility suggesting the number of trichotomies might be over ten (MS 339.662) [2].

5. The formation of the 11 trichotomies

The phaneron is formed by the collection of everything present in any mind at any given moment. It is the perfect sign, dynamic and built synthetically by the triadic relation S-DO-FI. The first work of the semioticist is to "break" these relations, in a way similar to what a chemist does with a substance, to achieve its elements and constructive relations.

5.1. The analysis of the *phaneron*

When we apply the analytical tools given by phenomenology, we produce an analysis of the relations that goes from the genuinely triadic level towards the most degenerated ones until we achieve the constitutive elements of the sign. We will call **Analytical Cascade of the Phaneron** the representation of this analysis:
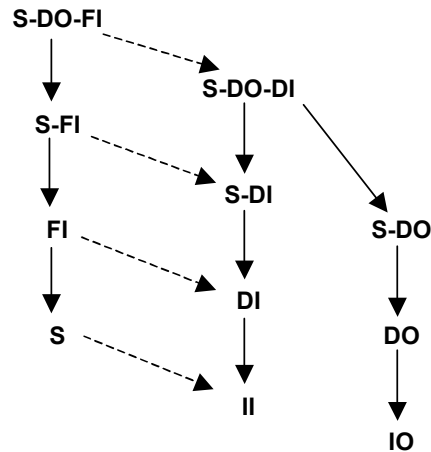
In the figure above, we count **eleven** trichotomies and not ten as Peirce insisted during all the mature phase of his research. The new trichotomy is the relation among sign, dynamic object and dynamic interpretant (S- DO- DI) and the question that naturally arises is about its impact in the arrangement of the classes of signs and how it can help us to understand semiotic better, maybe solving some of the problems semioticians have been struggling against, such as a clear differentiation between assertion and proposition.

5.1.1. Levels of the *phaneron*

The cascade brings us some other interesting information, such as the presence of four levels or constitutive degrees.

5.1.1.1. Grounding (IO, II):

It is the level in which the immediate object and the immediate interpretant compose in order to generate *grounded interpretability*.

5.1.1.2. Presentation (S, DO, DI, FI)

It is the level where the material implication (S **>-** DO **>-** I) happens. Here some words are necessary concerning the order of implication between sign and dynamic object. This is another enigma of semiotic that absorbed Peirce for a long time, and it has been passed on from him to other semioticians without anyone ever reaching a conclusive opinion.

Peirce never integrated the IO, S and DO trichotomies into an order that worked as he wished. In December 1908, in his most detailed attempts, when he came to the moment of including the dynamic object he hesitated saying that at that moment he was of the "opinion" that the dynamic object should determine the immediate object (DO**>-**IO) and consequently the sign as well (EP2: 489). However, he did not exercise this ordering.

Actually, as we hope to become clearer further, the dynamic object determines the sign only when the sign is an existent (Secondness). This situation forces the sign to have with its object a material relation. When it is not the case, the sign is free to detach itself from the existential materiality and produce metaphors, hypothesis, conjectures, fictions, emotions, hallucinations and many other possible signic manifestations.

5.1.1.3 Representation (S-DO, S-DI, S-FI)

It is the level in which the relation S-DO and its effective manifestation in S-DI occur, as well as the final destined effect of this representation in S-FI.

5.1.1.4. Communication (S-DO-ID, S-DO-FI)

It is the level in which sign, object and interpretant get into effective communion, creating a non-reducible triadic relation able to produce a final communicative effect.

5.1.2. The Inexhaustibility of Information

The difference between the continuous and dashed arrows in the Analytical Cascade of the Phaneron represents a fundamental property of information: it is always in a conditional future that remains inexhaustible by any number of its instantiations in replicas. Therefore, it is important to note that:

a) The arrows of continuous lines represent an analysis of the trichotomy towards its simplest levels, or the successive descents in the hierarchy of relations.

b) The arrows of dashed lines represent a reduction from continuous to discrete, or from the general conditional of the final cause towards its contingent application.

The presence of dashed lines in each level means that:

b.1) no finite multitude of immediate interpretants (II) can exhaust the potentiality of the sign (S).

b.2) no finite multitude of interpretative effects (DI) can exhaust the virtuality of the final interpretant (FI).

b.3) no finite multitude of effective manifestations of the sign (S-DI) can exhaust the possibilities of representation expressed in the relation between the sign and its final interpretant (S-FI).

b.4) no finite multitude of communicative acts or illocutions (S-DO-DI) can exhaust the whole meaning of an argument (S-DO-FI).

5.1.3. Axis of Semiosis

The Analytical Cascade also enables us to divide the three great axis of Semiosis:

5.1.3.1. Objectivation (Ob)

IO --------DO--------S-DO---------S-DO-DI--------- S-DO-FI

It is the axis of the two objects of the sign (immediate and dynamic), as well as the relations that the dynamic object establishes throughout the process of semiosis.

5.1.3.2. Interpretation (In)

II----------DI-----------S-DI----------S-DO-DI

It is the axis of the interpretation, whether immediate or dynamic, and the relations they produce in the semiosic process.

5.1.3.3. Signification (Si)

S ----------FI------------S-FI-----------S-DO-FI
   It is the axis of the telic development of the sign towards the final opinion.

5.2. Descriptions of the new trichotomies

   We have already described the Grounding trichotomies (IO and II, responsible for the *ground* and *grounded interpretability*) and the Presentative ones (S, DO, DI and FI, responsible for defining the materiality of the sign "in itself"). We are now going to describe the **Representative** and **Communicative** trichotomies, formed by dyadic and triadic relations established among the elementary trichotomies.

   The sign can relate to all other elements that comprise the classes of signs, except for the immediate object and interpretant, which are internal to it. Peirce explains that when we compose these relations, we shall take into consideration only those trichotomies in which the sign is a member of the relation. This rule excludes, for example, relations such as DO-DI, DO-FI or DI-FI (see in Liszka, 1996, p.130-131, a list with all possible relations left out due to this rule of exclusion).

5.2.1) Representative Trichotomies

   These are the trichotomies responsible for the representative property of the sign: the way it relates to its dynamic object, how this representation is effectively interpreted by the dynamic interpretant and the how this representation projects itself towards a representative ideal expressed in the relation between sign and final interpretant.

5.2.1.1. Relation of the Sign to the Dynamic Object (S-DO)

   This is the typically representative trichotomy, when the sign relates to its dynamical object. The sign appears in this relation as the final interpretant allows it to do, that is, here the sign is already loaded with a type of purpose. When relating to its dynamic object, which is exterior to it, the sign might adapt, correct and accommodate the purposes

that the final interpretant tries to perform through it. The relation S-DO is, therefore, the reactive confrontation between the tendency of the sign to perform a **final cause** and the indifference of the dynamic object to this *finious* purpose.

If the final cause the sign pursues does not find resonance in the dynamic object, the representation will fail and the sign will remain a mere presentation (an icon of its dynamic object) and will tend to waste its signic power until homogeneity consumes it completely. If the relation S-DO is a Secondness, the sign has the possibility to represent its dynamic object materially, transmitting factual information about it. If the representation is a Thirdness, the sign incorporates the Form of the dynamic object and applies for being the vehicle of its transmission to an interpreter. If it is able to transmit the Form to the Interpreter with success, it will depend on the S-DI and S-FI relations.

5.2.1.2. Relation of the Sign to the Dynamic Interpretant (S-DI)

It is the transformation of representation itself (given in the relation S-DO) into a representation able to produce effects (whether emotional, energetic or logic). In other words, it is the manner of **fluency** of the representation from the point of view of the interpreter. Once again, the sign appears loaded with the purpose given by the final interpretant. After coming to terms with the dynamic object, it needs to adapt itself to the concrete circumstances of representation, or the real situation that determines the production of an interpretative effect. The relation S-DI is, therefore, a kind of compromise between the possibilities of representation of the sign and the concrete circumstances in which this representation occurs.

A same sign (a word, for example) can produce infinite representative dynamic interpretants (each time that a word is used by the any speaker of a community) and in each of these circumstances it may succeed or not in transmitting the Form of its dynamic object. The way that the whole community tends to use this word in all possible situations corresponds to the last representative trichotomy, the S-FI relation.

5.2.1.3. Relation of the Sign to the Final Interpretant (S-FI)

It is the manner the sign would represent its object in an infinitely distant future, when it would achieve its representative perfection. This trichotomy is an iterative relation

between S and FI on the axis of Signification. After going through the sieve of representing its dynamic object and submitting itself to the constraints of the effective situations of representation, the sign now can pursue a **re**presentative final cause, which will overlap its previous presentative function. The relation S-IF means, thus, the return of the sign to the telic axis of signification to calibrate itself once again in its path to the *summum bonum.*

5.2.2. Communicative Trichotomies

The communicative trichotomies show how object, sign and interpretant fuse into a genuine triadic relation, generating information and understanding (Liszka, 1996, p. 81) and enabling the self-control over the whole process of semiosis.

5.2.2.1. Communication among Sign, Dynamic Object and Dynamic Interpretant (S-DO-DI)

It is the effect produced indeed by the triadic communion among sign, dynamic object and dynamic interpretant, or the way of *fluency* of communication. It can be a possible enunciation (for instance, a phatic communication, as when we say on the phone "Hello, hello" without knowing if we are being heard), an effective communication (an assertion or a conversational implicature the way Grice conceives it) or logic (such as communicative routines that emerge in the communication process).

If it is a mere Firstness, the communicated information can only be that of a possible quality of the Object (a Rhema). If it is a Secondness, the communication is the **fact** that a quality is materially connects to the object (Syntax or Assertion). If it is a habit, the communication is the habit with which the Interpreter is used to acting accordingly.

A good example is animal communication, which Maturana calls by the neologism "linguajar" (2002, p. 168): "a flow of recurrent interactions that constitute a system of consensual coordinations of conduct of consensual coordinations of conduct". Maturana believes that language, as a process, is not placed in any part of the body of its participants, but in the space of the habits of communicative behavior (what he calls "consensual coordinations of conduct") that emerges in the flow of the recurrent encounters:

No conduct, no gesture nor particular corporal posture constitute an element of language on its own, but are part of it provided they belong to a recursive flow of consensual coordinations of conducts. Thus, we consider as words only those gestures, sounds, or corporal postures that participate, as consensual elements, in the recursive flow of consensual coordinations of conduct that constitute language. The words are, therefore, paths of consensual coordinations of conduct and it is for this reason that when an observer attributes meanings to gestures, sounds, conducts or corporal postures, that he or she distinguishes as words, what he or she really does is to connote or refer to the relations of consensual coordinations of conduct of which he or she sees such gestures, sounds, conducts or corporal postures participate" (*Op. cit, idem, my translation*).

This very broad definition of "word" that Maturana gives us in his ontology of conversation, structured from habits iconically expressed (**metaphors**, thus), comes very near the late definition Peirce makes for the sign as vehicle in the communicative process:

> A sign, on the other hand, just in so far as it fulfills the function of a sign and none other, perfectly conforms to the definition of a medium of communication. It is determined by the object, but in no other respect than goes to enable it to act upon the interpreting quasi-mind other than that of determining it as if the object itself had acted upon it. Thus, after an ordinary conversation, a wonderfully perfect kind of sign functioning, one knows what information or suggestion has been conveyed, but will be utterly unable to say in what words it was conveyed, and often will think it was conveyed in words, when in fact it was only conveyed in tones or in facial expressions (MS 283).

5.2.2.2. Communication among Sign, Dynamic Object and Final Interpretant (S-DO-FI)

The trichotomy S-DO-FI expresses the final information the effective communicative flow of S-DO-DI is bound to transmit if communication is taken up to its completion. It is, therefore, the entelechy (W:5.404), or Perfect Sign (EP2: 545, n.25).

If it is a pure possibility (Rhema), it can play the role of the Predicate of a Proposition, incorporating the information produced in the flow of S-DO-DI; if it assumes the status of Secondness, it can be a **proposition** or an **inductive inference**. Should it be presented as Thirdness, it would be a complete **argument**.

It is important to understand that these three types of signs just cited (proposition, induction and argument) occur on the telic axis of Signification and they all express the final cause of the Signification process. A proposition, for instance, is a communicative sign whose information cannot be exhausted by any multitude of communicative syntax (or **assertions**) that may occur as a result of the S-DO-DI trichotomy.

As we have already seen, the grammar and the language used when we express a proposition or induction are accidental and do not alter the information the proposition contains. We can, for instance, alter the traditional order Subject-Verb-Predicate common in all Latin languages, write the proposition in Portuguese, English or any other language, express it in different moods (interrogative, indicative, conditional, etc) that its information will remain identical *provided that it is originated by a same collateral experience from the object*, that is: provided the *grounded interpretability* of these several illocutions keep the same Form (information) passed from object (utterer) to interpretant (interpreter).

To this grounded interpretability applied to communication Peirce gives the name of *common ground* (CP 3.621). It is the common universe between speaker and listener, what in the Philosophy of the Ordinary Language is normally called *Background.*

6) The baby still cries

Let us go back to the example of the crying baby that, we now know, is pure whining. We also know that the object of the whining-cry-sign is the expectation of the mother's caress – this is what it *professes* to represent (as well as the hygrometer professes to represent the expectation of the future storm, as we have seen above). The success of this representation depends on each specific situation in which is used, that is, how S-DO will evolve towards S-FI, and passing through S-ID. The first time the baby whines, it is expected that it does not succeed in communicating the information "caress". But here too the repetition of this communicative situation will tend, in the long run and through collateral experience, to cause the mother to understand what the baby really desires.

The mother starts to grasp the true intentions of her baby through communicational implicatures, or abductions that create fallible and correctable hypotheses about the

intentions of her child. If the mother "buys" her child's game and grants the caress on the belly every time it cries whiningly, she will "spoil her" (as it is popularly said), that is: she will be "conniver" in the production of this habit of representation, in which the relation between sign and dynamic object (S-DO) becomes habitual.

Every time the mother indulges her child's whining, she produces an energetic representative dynamic interpretant (S-DI). If she does it frequently, this effect will become habitual too and we may expect that, in a few days, the mother will be granting the wishes of her baby "automatically", with no need to consciously think about it. That is, the relation (S-FI), the representative effect, tends to be transformed into a habit too and, so long as the baby will be satisfied in her expectations with the same frequency she whines, the dynamic object of the whining-cry-sign ("I want caress") will be perfectly conformed with its destined representation (S-FI): "whinning means 'I want caress'".

The whining-cry-sign assumes then the statute of a **symbol** that conventionally represents, for the mother-baby system, the message "I want caress". This is why mothers claim to understand the language of their babies and feel anguish when they have to leave them with strangers who do not know the meaning of their gestures, groans and expressions that were symbolized only in the iterative contact between mother and baby.

When the whining-cry-sign assumes the garment of a symbol, we have a fully communicative situation, composed of (1) symbolic signs (the range of vocalizations, tonalities, gestures that constitute the whining-cry-sign, shared by mother and child and that obeys the function of offering a *grounded interpretability*), (2) utterer (the system or quasi-mind "baby-willing-caress", that plays the role of dynamic object) and (3) an interpretant (the system or quasi-mind "mother-willing-to-satisfy-her-child", that plays the role of Interpretant).

The whining-cry-sign is the vehicle that transfers from the baby to the mother the meaning expressed in a Form, which is a general immediate object (metaphor that is the predicates, ground, percipuum) and an equally general immediate interpretant (abductions). Actually, if we take it literally, every human communication, be it interpersonal or mass, occurs in the same way: the transmission of Forms through signs.

The happiness of the communication process, or success of the semiosis, occurs when sign, object and interpretant connect in an supra-system capable of fully performing

the possible signification that lies, as always, in the grounded interpretability of the sign, i.e. in the general immediate object and immediate interpretant that it carries along. This is its load of significance, its possible information awaiting to be embodied in an effective communicative illocution (S-DO-DI), or assertion, with the hope of obtaining the final communicative effect (S-DO-FI): in a given moment and context, the baby whines, the mother understands the message and fulfills her wishes knowing that there is in this act a conniving between both, a symbolic communion that unites them both in communication.

It is clear, thus, that the trichotomy S-DO-DI produces **repetition** or **redundancy** in order for the information to be transmitted. The communicative iteration origins **frequency** capable of producing intended final effect: a "conditioning".

7) The flux of semiosis
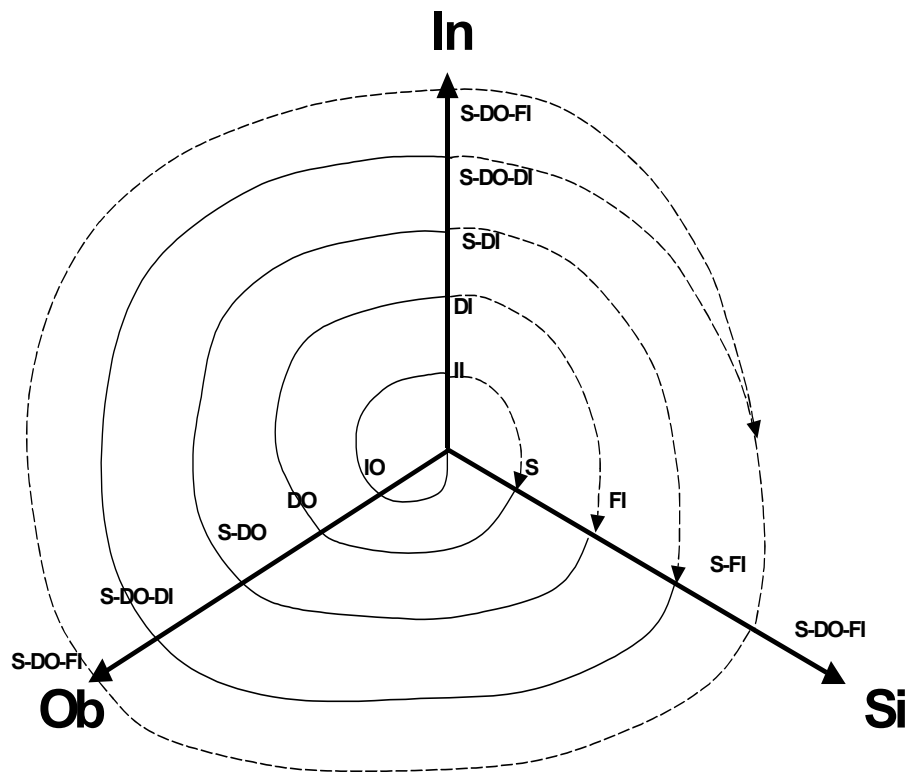
By organizing the three axes of semiosis seen before (Signification, Objectivation and Interpretation) into a figure, it is possible to represent the dynamic action of the sign. The figure above shows that the Semiosis is made of dynamic processes organized in hierarchies: a flux of information that needs no structural components such as "energy", "matter" or a "channel". In fact, according to Collier (2003, p. 109), if all components of a particular system are processes, there is no need for fundamental components.

8) General properties of semiosis

Some important general properties can be deduced from the figure above, although we cannot discuss them in detail in the ambit of this work:

8.1. Semiosis and dynamic systems

Semiosis behaves like a system built from the recursive interaction among the trichotomies on the axis of object, sign and interpretant. The three correlates can be considered the elements in interaction, each one with its attributes and producing relations that give cohesion to the system as a whole. The great system of semiosis can be divided into smaller sub-systems. This nesting of systems creates dynamical hierarchies (cf. Collier, 1999. p. 111 and 2003, p. 109).

8.2. Semiosis and periodicity

Semiosis is a periodical flux. By Periodicity we mean the phenomenon of repetition of a group of properties in steady intervals (Scerri, 1998), although there is increase of complexity in the whole. The periods seem to be connected as to produce what the systems theorists call **resonance** – a harmonic relation between frequencies (given by induction) that present themselves irreversible and constructive, capable of causing new properties in the system to emerge.[3]

8.3. Semiosis and *autopoiesis*

Semiosis is *autopoietic* (Maturana and Varela, 1973, p. 78), i.e. it produces itself from a fundamental complementarity between structure and function. This might be the property of the Perfect Sign, which allows for presenting itself as **entelechy**.

8.4. Semiosis and development

The Semiosis is ampliative, starting from the simple towards the varied and complex, i.e. it moves towards the increase of information.

9) Periods of Semiosis

The Semiosis has three complete **periods** and a sub-period nested within the third. A semiosic period always starts with Firstness in a trichotomy of the signification axis and is completed with Thirdness in the trichotomy of this same axis, but on a higher level. In other words, the presence of the Thirdness in the signification axis always marks the end of a period and beginning of the next one.

There is a good reason for that: the creation of a habit on the axis of Signification causes the whole period in question to acquire a certain rigidity and opacity. The periods dominated by habits leave the foreground, where the dynamism occurs, and are sent to lower grounds not immediately active. This is the same mechanism that sends to the genetic code the features selected in the biologic evolutionary process, or sends the habits acquired by iteration of experiences to the unconscious mental structures (Bateson, 1999). Note, for example, what Peirce says about this:

> (...) the inferential process involves the formation of a habit. For it produces a belief, or opinion; and a genuine belief, or opinion, is something on which a man is prepared to act, and is therefore, in a general sense, a habit. A belief need not be conscious. When it is recognized, the act of recognition is called by logicians a judgment, although this is properly a term of psychology. A man may become aware of any habit, and may describe to himself the general way in which it will act. For every habit has, or is, a general law. Whatever is truly general refers to the indefinite future; for the past contains only a certain collection of such cases that have occurred. The past is actual fact. But a general (fact) cannot be fully realized. It is a potentiality; and its mode of being is *esse in futuro* (CP 2.148).

But what would be the logical inference capable of producing habits? Peirce answers that is the Induction (CP 2.643). Bateson (*Idem*) agrees with Peirce about the process of formation of habit from the repetitions of the experience and about the manner the habits are sent, by a process of economy of flexibility, to the inactive parts of the mind:

(...) the process of habit formation is a sinking of knowledge down to less conscious and more archaic levels. The unconscious contains not only the painful matters which consciousness prefers to not inspect, but also many matters, which are so familiar that we do not need to inspect them. Habit, therefore, is a major economy of conscious thought. We can do things without consciously thinking about them (*Idem*, pp. 141-142).

The same idea is reinforced in the passage below:

(...) in mental evolution, there is (...) an economy of flexibility. Ideas, which survive repeated use, are actually handled in a special way, which is different from the way in which the mind handles new ideas. The phenomenon of habit formation sorts out the ideas, which survive repeated use, and puts them in a more or less separate category. These trusted ideas then become available for immediate use without thoughtful inspection, while the more flexible parts of the mind can be saved for use on newer matters (*Idem*, p. 509).

We are going to describe briefly each of the periods of semiosis, relating them to the four levels of the thought (Santaella, 2004, p. 81): perceptive, inquisitive, deliberative, and scientific:

9.1. First Period (1P): Perceptive

It starts at the infinitesimal point where the three axes encounter, and it ends when perceptive frequency originates the sign (S). This is the period proper of the Perceptive Semiosis. Its aim is to produce habits in the trichotomies of the immediate object, immediate interpretant and sign. When this period is at the Grounding stage, we see the work of **collateral experience**, by which the Form of the Object is being delineated inside the immediate object, producing *Percipuum* that later will be the ground of a sign. When both IO and II become Thirdness, semiosis gains ***grounded interpretability***, which will

enable a Perceptual Judgment about the universe of the percepts. When the perceptual judgment becomes habitual, we finally have the appearance of the full-fledged sign.

9.2. Second Period (2P): Inquisitive

It starts when Thirdness dominates the sign (S), which means that the whole First Period has been consolidated as a habit, and ends only when Thirdness dominates the final interpretant (FI). In this period, the sign participates in the synthetical process of Information from the contact with its dynamic object. During this period, the sign will be trying to represent its dynamical object in the truest possible way.

9.3. Third Period (3P): Deliberative

It starts when Thirdness dominates the final interpretant (FI) and ends when Thirdness dominates the relation between sign final interpretant (S-FI). This period begins at the point where semiosis enters the realm of legisigns to develop habits of representation. Thought becomes self-reflexive and detached from the perceptual facts (CP 7.187).

9.4. Sub-period of 3P (3P´): Scientific

It goes from the S-FI relation to the S-DO-FI relation. This is the period of the scientific argumentation, or Methodeutic. It is a sub-system of the previous one, but essentially symbolic.

10) The classes of signs

When we talk about the sign as the "object" of semiotic, we are always supposing its typology and its framing inside a **Class of Sign**. A class of sign is an arrangement among the aspects or relations of the sign, taking into account its trichotomic divisions and its formation rules. It is an abstract entity that describes a number potentially infinite of signs alive in semiosis. Depending on the number of trichotomies one decides to adopt, the classification of the signs may vary from 10 to a maximum of 66 if the "fan" of possible trichotomies (11) opens completely.

The flow of semiosis determines the ordering among the correlated elements that form the class of the sign, which can be represented this way:

	THE ELEVEN TRICHOTOMIES OF THE SIGN									
	IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
	Grounding		Presentative				Representative			Communicative	

10.1) Preliminary Table of the Eleven Trichotomies

Note that, in the table below, the evolution of the semiosic flux from a Firstness in the first trichotomy (that of the Immediate Object) until the last trichotomy (that of the relation S-DO-FI) is taken by Thirdness.

	THE 78 CLASSES OF SIGNS FROM 11 TRICHOTOMIES										
	IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
	Grounding		Presentative				Representative			Communicative	
1	1	1	1	1	1	1	1	1	1	1	1
2	2	1	1	1	1	1	1	1	1	1	1
3	2	2	1	1	1	1	1	1	1	1	1
4	2	2	2	1	1	1	1	1	1	1	1
5	2	2	2	2	1	1	1	1	1	1	1
6	2	2	2	2	2	1	1	1	1	1	1
7	2	2	2	2	2	2	1	1	1	1	1
8	2	2	2	2	2	2	2	1	1	1	1
9	2	2	2	2	2	2	2	2	1	1	1
10	2	2	2	2	2	2	2	2	2	1	1
11	2	2	2	2	2	2	2	2	2	2	1
12	2	2	2	2	2	2	2	2	2	2	2
13	3	1	1	1	1	1	1	1	1	1	1
14	3	2	1	1	1	1	1	1	1	1	1
15	3	2	2	1	1	1	1	1	1	1	1
16	3	2	2	2	1	1	1	1	1	1	1
17	3	2	2	2	2	1	1	1	1	1	1
18	3	2	2	2	2	2	1	1	1	1	1
19	3	2	2	2	2	2	2	1	1	1	1
20	3	2	2	2	2	2	2	2	1	1	1
21	3	2	2	2	2	2	2	2	2	1	1
22	3	2	2	2	2	2	2	2	2	2	1
23	3	2	2	2	2	2	2	2	2	2	2

24	3	3	1	1	1	1	1	1	1	1	1
25	3	3	2	1	1	1	1	1	1	1	1
26	3	3	2	2	1	1	1	1	1	1	1
27	3	3	2	2	2	1	1	1	1	1	1
28	3	3	2	2	2	2	1	1	1	1	1
29	3	3	2	2	2	2	2	1	1	1	1
30	3	3	2	2	2	2	2	2	1	1	1
31	3	3	2	2	2	2	2	2	2	1	1
32	3	3	2	2	2	2	2	2	2	2	1
33	3	3	2	2	2	2	2	2	2	2	2
34	3	3	3	1	1	1	1	1	1	1	1
35	3	3	3	2	1	1	1	1	1	1	1
36	3	3	3	2	2	1	1	1	1	1	1
37	3	3	3	2	2	2	1	1	1	1	1
38	3	3	3	2	2	2	2	1	1	1	1
39	3	3	3	2	2	2	2	2	1	1	1
40	3	3	3	2	2	2	2	2	2	1	1
41	3	3	3	2	2	2	2	2	2	2	1
42	3	3	3	2	2	2	2	2	2	2	2
43	3	3	3	3	1	1	1	1	1	1	1
44	3	3	3	3	2	1	1	1	1	1	1
45	3	3	3	3	2	2	1	1	1	1	1
46	3	3	3	3	2	2	2	1	1	1	1
47	3	3	3	3	2	2	2	2	1	1	1
48	3	3	3	3	2	2	2	2	2	1	1
49	3	3	3	3	2	2	2	2	2	2	1
50	3	3	3	3	2	2	2	2	2	2	2
51	3	3	3	3	3	1	1	1	1	1	1
52	3	3	3	3	3	2	1	1	1	1	1
53	3	3	3	3	3	2	2	1	1	1	1
54	3	3	3	3	3	2	2	2	1	1	1
55	3	3	3	3	3	2	2	2	2	1	1
56	3	3	3	3	3	2	2	2	2	2	1
57	3	3	3	3	3	2	2	2	2	2	2
58	3	3	3	3	3	3	1	1	1	1	1
59	3	3	3	3	3	3	2	1	1	1	1
60	3	3	3	3	3	3	2	2	1	1	1
61	3	3	3	3	3	3	2	2	2	1	1
62	3	3	3	3	3	3	2	2	2	2	1
63	3	3	3	3	3	3	2	2	2	2	2
64	3	3	3	3	3	3	3	1	1	1	1
65	3	3	3	3	3	3	3	2	1	1	1
66	3	3	3	3	3	3	3	2	2	1	1
67	3	3	3	3	3	3	3	2	2	2	1
68	3	3	3	3	3	3	3	2	2	2	2

69	3	3	3	3	3	3	3	3	1	1	1
70	3	3	3	3	3	3	3	3	2	1	1
71	3	3	3	3	3	3	3	3	2	2	1
72	3	3	3	3	3	3	3	3	2	2	2
73	3	3	3	3	3	3	3	3	3	1	1
74	3	3	3	3	3	3	3	3	3	2	1
75	3	3	3	3	3	3	3	3	3	2	2
76	3	3	3	3	3	3	3	3	3	3	1
77	3	3	3	3	3	3	3	3	3	3	2
78	3	3	3	3	3	3	3	3	3	3	3

10.2. The rule of the Triangle of Existence

As seen above, the trichotomization of the eleven aspects of the sign leads to the production of 78 classes. However, not all of them are logically possible. Twelve classes are logic aberrances because they do not respect what we will call the **rule of the triangle of existence**. This rule is necessary to preserve the reality of Secondness in semiosis. If the sign is an existent, for instance, it should be materially connected either to an immediate object or to a dynamic object. One cannot have a fingerprint, for instance, without having it materially connected to an existent finger, nor one can satisfy the desire of eating a piece of cake without having a piece of cake really being eaten (or at least a hallucination that guarantees a fictional experience of a piece of cake being eaten).

The rule of the triangle of existence has two parts:

1ª) determines that there cannot be Secondness on the Signification axis without having Secondness in each of the other two axes. This must be true when we see Secondness in any of the four trichotomies placed on the Signification axis: S, FI, S-FI and S-DO-FI.

2ª) establishes that there should be a number of triangles of existence always equal to the number of Secondness manifested on the Signification axis. Thus:

a) If on the Signification axis there are existents in **two** periods, so there should be **two** existent triangles linking the three axes (one nested into the other).

b) In case S, FI and S-FI are existents, there should be so, correspondently, three nested existent triangles uniting the axes.

There is another important observation to be made: the trichotomy S-DO-DI participates both in the Objectivation and the Interpretation axes (because it is construed with DO and DI), so it is enough for S-DO-DI to be existent in order to guarantee existence conditions for both axes. Similarly, the trichotomy S-DO-FI participates in the three axes, so that the occurrence of an existent in this trichotomy automatically produces an existence triangle covering the flow of semiosis.

See below which are the 12 eliminated classes and the reasons for their elimination:

a) Restrictions from the trichotomy of the Sign (S)

If the sign (S) is an existent in the Signification axis, then there should be a triangle of existence formed by one of the triads below:

1) **S & OI & II**

2) **S & DO & II**

3) **S & DO & DI**

The three classes below do not satisfy this restriction:

No	IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
15	3	2	2	1	1	1	1	1	1	1	1

	IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
25	3	3	2	1	1	1	1	1	1	1	1

	IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
26	3	3	2	2	1	1	1	1	1	1	1

b) Restrictions from the trichotomies S and FI

If both S and FI were existents on the Signification axis, then there should be two existence triangles. The possible options are:

1) First triangle: **S & IO & II**; Second triangle: **FI & DO & DI**

2) First triangle: **S & DO & II**; Second triangle: **FI & S-DO & DI**.

3) First triangle: **S & DO & DI**; Second triangle: **FI & S-DO & S-DI**

The classes below do not satisfy the rule:

	IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
18	3	2	2	2	2	2	1	1	1	1	1

	IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
28	3	3	2	2	2	2	1	1	1	1	1

	IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
29	3	3	2	2	2	2	2	1	1	1	1

c) Restrictions from the trichotomy FI

If only FI is an existent on the Signification axis, then it should compose existent triangles of existence in one of the following possible configurations:

1) **FI & DO & DI**
2) **FI & S-DO & DI**
3) **FI & S-DO & S-DI**

The classes below do not satisfy the rule:

	IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
45	3	3	3	3	2	2	1	1	1	1	1

	IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
52	3	3	3	3	3	2	1	1	1	1	1

	IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
53	3	3	3	3	3	2	2	1	1	1	1

d) Restrictions from the trichotomies S, FI and S-FI

If S, FI and S-FI are existents, so there must be three nested triangles of existence that can be formed with the following combination:

1) First triangle: **S & IO & II**; Second triangle: **FI & DO & DI**; Third triangle: **S-FI & S-DO & S-DI**.

2) First triangle: **S & DO & II**; Second triangle: **FI & S-DO & DI**; Third triangle: **S-FI & S-DO-DI** (remember that this trichotomy comprises two axis).

3) First triangle: **S & DO & DI**; Second triangle: **FI & S-DO & S-DI**; Third triangle: **S-FI & S-DO-DI**.

The class below does not satisfy any of the conditions:

	IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
31	3	3	2	2	2	2	2	2	2	1	1

e) Restrictions from FI and S-FI

If both S and FI are existents on the Signification axis, so there must be two nested triangles of existence that can be formed with the following combination:

1) First triangle: FI & DO & DI ; Second triangle: S-FI & S-DO & S-DI

2) First triangle: FI & DI & S-DO ; Second triangle: S-FI & S-DO-DI

3) First triangle: FI & S-DO & S-DI; Second triangle: S-FI & S-DO-DI

The class below does not satisfy these conditions:

	IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
55	3	3	3	3	3	2	2	2	2	1	1

f) Restriction from S-FI

If only S-FI is an existent on the signification axis, so there must be at least one triangle of existence with one of the two possible combinations:

1) **S-FI & S-DO & S-DI**

2) **S-FI & S-DO-DI** (remember that this trichotomy covers two axes).

The class below does not satisfy the conditions:

	IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
70	3	3	3	3	3	3	3	3	2	1	1

10.2.1. An example: the vertex of the existence

The rule of the triangle of existence can be much better understood when we analyze the class of sign more immediately connected to its object, which is the dicisign indexical sinsign – the true pole of existence in the sign classification. In fact, this class has existents in all four trichotomies on the signification axis: S, FI, S-FI and S-DO-FI. It should be represented, therefore, with four nested triangles linking the three axes, as shown in the figure bellow:

No	IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
	2	2	2	2	2	2	2	2	2	2	2
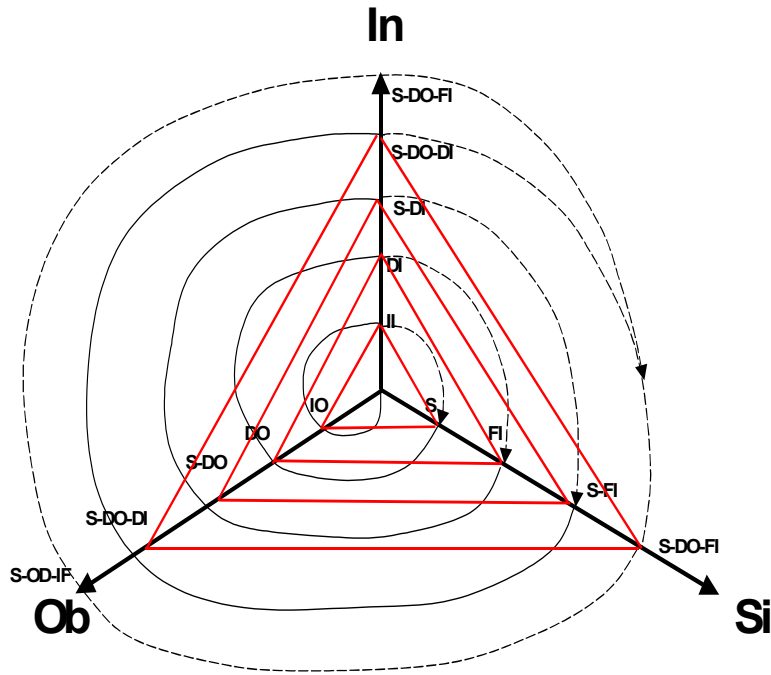
10. 3. The Triangle of the 11 Trichotomies

The 66 Classes of Sign can be arranged in a triangular chart having the categories (Firstness, Secondness and Thirdness) as vertexes, as show below. The black windows or "holes" correspond to the classes eliminated by the rule of the triangle of existence.

The arrows correspond to the logic relation of illation or material implication. The arrows that go from 1 to 2 correspond to the four semiosis stages: grounding, presentation, representation and communication. As a corollary, Presentation involves Grounding, Representation involves the first two and Communication involves all the other three.

The arrows going from 2 to 3, which we know indicate as generalization, here also correspond to the four periods or stages of knowledge: Perceptive, Inquisitive, Deliberative and Scientific. This means that all knowledge begins with Perception, that Deliberation demands both Perception and Inquisition and the scientific method is a generalization of the previous ones.

Reduction from 3 to 66 classes

The figure shows a triangular arrangement of numbered cells (1–78), with axes labeled:
- **1** — Grounding / Presentation / Representation / Communication
- **2**
- **3** — Scientific / Deliberative / Inquisitive / Perceptive

Order of the Eleven Trichotomies

Grounding			Presentation			Representation		Communication	
IO	II		S	DO	DI	FI	DI	FI	S-DO	S-DI	S-DO-FI
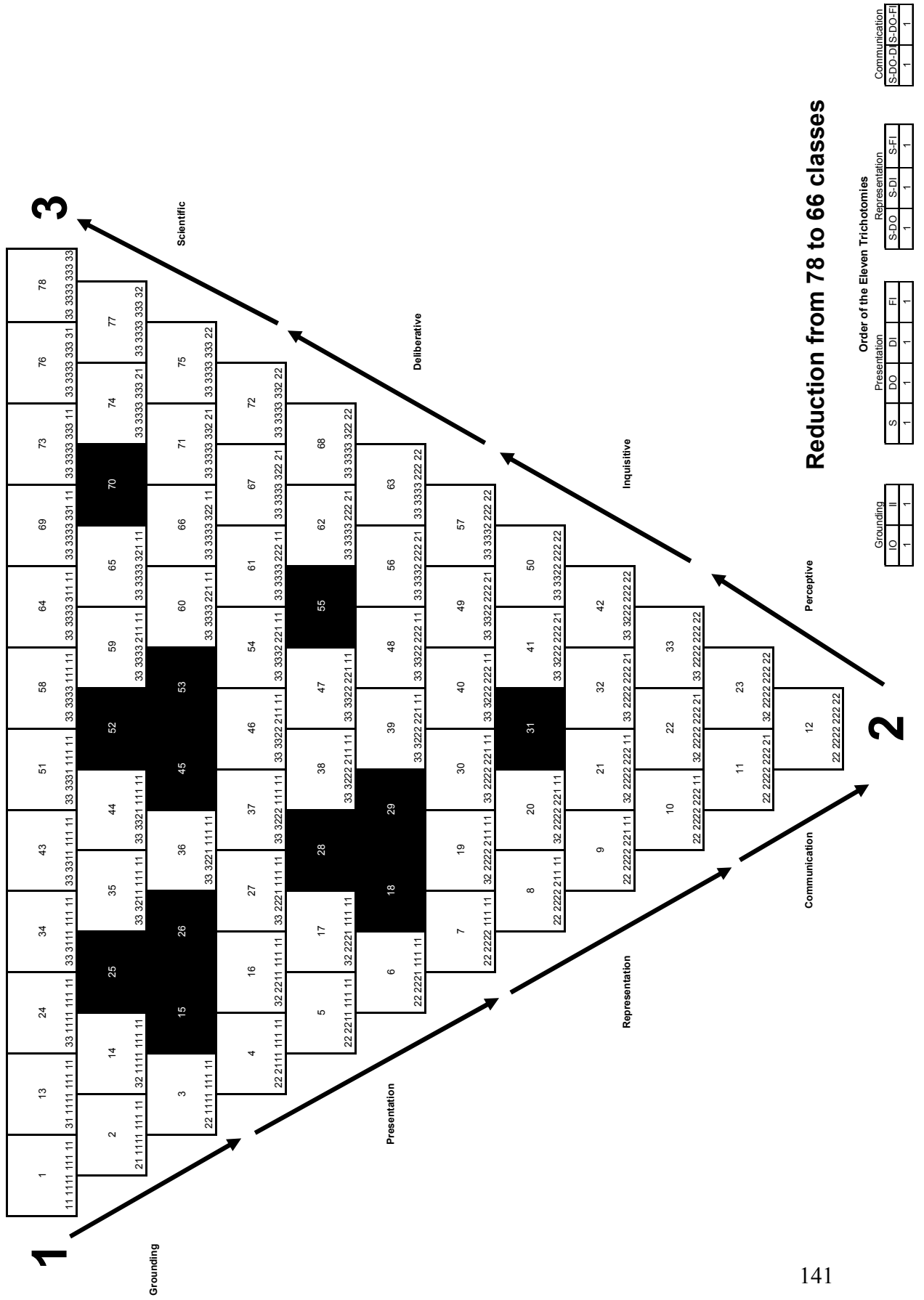
[1] It should be S-DO-**FI**

[2] In this manuscript, Peirce declares that the trichotomies he had isolated and named were sufficient to solve "most part" of the problems of logic. Anyhow, completes Peirce, these ten trichotomies would already be more than enough to occupy him in the years left of his life.

[3] Deleuze and Guatari also used the ideas of frequency and resonance to explain phenomena as the significance, the information and the communication (cf. Gomes, 2004, p. 26).

VII - THE GENERAL TABLE OF CLASSES OF SIGNS

1. The union of the two classifications

Will it be possible to relate the two classifying systems we developed so far, one based on three trichotomies and the other on eleven? The fact that both produced 66 classes of signs in an identical triangular disposition is more than promising. But what relations might there be hidden under this structural similarity? In short, do they describe the same phenomena from different points of view?

Our research has demonstrated that the two systems are isomorphic and can be mapped one into the other. The main transformation to produce their fusion will be a projection of the axis of the Objectivation (Ob) and Interpretation (In) over the axis of Signification (Si). We will use the sign ">>>" to indicate this transformation. The reason for this kind of projection is simple: the classification from the three correlates "sees" the 66 classes of signs only from the point of view of the axis of the Signification (Si).

An example: during the Grounding phase of the 10-trichotomic classification (when the sign is always a possibility), the sign trichotomy (S) is the point of view assumed for the collapse of the three axes. But it is also the First Correlate of the 3-trichotomic classification. Thereupon, both the immediate object (IO) and the immediate interpretant (II) degenerate into Firstness when they form the Second and Third Correlate. If they happen to have an ontological status superior to Firstness, the projection will make them degenerate. If the immediate object (IO) is a Secondness (2), for instance, the projection over S will transform it into a Firstness of the Secondness (1'), or Idoseme. The projection is much more evident when we visualize it in the dynamics of the Flow of Semiosis:

In the figure below, in which we have isolated only the Grounding phase of the flow, we see how the IO and II trichotomies project themselves over the S trichotomy. The **dashed line** indicates, as always, that the Sign has a telic essence that does not exhaust in any finite series of energetic immediate interpretants. Therefore, in the Grounding phase of the Sign, the projection will produce the following transformation:
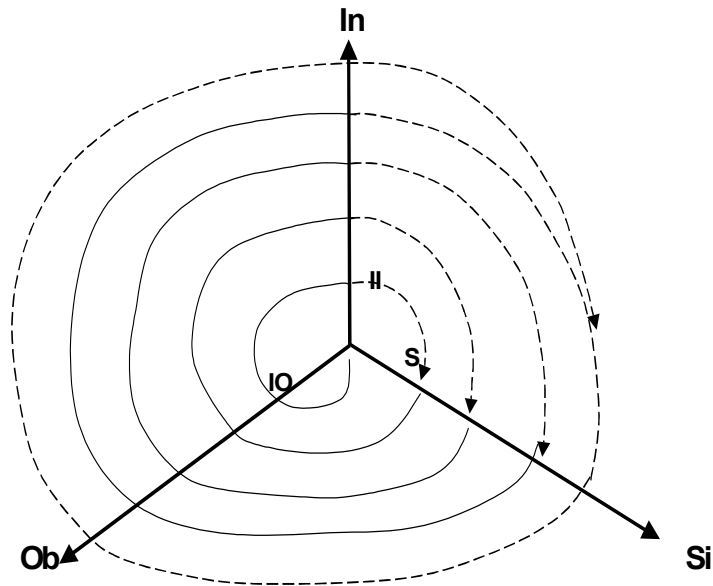
a) Collapse of the Axis (Ob) over (Si) to form the Second Correlate (SC)

      If OI=1 >>> S=1, then SC = 1 (Icon)
      If OI=2 >>> S=1, then SC = 1' (Idoseme)
      If OI =3 >>> S=1, then SC = 3´ (Metaphor)

b) Collapse of the Axis (In) over (Si) to form the Third Correlate (TC)
      If II = 1 >>> S=1, then TC =1 (Rhema)
      If II = 2 >>> S=1, then TC =1' (Syntax)
      If II= 3 >>> S=1, then TC = 1" (Abduction)

      There are six possible combinations among IO, II and S:
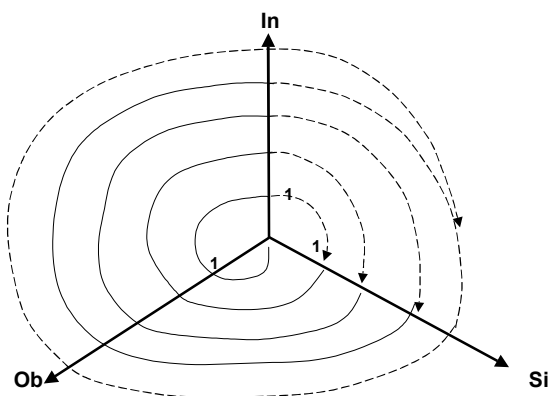
1)   **2)**
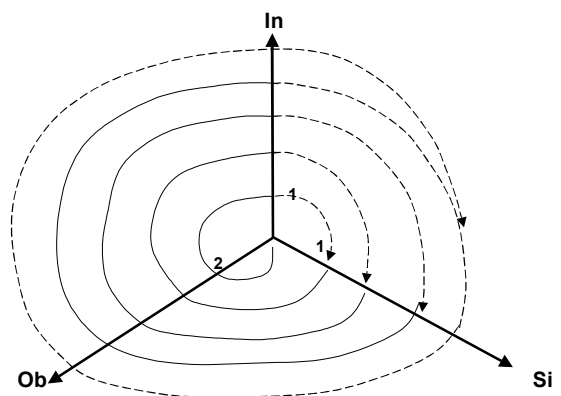
3)
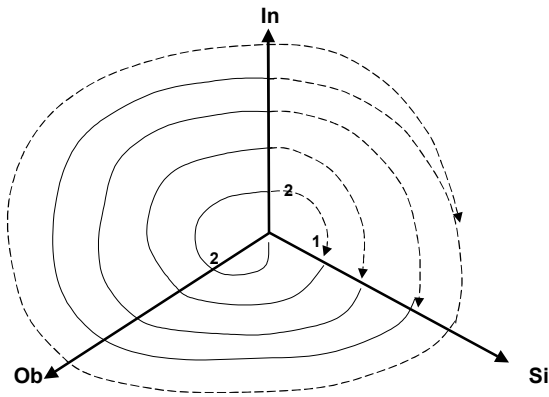
4)
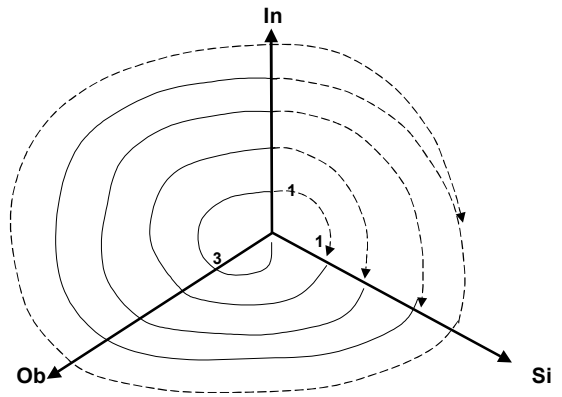
5)
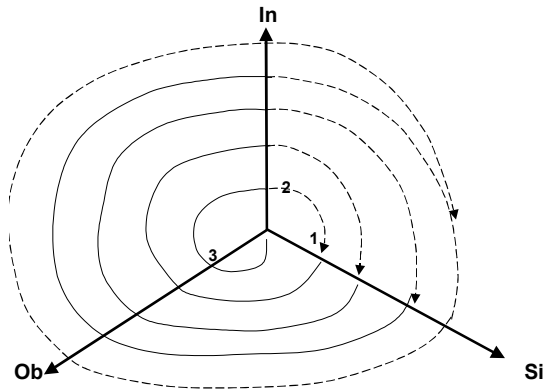
6)
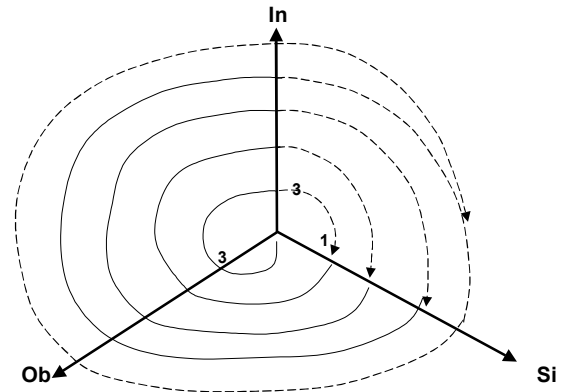
When we project the numbers of the axes (Ob) and (In) over the Firstness of the axis (Si), the six graphs above produce, in fact, the first six Classes of Signs of the 3-trichotomic classification, as it can be observed below:

	FC	SC	TC	First Correlate	Second Correlate	Third Correlate
1	1	1	1	Qualisign	Icon	Rhema
2	1	1'	1	Qualisign	Idoseme	Rhema
3	1	1'	1'	Qualisign	Idoseme	Syntax
4	1	1"	1	Qualisign	Metaphor	Rhema
5	1	1"	1'	Qualisign	Metaphor	Syntax
6	1	1"	1"	Qualisign	Metaphor	Abduction

If we continue this transformation, the next step will be the attribution of Secondness (2) to the trichotomy of Sign (S). However, in that case the rule of the triangles of existence obligates us to attribute Secondness to the two other axes too. What happens, then, is a **collapse** of the three axes into the realm of Secondness.

The "atmosphere" of general and continuous possibilities (the grounded interpretability) projecting over the Sign (S) suffers a categorical reduction. This is the typical abductive proceeding of the Perception: the imputation of Secondness to a pattern that sustains a certain phenomenical regularity – what Peirce calls the Perceptual Universe. It is by this way, for example, that the percept will be represented as an index when we leave immediate perception.

At this point, semiosis abandons the Grounding phase and enters the Presentation phase, in which the trichotomies of the axis (Ob) and (In) must be projected over the Final Interpretant (FI) – and no longer over (S) as in the Grounding phase. Continuing the mapping of the 11-trichotomic classification over the 3-trichotomic one, this will produce the first of the altersigns (Altersign Icon Rhema). The continuation of this operation will lead us to the 66 classes of signs that we described when discussing the eleven trichotomies.

2. The path of semiosis

We note, then, that a natural **trajectory** shows on the triangular figure how the **Flow of Semiosis** develops from Firstness towards Thirdness (below).
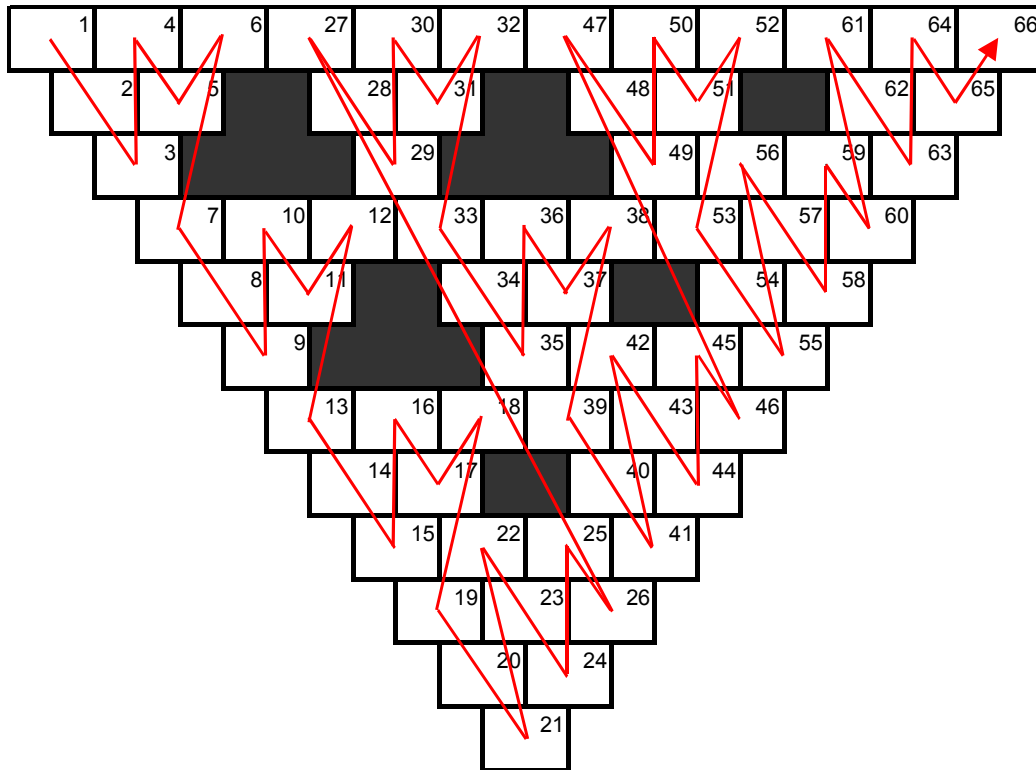
3. The Periodic Table of Classes of Signs

Finally, the fusion of the two classificatory systems allows us to build a chart, which we will call **General Table of Classes of Signs**, representing the 66 possible classes of signs. The segmented arrows that go from 1 to 2 indicate **involvement** in the progression of phases from Grounding to Communication. Those segmented arrows that go from 2 to 3 indicate generalization in the ampliative development of semiosis, which starts at Perception and gradually goes up to reach the self-controlled forms or reasoning.

PERIODIC TABLE OF CLASSES OF SIGNS

1   **2**   **3**

Grounding — Presentation — Representation — Communication

Scientific — Deliberative — Inquisitive — Perceptive

Diagonal labels: Grounding, Presentation, Representation, Communication, Scientific, Deliberative, Inquisitive, Perceptive

Legend box:

- Order of the Three Correlates (FC ≺ SC ≺ TC)
- Position in the Flow of Semiosis
- Name of the Class of Sign
- Order of the eleven trichotomies

Example cell: Rhema Icon Qualisign — 11111 111 11

Trichotomy columns:

Grounding	Presentation			Representation			Communication	
IO	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
1	1	1	1	1	1	1	1	1	1

Sample classes of signs (numbered cells):

- 1 — Rhema Icon Qualisign (11111 111 11)
- 2 — Rhema Idoseme Qualisign (21111 111 11)
- 4 — Syntax Metaphor Qualisign (32111 111 11)
- 5 — Abduction Metaphor Qualisign (33111 111 11)
- 9 — Rhema Icon Sinsign (22222 111 11)
- 21 — Dicisign Index Sinsign (22222 222 22)
- 37 — Rhema Icon Legisign (33333 111 11)
- 55 — Dicisign Index Legisign (33333 222 22)
- 66 — Argument Symbol Legisign (33333 333 33)

Legend:

FC = First Correlate
SC = Second Correlate
TC = Third Correlate

IO = Immediate Object
II = Immediate Interpretant
S = Sign
DO = Dynamic Object
DI = Dynamic Interpretant
FI = Final Interpretant

S - DO = Relation between Sign and Dynamic Object
S - DI = Relation between Sign and Dynamic Interpretant
S - FI = Relation between Sign and Final Interpretant
S - DO - DI = Relation among Sign, Dynamic Object and Dynamic Interpretant
S - DO - FI = Relation among Sign, Dynamic Object and Final Interpretant

4. Descriptions of the 66 Classes of signs

4.1. Qualisigns

1) Rhematic Iconic Qualisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
1	1	1	1	1	1	1	1	1	1	1

Projection to form the three correlates

FC (S)	SC (IO>>>S)	TC (II>>>S)
1	1	1
Qualisign	Icon	Rhema

Analysis: a sign of pure possibility represents its object iconically to produce an emotional immediate interpretant. This is a genuine class of sign, for its correlates do not present degenerations. It is the zero degree of the phaneron, what Peirce called *Orience* or pure originality (CP 2.85). We cannot experience it directly. We can only describe its presence incorporated in other signs. It is the "quality of the quality" (CP 1.484), the possibility of a quality in a limitless ocean of possibilities.

2) Rhematic Idosemic Qualisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
2	1	1	1	1	1	1	1	1	1	1

Projection to form the three correlates

FC (S)	SC (IO>>>S)	TC (II >>> S)
1	1'	1
Qualisign	Idoseme	Rhema

Analysis: a sign of possibility represents its object idosemically to produce an emotional immediate interpretant. The immediate object is a Secondness projected over a Firstness and, therefore, degenerated into possibility. It is the insistence of a quality manifested as

intensity. It allows for outlining possible limits between qualities in opposition, such as the qualities of sweet and salty (cf. CP 1.484).

3) Syntatic Idosemic Qualisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
2	2	1	1	1	1	1	1	1	1	1

Projection to form the three correlates

FC (S)	SC (IO>>>S)	TC (II>>>S)
1	1'	1'
Qualisign	Idoseme	Syntax

Analysis: a sign of possibility represents its object idosemically to produce an energetic immediate interpretant. It is the perceptual illocution of a quality, a purely qualitative percept or perceptive fluctuation of intensity in a quality. It may be what Peirce calls *médad*,[1] (CP 1.292 *apud* Santaella, 1998, p. 73).

4) Rhematic Metaphoric Qualisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	1	1	1	1	1	1	1	1	1	1

Projection to form the three correlates

FC (S)	SC (IO>>>S)	TC (II>>>S)
1	1"	1
Qualisign	Metaphor	Rhema

Analysis: a sign of quality represents its object metaphorically to produce an emotional immediate interpretant. It is the continuity of a quality and, therefore, its generality in the Form of an Idea or **general qualitative predicate** (maybe what Duns Scotus called *Universals* or *natura communis*). It is the *Ground* of the sign, the **Form** or **Information** in its most fundamental aspect – what utterer (object) and interpreter (interpretant) must have

in common in order to make possible a communication between them. It is, therefore, the "background" of all possible intelligible communication.

5) Syntatic Metaphoric Qualisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	2	1	1	1	1	1	1	1	1	1

Projection to form the three correlates

FC (S)	SC (IO>>>S)	TC (II>>>S)
1	1"	1'
Qualisign	Metaphor	Syntax

Analysis: a sign of quality represents its object metaphorically to produce an energetic immediate interpretant. It is a qualitative and immediately experienced perceptual fact. It is a *presentiment* or *premonition* based on the presence of a general quality.

6) Abductive Metaphoric Qualisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	1	1	1	1	1	1	1	1	1

Projection to form the three correlates

FC (S)	SC (IO>>>S)	TC (II>>>S)
1	1"	1"
Qualisign	Metaphor	Abduction

Analysis: a qualisign represents its object metaphorically to produce a logical immediate interpretant. It is the common sense, the "aura" of superposed interpretative possibilities, a continuous of **expectations** and virtualities. It is the ***grounded interpretability*** that unites immediate object and immediate interpretant inside the sign (cf. Short, 1981, p. 215). It is the expectation of those regularities we hope to find in the world.

Example: if I survive a shipwreck and end up in an apparently desert island, the first thing I do is go search for water. What leads me to have the expectation of the possibility of encountering sweet water in an unknown island is the grounded interpretability that water

is a mineral common throughout the planet; the expectation that the red color of a mushroom (habitually linked to poison in nature) really represents the quality "poisoned"; Shank and Cunningham (1996) describe the qualitative abduction like this:

> This type of inference deals with the possibility of a possible resemblance. A more concrete way to characterize this type of reasoning is to describe it as reasoning in order to determine the possibility that our initial observations might serve as omens for possible evidence. An omen is a sign whose resolution is in future acts of inquiry and observation. When the inference of the omen is more implicit, we might call it a hunch. For instance, an archeologist might guess that she should examine the banks of an old streamed, because she might possibly find something that might possibly be an artifact. This type of inference we traditionally consider to be merely a subjective act. However, it is an abduction, and one that is systematically related to other types of abductions.

4.2. Altersigns

7) Rhematic Iconic Altersign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
2	2	2	1	1	1	1	1	1	1	1

Projection to form the three correlates

FC (S >>> FI)	SC (DO >>> FI)	TC (DI >>> FI)
1'	1	1
Altersign	Icon	Rhema

Analysis: an altersign represents its object iconically to produce an emotional dynamic interpretant. It is the hypostatization of a grounded interpretability of a sign, when it is interpreted as a percept of possible existence.

Examples: the feeling of "otherness", the non-ego, the possibility of the other.

8) Rhematic Idosemic Altersign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
2	2	2	2	1	1	1	1	1	1	1

Projection to form the three correlates

FC (S >>> FI)	SC (DO >>> FI)	TC (DI >>> FI)
1'	1'	1
Altersign	Idoseme	Rhema

Analysis: an altersign represents its object idosemically to produce an emotional dynamic interpretant. It is a possible existent that incorporates qualities.

Example: the idea of the presence of "something".

9) Syntatic Idosemic Altersign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
2	2	2	2	2	1	1	1	1	1	1

Projection to form the three correlates

FC (S >>> FI)	SC (DO >>> FI)	TC (DI >>> FI)
1'	1'	1'
Altersign	Idoseme	Syntax

Analysis: an altersign represents its object idosemically to produce an energetic immediate interpretant. It is the sign that connects itself to a dynamic object existent to produce a perceptual illocution of a possible existent.

Example: an actual flash of doubt or feeling of upset (as when we approach a dark alley and place ourselves in a state of alert).

10) Rhematic Metaphoric Altersign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	2	2	2	1	1	1	1	1	1	1

Projection to form the three correlates

FC (S >>> FI)	SC (IO >>> FI)	TC (DI >>> FI)
1'	1"	1
Altersign	Metaphor	Rhema

Analysis: an altersign represents its object metaphorically to produce an emotional dynamic interpretant. The dynamic object is a possible existent, whereas the immediate object is a general predicate, or *percipuum*. It is an image or Form that we apply over a possible presence of "something".

Example: It may be an emotion (as "fear", "anxiety", "anguish") or a conjecture applied to a felling of upset, such as "thief", "danger" etc.

11) Syntatic Metaphoric Altersign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	2	2	2	2	1	1	1	1	1	1

Projection to form the three correlates

FC (S >>> FI)	SC (IO >>> FI)	TC (DI>>> FI)
1'	1"	1'
Altersign	Metaphor	Syntax

Analysis: an altersign represents its object metaphorically to produce an energetic dynamic interpretant. It is the perceptual illocution of an illusion created over a possible existent.

Example: the sensation that we have seen someone we know in the crowd; the sensation that some dead beloved person is spiritually present.

12) Abductive Metaphoric Altersign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	2	2	2	1	1	1	1	1	1

Projection to form the three correlates

FC (S >>> FI)	SC (IO >>> FI)	TC (II >>> FI)
1'	1"	1"
Altersign	Metaphor	Abduction

Analysis: an altersign represents its object metaphorically to produce an energetic dynamic interpretant. It is a perceptual judgment over a possible existent, creating the habit or acceptance of its reality.

Example: a hallucination; the **conjecture** of in a possible existent, as the hypothesis that there may be a superior divinity.

4.3. Sinsigns

13) Rhematic Iconic Sinsign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
2	2	2	2	2	2	1	1	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DI>>>S- FI)
2	1	1
Sinsign	Icon	Rhema

Analysis: a singular sign represents its object iconically to produce an emotional representative interpretant. It is a genuine sign.

Example: an individual diagram (CP 2.256); an irritation of our nervous system, the discomfort created on us by the presence of a perceptual stimulus requiring explanation; an individual *hic et nunc*, a percept that incorporates only the qualities of its object.

14) Rhematic Idosemic Sinsign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
2	2	2	2	2	2	2	1	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DI>>>S- FI)
2	1'	1
Sinsign	Idoseme	Rhema

Analysis: a singular sign represents its object idosemically to produce an emotional representative interpretant. It is any vestige left either by the presence of something or by a singular fact; any sign of novelty that incorporates the qualities of a singular object.

Example: an improvised piece of music, any babbling of sounds or an improvised movement of dance.

15) Syntatic Idosemic Sinsign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
2	2	2	2	2	2	2	2	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DI>>>S-FI)
2	1'	1'
Sinsign	Idoseme	Syntax

Analysis: a singular sign represents its object idosemically to produce an energetic dynamic representative interpretant. It is the illocution of an idosemic sinsign.

Example: the ostentation or exhibition of the characteristic properties of an individual (the appearance of the Pope in the window, for instance); a fashion show of *haute-couture*; the exposition of the work of art in a museum; the "strolling in the mall" in which young people show off.

16) Rhematic Metaphoric Sinsign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	2	2	2	2	2	2	1	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (IO>>>S-FI)	TC (S-DI>>>S-FI)
2	1"	1
Sinsign	Metaphor	Rhema

Analysis: a sinsign represents its object metaphorically to produce an emotional dynamic representative interpretant. The projection of the immediate object (the predicate or *ground*) over the emotional final representative interpretant creates **Possible Information.**

Example: the figures we "see" in certain geologic formations; the forms we "see" in the clouds; the "image" of the future in the dregs of the coffee; the interpretation of a natural disaster as a sign of the divine rage (cf. Short, 1981); an original metaphor in a poem.

17) Syntatic Metaphoric Sinsign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	2	2	2	2	2	2	2	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (IO>>>S-FI)	TC (S-DI>>>S-FI)
2	1"	1'
Sinsign	Metaphor	Syntax

Analysis: a sinsign represents its object metaphorically to produce an energetic dynamic representative interpretant. Due to the projection IO>>>S-FI creating the metaphor on the Second Correlate, it is the sign of **Possible Information**.

Example: the fragments of a person (piece of hair etc) representing its presence during the ritual of sympathetic sorcery.

18) Abductive Metaphoric Sinsign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	2	2	2	2	2	2	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (IO>>>S-FI)	TC (II>>>S-FI)
2	1"	1"
Sinsign	Metaphor	Abduction

Analysis: a singular sign represents its object metaphorically to produce an energetic dynamic representative interpretant. It is every instinctive behavior, based on a grounded interpretability before an unusual sign. It is a sign that represents the **Possible Information**.

Example: the animal that flees when hears steps or human voices in the forest; a cockroach that hides when the lights are turned on.

19) Rhematic Indexical Sinsign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
2	2	2	2	2	2	2	2	2	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
2	2	1
Sinsign	Index	Rhema

Analysis: a sinsign represents its object indexically to produce an emotional dynamic communicative interpretant. It is a genuine sign that draws the attention of its interpretant to the existence of "something" with which it is materially connected.

Example: the "pointing" of an arrow or finger; the blinking of an illuminated ad; the tinkling of the bell producing noise when shaken.

20) Syntatic Indexical Sinsign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
2	2	2	2	2	2	2	2	2	2	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
2	2	1'
Sinsign	Index	Syntax

Analysis: a sinsign represents its object indexically to produce an energetic dynamic communicative interpretant. It is an illocutionary performative act, an **Indicative Singular Assertion** that declares the existence of a fact or object.

Example: an arrow indicating which way to go in a bifurcation; the shout or whistle in the crowd calling our attention; a hand waving to us; the new signal that appears on our body (a stain, a pain, a lump etc) denoting that "there is something"; the illuminated ads blinking in the street, the bell tinkling in a commercial establishment.

21) Dicisign Indexical Sinsign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
2	2	2	2	2	2	2	2	2	2	2

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DI>>>S-DO-FI)
2	2	2
Sinsign	Index	Dicisign

Analysis: a singular sign represents its object indexically to produce an energetic final communicative interpretant. It is a perlocutionary performative act, an **Indicative Singular Proposition.** Its general Form is **"Something exists"**. It is a genuine class of sign and does not possess conditional.

Example: the effective denotation that there is something, as the illuminated ad that effectively captures the look of the passer-by; the bell that really calls the attention of whoever is around; the hand waving that manages to attract the attention of an interpreter.

22) Rhematic Metonymic Sinsign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	2	2	2	2	2	2	2	2	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (IO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
2	2'	1
Sinsign	Metonymy	Rhema

Analysis: a sinsign represents its object metonymically to produce an emotional dynamic communicative interpretant. It is the **Predicate** or **ground** of a **Declarative Singular Proposition.** It is a sign of **Real Information** transmitted by cognition.

Example: the ringing of the telephone indicating that someone is calling (so long as the ringing of the telephone is familiar to the interpreter); the tinkling of the bell making noise at the door of a shop indicating a possible client (for the owner of the store that puts it and knows its function); the movement of the luminous point on the radar screen communicating the position of the aircraft (for the flight controller familiar with the reading of the radar); the movement of the seismograph communicating the seismic activity (for the expert); the weather vane communicating the direction of the wind (for someone that knows how the weather vane works).

23) Syntatic Metonymic Sinsign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	2	2	2	2	2	2	2	2	2	1

Projection to form the three correlates

FC (S>>>FI)	SC (IO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
2	2'	1'
Sinsign	Metonymy	Syntax

Analysis: a sign of novelty represents its object metonymically to produce a communicative energetic dynamic interpretant. The immediate object is a **Predicate** or *ground*. It is an illocutionary act, a **Declarative Singular Assertion** that instantiates a hypothesis or abductive inference. It transmits **Real Information**.

Example: a meteor with marks of biologic activity communicates to the scientists the information that there is life out of the Earth; a signal coming in a frequency only producible by means of advanced technology also communicates the existence of life out of

the Earth; in the film "2001: A Space Odyssey", the monolith found in the Moon by the astronauts is a perceptive assertion asseverating the same fact.

24) Dicisign Metonymic Sinsign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	2	2	2	2	2	2	2	2	2	2

Projection to form the three correlates

FC (S>>>FI)	SC (IO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
2	2'	2
Sinsign	Metonymy	Dicisign

Analysis: a sinsign represents its object metonymically to produce a communicative final energetic interpretant. It is a perlocutionary effect of producing **understanding** by means of a **Declarative Singular Proposition**. Its general form is: **"Something possesses the propriety S"**. It is the instantiation of an inductive inference. It transmits **Real Information** of the cognition.

Example: A specific *hic et nunc* indication made by the weathercock; the information "Something lives out of the Earth" or "Some client is at the door" given by a sinsign.

Conditional: It possesses conditional mode because the cognition is true only if the ground of the predication is too, i.e., if the union of the Predicate (general immediate object) with the indexical representation is really valid. This validity is conditioned in two ways.

1) The Predicate might be false because its interpretability is not well grounded (the marks in the meteor may not be from micro-organic activity, but from inanimate chemical reactions). This is the corollary of the Falibilism.

2) The union of the Predicate with the representative index, apart from being well grounded, might be false in an individual occasion (the bell that rings at the door is not produced by the client, but by a thief; the telephone rings, but it is a mistake or a mockery).

25) Abductive Metonymic Sinsign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	2	2	2	2	2	2	2	2	1

Projection to form the three correlates

FC (S>>>FI)	SC (IO>>>S-FI)	TC (II>>>S-DO-FI)
2	2'	1"
Sinsign	Metonymy	Abduction

Analysis: a sinsign represents its object metonymically to produce an energetic dynamic communicative interpretant. It is an illocutionary act that expresses to an **implicature**, or communicative abductive inference due to the projection of the habitual immediate interpretant over S-DO-FI. It transmits **Real Information** and it is instantiated in Declarative Singular Assertions.

Example: the hypothesis that there is life out of the Earth after observing a meteor containing signals that resembles marks of biologic activity (the meteor communicates the Information only transmissible by means of the perception and collateral experience over the concept of "life" capable of producing a ground sufficiently believable for such judgment); the hypothesis that there is a new client in the store after hearing the tinkling of the bell due to the habit that grounds the interpretability of the tinkling-sign.

26) Inductive Metonymic Sinsign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	2	2	2	2	2	2	2	2	2

Projection to form the three correlates

FC (S>>>FI)	SC (IO>>>S-FI)	TC (II>>>S-DO-FI)
2	2'	2'
Sinsign	Metonymy	Induction

Analysis: a singular sign represents its object metonymically to produce an energetic final communicative interpretant. It is a perlocutionary effect that generates **persuasion** of the interpreter. It is the transformation of a hypothesis created by a new fact into a **belief** or mental habit capable of grounding **future conduct**. It transmits **Real Information**. It is instantiated in Declarative Singular Propositions.

Example: the establishment of the belief that there is life out of the Earth in a person that already had this conjecture as possible. Every new belief, mental habit change, involves this class of sign, which is the fixation of the abductive hypothesis that precedes it.

4.4. Holosigns

27) Rhematic Iconic Holosign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	1	1	1	1	1	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (DO>>> FI)	TC (DI>>>FI)
1"	1	1
Holosign	Icon	Rhema

Analysis: a holosign represents its dynamic object iconically to produce an emotional dynamic interpretant. It is the sign of the possibility of Thirdness, the representation of a pattern that emerges from the perceptive synthesis. It is the expectation that a system would exhibit certain qualities of *ensemble*.

Example: the "mentality" or habits in state of possibility that permeates all things; the *would be* or conditional ideas that determine the objects.

28) Rhematic Idosemic Holosign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	2	1	1	1	1	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (DO>>> FI)	TC (DI>>> FI)
1"	1'	1
Holosign	Idoseme	Rhema

Analysis: a holosign represents its object idosemically to produce an emotional dynamic interpretant. It is the material incorporation of the qualities of the holosign by the dynamic object, the presence of general qualities in a dynamic system.

Example: the **temperature** of a specific dynamic system; the **temperament** or personality of a person.

29) Syntatic Idosemic Holosign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	2	2	1	1	1	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (DO>>> FI)	TC (DI>>> FI)
1"	1'	1'
Holosign	Idoseme	Syntax

Analysis: a holosign represents its object idosemically to produce an energetic dynamic interpretant. It is the illocution of a holistic idosemic fact. It is the effective presentation of a potentiality, expectation or predisposition.

Example: the manifestation of the general property in a fact or object; a hygrometer asserting the general qualities of the climate; the kettle that starts to whistle the moment the water boils; the rain that starts to precipitate when steam condenses.

30) Rhematic Metaphoric Holosign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	1	1	1	1	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (DO>>> FI)	TC (DI>>> FI)
1"	1"	1
Holosign	Metaphor	Rhema

Analysis: a holosign represents its object metaphorically to produce an emotional dynamic interpretant. It is the metaphor produced over holistic patterns.

Example: the capacity of the hologram to represent its object tri-dimensionally; the capacity of the dry ice to represent the smoke; the term "stressed out" used to represent the general state of the person; any fictitious (invented) representation accounting for holistic properties of a system.

31) Syntatic Metaphoric Holosign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	2	1	1	1	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (DO>>> FI)	TC (DI>>> FI)
1"	1"	1'
Holosign	Metaphor	Syntax

Analysis: a holosign represents its object metaphorically to produce an energetic dynamic interpretant. It is the illocution of a holistic metaphor, or the manifestation of a metaphor to represent a general disposition.

Example: the emotional manifestations in general, for they are "metaphors" of holistic internal states: our laugh when we are confronted with a funny situation is the illocution of a metaphor (the laugh) that represents the general state of logical inconsistency; the dog's waving its tail that metaphorically represents its interior state of satisfaction.

32) Abductive Metaphoric Holosign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	1	1	1	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (DO>>> FI)	TC (DI>>> FI)
1"	1"	1"
Holosign	Metaphor	Abduction

Analysis: a holosign represents its object metaphorically to produce a logical dynamic interpretant. It is the behavioral habit of expressing an emotion, an expectation or a predisposition by means of a metaphor.

Example: the baby's habit of crying, representing metaphorically its discomfort; the dog's habit of waving its tails; any animal's analogical behavior habits (Watzlawick et al, 2002, p. 89) representing its internal states.

4.5. Replicas

33) Rhematic Iconic Replica

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	2	2	2	1	1	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DI>>>S- FI)
2'	1	1
Replica	Icon	Rhema

Analysis: a replica represents its object iconically to produce an emotional dynamic representative interpretant. It is the instantiation of a habitual or conventional sign that represents its object by identity of qualities.

Example: a geometric figure drawn on a paper; the qualities of a type of coin that appear replicated in its copies; the qualities of a logomark that appear when it is printed.

34) Rhematic Idosemic Replica

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	2	2	2	2	1	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DI>>>S-FI)
2'	1'	1
Replica	Idoseme	Rhema

Analysis: a replica represents its object idosemically to produce an emotional representative interpretant. It is the indication of the object's intrinsic quality.

Example: a tone of voice, smell or other familiar and recurrent emanation of any person that is familiar to us, and that allows us to recognize that same person (these qualities are instantiations of the general pattern that governs them); the calligraphy of a person, that repeats every time he/she writes; the finger prints that we spread on every object we touch.

35) Syntatic Idosemic Replica

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	2	2	2	2	2	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DI>>>S-FI)
2'	1'	1'
Replica	Idoseme	Syntax

Analysis: a replica represents its object idosemically to produce an energetic dynamic representative interpretant. It is the illocution of certain indicative qualities capable of representing the existent object.

Example: a signature in a document; the finger print left on a glass, the exhalation of the sexual pheromone (representing the object 'disponibility for mating'); the singing or dancing of a bird's mating ritual; in a situation of flirt, the gestures emitted to "iconically indicate" availability to love (smiles, intense look, touches).

36) Rhematic Metaphoric Replica

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	2	2	2	1	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (DO>>>S-FI)	TC (S-DI>>>S-FI)
2'	1"	1
Replica	Metaphor	Rhema

Analysis: a replica represents its object metaphorically to produce an emotional representative interpretant. It is a sign of **Possible Information**.

Example: a linguistic metaphor worn out by the usage; the printed poster of Monalisa; any replica of an original work of art.

37) Syntatic Metaphoric Replica

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	2	2	2	2	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (DO>>>S-FI)	TC (S-DI>>>S-FI)
2'	1"	1'
Replica	Metaphor	Syntax

Analysis: a replica represents its object metaphorically to produce an energetic dynamic representative interpretant. It possesses grounded interpretability. It is a sign of **Possible Information**.

Example: the use of a worn out Metaphor in a poem; the representation of a character by an actor in a drama play (as long as each given performance is a replica of this same play).

38) Abductive Metaphoric Replica

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	2	2	2	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (DO>>>S-FI)	TC (DI>>>S-FI)
2'	1"	1"
Replica	Metaphor	Abduction

Analysis: a replica represents its object metaphorically to produce an energetic representative interpretant. It possesses grounded interpretability. It is the sign of **Possible Information**.

Example: the interpretation of a poem printed in a book by its reader, the fruition of a reproduction of a original work of art (a copy of the original); the interpretation by the viewer of a drama play, movie (or any other cultural product subject to technical reproduction).

39) Rhematic Indexical Replica

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	2	2	2	2	2	2	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
2'	2	1
Replica	Index	Rhema

Analysis: a replica represents its object indexically to produce an emotional dynamic communicative interpretant.

Example: replicas of signaling plates, repetitions of the same *link* on an Internet page, personal or indicative pronouns in a published text.

40) Syntatic Indexical Replica

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	2	2	2	2	2	2	2	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
2'	2	1'
Replica	Index	Syntax

Analysis: a replica represents its object indexically to produce an energetic dynamic communicative interpretant. It has grounded interpretability. It is the communicative illocution of an index.

Example: the traffic signs placed along a road; the *links* published on an Internet page and visible on the screen of a particular computer.

41) Dicisign Indexical Replica

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	2	2	2	2	2	2	2	2

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
2'	2	2
Replica	Index	Dicisign

Analysis: a replica represents its object indexically to produce an energetic final communicative interpretant. It is the illocutionary performative act of an Indexical Particular Proposition. Its general form is "**Some x belonging to the class of P exists**". It does not possess conditional.

Example: the understanding of the indicative fact communicated by the sign on the road; the understanding that the link on an Internet page indicates something to be explored (without our knowing what content that link will take us to).

42) Rhematic Metonymic Replica

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	2	2	2	2	2	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
2'	2'	1
Replica	Metonymy	Rhema

Analysis: a replica represents its object metonymically to produce an emotional dynamic communicative interpretant. Its dynamic object is a natural class materially represented by the Index. It is the **Predicate** of the Declarative Particular Proposition. It carries **Real Information** due to the projection of the Form of the dynamic object (DO), or Predicate, over the existent final representation.

Example: the typical symptoms of a disease, as the characteristic stains of the chicken pox; the name of any person that is familiar to us (including our own name).

43) Syntatic Metonymic Replica

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	2	2	2	2	2	2	1

Projection to form the three correlates

FC (S>>>FI)	SC (DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
2'	2'	1'
Replica	Metonymy	Syntax

Analysis: a replica represents its object metonymically to produce an energetic dynamic communicative interpretant. It is the illocutionary act of a ***Declarative Particular Assertion.*** It transmits **Real Information**. Every assertion of this kind is an **attempt** to produce understanding in a Proposition. Many declarative particular assertions are usually necessary so that the final perlocutionary effect appears in the Form of the meaning of a Proposition. This class of sign is, therefore, the **fluency** or **redundancy** of the Information to produce understanding.

Example: the appearance of the many familiar symptoms of a disease: pain, fever, runny nose, throat irritation (each of these symptoms is the declarative particular assertion that intends to produce the same final effect: the final diagnosis or the understanding of the disease); if the doctor asks me "Do you feel any pain?" and I answer "Yes, I feel pain", these are two distinct particular assertions that tend to be synthesized in a same "Vinícius feels pain", which is the final understanding of both of them, represented by a proposition (cf. Short, 1984, p. 23).

44) Dicisign Metonymic Replica

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	2	2	2	2	2	2	2

Projection to form the three correlates

FC (S>>>FI)	SC (DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
2'	2'	2
Replica	Metonymy	Dicisign

Analysis: a replica represents its object metonymically to produce an energetic final communicative interpretant. Its dynamic object is the class indexically represented by the sign. It is the perlocutionary effect of a **Declarative Singular Proposition**, or the **intended understanding** during the act of communication. This class of signs informs "**Some x, belonging to the class of P, possesses the property S**". It transmits **Real Information**, which is the sum of all information present in the declarative particular assertions and synthesized by the Proposition.

Example: the medical diagnosis of any familiar disease ("this thing, belonging to the class of the red stains of skin, is *typical* of chicken pox").

Conditional: the declarative Particular proposition possesses conditional mode, for the truth of any metonymy depends on the fact that:

1) The dynamic object truly be habitual, that is: to really posses the general Form that suits as Predicate (maybe the chicken pox does not present a regularity of symptoms so strong to the point of allowing generalizations).

2) The index truly belong to the class of the habitual dynamic object (maybe the stain is not from chicken pox, but from any other cause).

45) Abductive Metonymic Replica

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	2	2	2	2	2	1

Projection to form the three correlates

FC (S>>>FI)	SC (DO>>>S-FI)	TC (DI>>>S-DO-FI)
2'	2'	1"
Replica	Metonymy	Abduction

Analysis: a replica represents its object metonymically to produce an emotional final communicative interpretant. Its dynamic object is the class represented indexically by the sign. It is the illocutionary act, a communicative **implicature** that instantiates in Declarative Singular Proposition.

Example: any interpretative hypothesis of a normal communicational situation, as:

"Question: Are you going to the game?"

"Answer: My mother-in-law is visiting me."

46) Inductive Metonymic Replica

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	2	2	2	2	2	2

Projection to form the three correlates

FC (S>>>FI)	SC (DO>>>S-FI)	TC (DI>>>S-DO-FI)
2'	2'	2'
Replica	Metonymy	Induction

Analysis: a replica represents its object metonymically to produce an energetic final communicative interpretant. It is the perlocutionary effect that induces an interpreter to a **belief** or mental habit. It instantiates in Declarative Particular Propositions and transmits **Real Information**.

Example: the conditioning of a soldier leads him to obey "blindly" the familiar order of his commander, as: "Ground arms!" (cf. EP2: 493; in this case, the action of obeying, the "thump" of the arms on the ground, corresponds to a Declarative Particular Proposition analogous to a "Yes, sir"); the launch actually completed by the sportists when they hear the shot of launching (which they are familiar with it).

4.6. Legisigns

47) Rhematic Iconic Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	1	1	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DI>>>S-FI)
3	1	1
Legisign	Icon	Rhema

Analysis: a sign of law represents its object iconically to produce an emotional representative interpretant. It is a conventional representation of purely qualitative aspects of the dynamic object.

Example: the qualitative norms expressed by the mould of coining, and that will be instanced in the coined replicas; the qualities present in a seal that will be transmitted when it is used; the qualitative norms expressed in the gesture of the instructor of physical education, dance etc and that should be mimicked by the students.

48) Rhematic Idosemic Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	2	1	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DI>>>S-FI)
3	1'	1
Legisign	Idoseme	Rhema

Analysis: the sign of law represents its object idosemically to produce an emotional dynamic representative interpretant. It is the habit of iconic legisigns being incorporated during the indexical representation of an individual.

Example: the general pattern that governs the tone of voice, smell or other familiar and recurrent emanation of any known person; the style or pattern of the calligraphy of a

person, which is repeated every time he/she writes; the "general type" of finger prints (the one that we leave printed in the identification document, for example).

49) Syntatic Idosemic Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	2	2	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DI>>>S-FI)
3	1'	1'
Legisign	Idoseme	Syntax

Analysis: a sign of law represents its object idosemically to produce an energetic dynamic representative interpretant. It is the rule or habit that rules the ***illocution*** of a representative Idoseme.

Example: the habit of signing a document with a signature that carries intrinsic qualities; the habit many species have of exhaling sexual pheromone (representing the object 'disponibility for mating'); in a situation of flirt, the habit of emitting gestures and behaviors to "*iconically indicate*" the availability for love (smiles, intense look, touches).

50) Rhematic Metaphoric Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	3	1	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DI>>>S-FI)
3	1"	1
Legisign	Metaphor	Rhema

Analysis: a sign of law represents its object metaphorically to produce an emotional dynamic representative interpretant. It has grounded interpretability and intentionality. It

represents its object by possible habit or convention and has a possibility in its communicative dimension too.

Example: The expectation that the gestural metaphors of the miming language represents the object; the norm or habit that the metaphors of the metaphoric code represent their objects (such as the figures, drawings, colors etc of an Atlas); the conventional habits of analogical behavior (cf. Watzlawick et all. 1967, p. 57), as the animal species that has the habit of "pretending" to attack in order to represent that they **do not** intend to attack.

51) Syntatic Metaphoric Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	3	2	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DI>>>S-FI)
3	1"	1'
Legisign	Metaphor	Syntax

Analysis: a sign of law represents its object metaphorically to produce an energetic dynamic representative interpretant. It is the rule or habit that rules a metaphoric representative illocution.

Example: the habit between the users of *online* chats of using *emoticons* to express their emotions; the catholic habit of crossing before the church, as well as it metaphorically represents the "house of God".

52) Abductive Metaphoric Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	3	3	1	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DI>>>S-FI)
3	1"	1"
Legisign	Metaphor	Abduction

Analysis: a sign of law represents its object metaphorically to produce an emotional final representative interpretant.

Example: any psychosis; the habit we have to "feel as real" movie scenes or written narratives, identifying ourselves with the protagonist; the habit we have to create "fictions" about ourselves or about other people; a preconception taken as norm.

53) Rhematic Indexical Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	2	2	2	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
3	2	1
Legisign	Index	Rhema

Analysis: a sign of law represents its object indexically to produce an emotional dynamic communicative interpretant. This is a genuine class of sign.

Example: the rule, law, or habit determining that the sign "No Parking" must be placed in the front of the place where it is really forbidden to park; the rule that the demonstrative pronouns point to their subjects (CP 2.259); the habit determining that the act of pointing the index-finger means to indicate the object.

54) Syntatic Indexical Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	2	2	2	2	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (DI>>>S-DO-FI)
3	2	1'
Legisign	Index	Syntax

Analysis: a sign of law represents its object indexically to produce an energetic dynamic communicative interpretant. It is the habit of carrying an illocutionary performative act while producing an **Indexical Universal Assertion**.

Example: the habit, law, rule or conventional expectation that the information contained in the sign "No Parking" of the example above will be really communicated to the drivers that pass there (that is why the traffic police officer have the right of fining whoever breaks this law); the habit that the expression "click here" blinking on the screen of a computer of a person who is navigating in the Internet, when he/she sees it, would really communicate the link to be clicked (if people did not have this habit, there certainly would be less viruses infecting their computers).

55) Dicisign Indexical Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	2	2	2	2	2

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (DI>>>S-DO-FI)
3	2	2
Legisign	Index	Dicisign

Analysis: a sign of law represents its object indexically to produce an energetic final communicative interpretant. It is the illocutionary performative act of enunciating the **Indicative Universal Proposition**. Its general Form is "**The class of P exists**". It does not possess conditional.

Example: the rule or convention that there is connection between the indications of latitude and longitude written over the map of navigation and the position of these objects in reality (had not been by this rule, navigation maps would not be reliable); the conventional rules (social, linguistics, etc) that guarantee the effective communication carried out by a street vendor who shouts "Hot dogs!" indicating the existence of the goods that are being announced (cf. Liszka, 1996, p.51; we do not expect, for example, that the street vendor shouts "hot dog" whereas his stand sells corn).

56) Rhematic Metonymic Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	3	2	2	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
3	2'	1
Legisign	Metonymy	Rhema

Analysis: a sign of law represents its object metonymically to produce an energetic final representative interpretant. It is the **Predicate** both of an **Assertion** and of a **Declarative Universal Proposition**. Its instantiation is the Predicate of a Declarative Particular Proposition. It transmits **Real Information**.

Example: the biological rule regulating that a starving bear will relate, by contiguity, the smell of rotten wood to the existence of worms (cf. Short, 2004); the habit that the foot prints of an animal are, for the expert hunter, **Information** about that animal; the habit that the paramecium immersed in a water solution has, when receiving the stimulus of the familiar chemical substance (food, for example), of considering such stimulus as **Information** about the presence of this same substance.

57) Syntatic Metonymic Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	3	2	2	2	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
3	2'	1'
Legisign	Metonymy	Syntax

Analysis: a sign of law represents its object metonymically to produce an energetic dynamic communicative interpretant. It is the illocutionary Performative act, a **Declarative Universal Assertion** able to transmit **Real Information.**

Example: the habit that shoal of fishes usually produce certain signs that enable an expert fisher to associate them to the presence of fish; the habit that worms produce a certain smell when the eat the rotten wood enabling the bear to "read" this smell by association of contiguity as a fact about the presence or this worms.

58) Dicisign Metonymic Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	3	2	2	2	2

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
3	2'	2
Legisign	Metonymy	Dicisign

Analysis: a sign of law represents its object metonymically to produce an energetic final communicative interpretant. It is an illocutionary performative act, a **Declarative Universal Proposition**. Its general Form is **"The class of P possesses the property S"**. It is the realization of a **purpose**: the transference of Information to the interpreter.

Example: in the animal world, it is common to observe behaviors in which the animal represent its intentions by miming its own desired actions, as when the offspring sucks any part of the body of the mother to mean its desire of nursing; the habit of communicating by means of examples (in the 13th century, Saint Francis transformed the religious rhetoric when he preached the word of Christ by means of examples or representative actions).

59) Abductive Metonymic Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	3	3	2	2	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DI) >>>S-DO-FI)
3	2'	1"
Legisign	Metonymy	Abduction

Analysis: a sign of law represents its object metonymically to produce an energetic dynamic communicative interpretant. It is the habit of producing an illocutionary performative act that produces a hypothesis. It is instantiated as Declarative Universal Assertions.

Example: what Kuhn called paradigm (a group of beliefs, judgments and routines unconsciously assumed by a given community); the habit of driving a car, in which the continuous flux of communication and transmission of information produces an unconscious and "automatic" conduct; the general habit of establishing routines in our day-by-day, the habit that creates manias and cognitive schemes enthroned when we are performing repetitive tasks.

60) Inductive Metonymic Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	3	3	2	2	2

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DI>>>S-DO-FI)
3	2'	2'
Legisign	Metonymy	Induction

Analysis: a sign of law represents its object metonymically to produce an energetic final communicative interpretant. It is the habit of a belief, the manifestation of a mental habit established by means of a perlocutionary performative act.

Example: the habit of expressing a belief; the reiteration of a preconception; the habit of voting for a politician, party etc; the habit of every Argentinean cheerer refuting the Assertion that the Brazilian soccer team is the best in the world (while the Brazilian cheerer has the habit of judging as correct the same Assertion).

61) Rhematic Symbolic Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	3	3	3	1	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
3	3	1
Legisign	Symbol	Rhema

Analysis: a legisign represents its object symbolically to produce an emotional dynamic communicative interpretant. It is the **Predicate** both of the **Assertion** and **Categorical Universal Proposition**.

Example: the concept or general term in logic.

62) Syntatic Symbolic Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	3	3	3	2	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
3	3	1'
Legisign	Symbol	Syntax

Analysis: a habitual sign represents its object symbolically to produce an energetic dynamic communicative interpretant. It is an illocutionary performative act, a **Categorical Universal Assertion** that transmits a purely conventional type of information.

Example: the habit of a parliament approving laws, announcing them to the society; the habit of the president creating decrees; the habit of the scientist publishing the results of his/her researches.

63) Dicisign Symbolic Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	3	3	3	2	2

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
3	3	2
Legisign	Symbol	Dicisign

Analysis: a sign of law represents its object symbolically to produce an energetic final communicative interpretant. It is a genuine sign. It is the habit of enunciating a perlocutionary performative act, a **Categorical Universal Proposition**. Its general Form is: **"Every S is P"**.

Example: the habit of enunciating the categorical proposition, such as "God exists"; a publicity slogan.

64) Abductive Symbolic Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	3	3	3	3	1

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
3	3	1"
Legisign	Symbol	Abduction

Analysis: a sign of law represents its object symbolically to produce a logical dynamic communicative interpretant. It is the habit of making an illocutionary performative act by enunciating a symbolic abdutive inference. It is a communicative implicature.

Example: any universal conjectures that govern our "everyday conjectures"; the metaphysics we carry with us; the "instinct of reason" that leads us to scientific discoveries, as those abductions Einstein made to "deduce" the laws of gravity (cf. Santaella, 2004).

65) Inductive Symbolic Legisign

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	3	3	3	3	2

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
3	3	2'
Legisign	Symbol	Induction

Analysis: the sign of law represents its object symbolically to produce an energetic final communicative interpretant. It is an illocutionary routine that produces concrete perlocutionary effects on the interpreters.

Example: the habit of repeating a communication *ad nausea* (a remarkable strategy used in TV advertisements and in the speech of many politicians etc) to make true a finality that existed only as a future possibility, such as the acquisition of a product, the conquering of a vote etc; the habit of educating a person by means of symbols capable of producing on this person future concrete actions; the habit of establishing routines of symbolic communication (the daily lessons of the school, the habitual Sunday sermon in the church, the habitual admonishment the parents address their children) so that it produces a desired final effect; the conscious creation of mental habits by means of meditation, or by neuro-linguistic programming, etc; the habit of self-education or conscious effort of continuously changing established mental habits so that to produce a different future (cf. Houser, 1992, p. xl); the habit of judging our own judgments, producing correction when it is the case; the internalized self-criticism as to produce future effects.

66) Argument

Eleven trichotomies

Grounding		Presentative				Representative			Communicative	
IO	II	S	DO	DI	FI	S-DO	S-DI	S-FI	S-DO-DI	S-DO-FI
3	3	3	3	3	3	3	3	3	3	3

Projection to form the three correlates

FC (S>>>FI)	SC (S-DO>>>S-FI)	TC (S-DO-DI>>>S-DO-FI)
3	3	3
Legisign	Symbol	Argument

Analysis: a sign of law represents its object symbolically to produce a logical final communicative interpretant. It is the most general of all classes of signs. It represents the **entelechy**, the principle of telic self-realization (cf. CP 6.341), of conscious self-organization and **final causation**. It is the super-order or super-habit (CP 6.490) that makes everything develop towards the ***summum bonum***.

Example: the leading-principle ordering synthetic propositions and inductive inferences; the *ars poetica* of an artist (the "argument" that directs his/her whole production); the logical structures of the *autopoietic* systems; a differential equation.

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[1] (...) a flash of mental "heat-lightning" absolutely instantaneous, thunderless, unremembered, and altogether without effect.

CONCLUSION

I presented in this work a proposal of classification for the 66 classes of signs foreseen by Peirce, organized in the form of a periodic table. A correct and comprehensive classification of the Class of Signs has been a great concern for Peircean semioticians. When exposing his first systematic classification, in 1903, Peirce identified and described only ten classes, considered genuine by him, and explained that they were enough to deal with most questions of logic. At that time, however, Peirce had not gone deep in his research in the third branch of semiotic, that of communication, what he would do only after the beginning of his correspondence exchange with Lady Welby.

Not until Peirce's latest phase of studies, after he faced the complexity of communication, did he see the necessity of expanding his semiotic system, uniting it to his philosophy of pragmatism. Finding the 66 classes proved to be a much harder task than he had imagined, though. Peirce dedicated six years studying the problem intensively, but never achieved a final result. The very fragmented manuscripts of this period show a clear intention of using communication in the attempt of finding, maybe empirically, all the classes of signs left to complete the puzzle of his theory of signs.

Authors like Santaella and Noth (1994), Liszka (1996, 2000) and Bergman (2000), dig this material in order to suggest a semiotical, if not strictly Peircean, theory of communication. Nevertheless, the lack of an ample logical structure capable of covering the range of all communicative phenomena blocks the possibility of success for any project in this direction. Semiotic is a formal science and there is no two ways about it. A semiotical theory of communication has to be grounded on the logic of relations, which sprouts from the three categories and the sign triadic division. Only a complete classification of all possible classes of signs can give us the needed grid, as Peirce certainly realized.

This lack has cost a lot to Peircean semiotic in the last decades. Note, for instance, the course taken by the Philosophy of Language during the 20th century, from its purely analytical phase until the new trend of the Philosophy of Ordinary Language opened by Wittgenstein and brought to maturation by the philosophers of Oxford, as Austin and Searle (Marcondes, 2001). There is a strongly Peircean and pragmatic flavor in the Speech Act

Theory and, in some moments, some great terminological resemblances – like the terms *interpretant* and *common ground* used by Grice. It sounds strange that these authors would deny any direct influence from Peirce in their theories. Nevertheless, Brock (1981, 1982) has shown us that Peirce had a kind of Speech Act Theory very similar to the one developed by the British philosophers – only half a century before.

It is not that Austin and his followers had never heard of Peirce. On the contrary, he read the Collected Papers carefully enough to affirm he had not been able to find in Peirce's 66 Classes of Signs a principle that would enable us to clearly differentiate between assertions and propositions (Austin, 1960, 87n *apud* Pietarinen). Habermas is another modern philosopher of language who read the later phase of Peirce's work but felt uncomfortable with the "metaphysical contamination" of his theory of communication (Bergman, 2000).

Our dissertation was not intended to answer to these critics, but might be a small step towards placing Peirce's semiotic on its due place in the modern Philosophy of Language. If our Periodic Table of Classes of Signs is on the right track, Peirce's Semiotic will have been honored, for it would not be possible to move further in the study of language, communication, cognitive sciences and artificial intelligence without using it. Language is made of signs and to know the logic of signs is to know the logic of language too.

It is not possible to state whether this is the case yet. We have presented here an ongoing research and it would be pretentious to finish this report with any peremptory conclusion. Although it is possible to glimpse interesting possibilities in our table and in the attempts of description we made of each Class of Sign, only their application in future researches will enable us to say if we have achieved the result proposed almost ten years ago when we started to study Peirce's semiotic.

The main difference between our classification and the one Peirce sought is in the number of trichotomies. Peirce believed that ten would be enough; we try to prove logical and mathematically that **eleven** are needed to produce a complete and coherent classification. The eleventh trichotomy is precisely the one that may enable us to solve the thorny question about the difference between assertions and propositions. This new trichotomy relates sign, object and **dynamic** interpretant (which is the interpretant that puts

the interpretative possibilities of the communicative sign into effect). In fact, Peirce says that every assertion has a degree of energy (MS L 75: 324) and it seems coherent to be linked to the interpretant. The proposition, in its turn, is linked to the relation among sign, object and **final** interpretant. Therefore, it can only be the *meaning* that incorporates the information produced by a series of assertions.

In addition, we have proposed a graphic model for the flow of semiosis that clarifies many relations among the trichotomies of the Sign, enabling us to dispose them in a coherent *rationale* and, above all, sustained by a mathematical logic. It can be said that the model leads to an axiomatization of Semiotic (Bunge, 2000, p. 25 and ss). It is not just a pretty graphic model which we may have fun with while dealing with the Classes of Signs. Either it unveils the internal logic of the signs or it takes us back to the drawing board.

We have not advanced much in the application of the Periodic Table of Classes of Signs for the communication theory. It is something intended to be done in the future. It is possible to say in advance though that a communication in accordance to our results would be much similar to a ***Coduction*** – word invented by Booth (1988) to mean a type of inference that unites Induction, Deduction and Abduction within a context of cooperative effort in which collateral experiences, inter-subjective norms, advice, intuition, personal relations, feelings and emotions interact in time to produce and revise judgments (Liszka 1996, p.134 n.4).

Coduction seems to be something similar to what Peirce had in mind with his *Critical Common-Sensism*: a method of advancing knowledge which accepts to have indubitable judgments, but also the possibility of experimentation about the truth of these judgments in order to correct them every time they do not conform to the reality (CP 5.440).

However, we cannot simply think Conduction as an activity *inter homines*. It may be naturalized in order to comprise phenomena of the intelligent development in nature. If it were so, it would be necessary to face the history of the universe as a narrative that expresses itself creatively in search for an aesthetical harmony. The Conduction is fruit of the universal leading principle, agapastic (CP 6.307), and the daily practice of the evolutionary love. Its corollary is in the famous phrase in which Peirce sees the Universe as a work of art:

The Universe as an argument is necessarily a great work of art, a great poem -- for every fine argument is a poem and a symphony -- just as every true poem is a sound argument (CP 5.119).

The Periodic Table of Classes of Signs should not be seen as a plastered system, capable of originating an artificial theory of communication. It is just a leading principle, a logical grid envisioned to provide some understanding to the field of uncertainties where the true semiosis of the world occurs, impure and creative as always.

The theory of communication sprouting from the Peircean version of semiotic should not only help us to understand better the *media* and our role as professional communicators in the modern world, but also to offer a much deeper meaning to the concept of communication: the sharing of a creative vitality that enlivens the Universe and of which we are its most developed medium of communication.

APPENDIX I

Where are we going, after all? [1]
Relations among technology, information and sustainable development

> **"we feel that even if *all possible* scientific questions be answered, the**
> **problems of life have still not been touched at all**"
>
> Wittgenstein, *Tractatus logico-philosophicus,* §6.52

Enchanting technology

Most part of the scientific coverage we find in the *media* refers actually to the technological outspreads of the scientific knowledge. People talk more about technology than "pure" science in scientific journalism. It is easy to understand why this is so: the lay public, composed by those who do not have professional or specific academic interests in scientific matters, finds more appealing news about the latest advances of the computing, pharmaceutical, automobile or entertaining industry than the long and complex explanations about what scientists are doing shut in their laboratories and research institutes. Technology is more interesting to the general public because it has an almost immediate impact in their daily life, while sheer scientific research takes slow steps and brings a mass of concepts most of the times incomprehensible to the non-initiated ones.

Science can be defined as a type of knowledge whose ultimate goal is the "truth" about the world – even though one can raise questions about it, as they have been brought up many times, about the existence of such truth or the possibility of accessing it with our limited perceptive and mental faculties. In this sense, science is a direct heir of classic philosophy, but with some important differences. Philosophy normally includes in its speculations metaphysical themes (those, which are beyond the possibility of perceptive testing, as the existence of a soul or God). A philosopher can build his architecture of ideas about the world in a solitary manner. Modern scientists work as a community of researchers interested in unveiling the patterns of reality. Science is not interested in the

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[1] Article published abridged and with alterations in: Vilas Boas, Sérgio (org.). Formação e Informação Científica, 2005, pp. 105-123.

individual, in what happens one single time, but in what exists as a whole. The theories and the scientific laws are messages expressed in an intelligible language to the scientific community, which describes these regularities perceived in the world.

What we understand as science today is a late invention of our civilization. It emerges in the Occident after the Renaissance, in the 15th century, and is narrowly related to the creation of the so-called scientific method and the adoption of certain ontologic presuppositions, such as the belief in a reality regardless of our minds (the objective realism), and epistemologic, or the belief that human reason is sufficiently developed to learn the patterns of the world and give them a logic treatment. Science moves through formulation of hypotheses, which try to explain regularities either directly observed or indirectly through scientific instruments. Experimentation is fundamental in scientific method for it allows the confirmation or disproof of the raised hypotheses. Hypotheses that cannot be disproved, due to the impossibility of making experiments about them, are not usually accepted as scientific (Popper, 1959). Induction is, therefore, the main logical tool available to the scientist who adopts the traditional scientific method.

We will consider technology, in its turn, as a utilization of each and every type of knowledge – either acquired by means of scientific method or pertaining to the common sense – in order to produce practical effects in reality. If science wants to be true, technology wants efficacy. This is a very broad definition, but has its advantages. The first one is that it includes the technology produced by traditional scientific method, but it is not restricted to it. It is able to include techniques and processes produced in other fields of knowledge. The second advantage is that it allows us to escape from an anachronistic anthropocentrism to get closer to important questions raised in the last decades by ethologists (those who study the behavioral patterns of animals) about the capacity of other species, mainly of great primates, of also producing appropriate technology for their needs.

Technology is a natural product of intelligence, no matter from which species or region of the universe it comes from. And wherever we find intelligence there will also be some kind of technology being applied. We define intelligence as the ability for solving problems by means of elaboration of information extracted from the environment. This elaboration creates what we call knowledge – which is always a cultural construction forged by the limitations of the cognizant species (Uexkull, 1992). Intelligence presupposes

perceptive, cognitive and memory capacities, which can allow respectively the extraction, processing and storage of the utility of the information. Technology follows the human species since its first steps. Every action based on a precept that is not purely instinct, but culturally learned, should be consider part of technology. We are using the term technology, therefore, to define a group of techniques and knowledge accumulated through the relationship of human species with its environment.

It follows that doing scientific or technological divulgation are two very different things. In order to get information about sheer scientific research, the journalist must have a specific education and be prepared to tackle many obstacles, which begin in the suspicious and prevention that scientists usually have in speaking about their activities with people who are not their peers and lengthen up to the linguistic and ethical aspects, which emerge when one translates concepts from a sphere of specialized knowledge to the lay one. Journalists that cover science must understand some of the main concepts and themes used by scientists, acquire a little of technical jargon and also understand very well the backstage where the academic and scientific politics and the struggle for power, status and money continues the research[2].

On the other hand, technology and its growing quantity of innovation in practically all areas of human activity seems to fit for frequenting the *media* of mass communication: it yields headlines easily, shows its products and services in an easy-to-understand publicity language and, above all, presents itself in a touchable way to our senses: it can be pictured, filmed or tested in such way as to generate enthusiastic testimonies from its users. Besides, the journalist who covers technology has his way paved by releases coming from manufacturers or suppliers, by public demonstrations and detailed manuals that explain the functioning of devices and products. Let us be frank: is there an easier coverage than that of a technological novelty fair?

Dangerous Relations

This affinity of interests between journalism and technology produces a dangerous phenomenon: the press tends to highlight the positive aspects of technologic advances and

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[2] After all scientists are normal people, who like to be recognized by their merits. They know that the scientific divulgation can help them to bring financing to their projects and respect from their colleagues. It behooves the journalists to also deal with psychological and political aspects of the scientific activity.

neglect the negative ones. We should not attribute this to the irresponsibility of journalists. This occurs because there is unsteadiness in the rhythm that the positive and negative aspects appear in the reality. The positive and nice ones are usually clearly shown and generate direct satisfaction in people, while the negative ones are usually cumulative and become perceptive only after more dilated periods have gone through. The positive ones answer well the journalistic appetite for bombastic news and of massive interest, whereas the negative ones many times are not even mentioned. And when they appear in the *media,* they are usually presented as isolated facts or fatalities with no connection to their causes. In the press business, technology always receives the bonus, but rarely the onus.

This discrepancy appears in the debates about the human impact in the environment, the social changes produced by the introduction of new technologies and the cultural shock born from the relation among cultures more and less technologically developed. We know today that the introduction of a new technology can modify in an irreversible way both nature and human culture. This change can lead us to unpredictable directions, including risks to our own survival. For that reason, in the 1970's we saw the creation of the concept of sustainable development, which preaches a balance between the usage of technologies and the ability of our environment (and of our own body) of absorbing the impact of technological interferences. This concept was initially used regarding the ecological problems of the planet, but today we talked of sustainable development to refer not only physical or ecological environments, but also to the cultural ones – since these are sources of diversity of knowledge equally important to our species.

The end of an illusion

Journalists who cover science and technology must know a little deeper the questions related to sustainable development. This would help to eliminate the naivety, many times repeated, that science and technology are ethically neutral, that is, that the problems they cause lay on the usage that is made of them and not in their intrinsic existence. Actually, there is no human knowledge free of intentionality, much less scientific and technological knowledge. All new knowledge is assimilated by our society because it answers a need that can and should be discussed by its members. Science and technology cannot escape from the ethical court, as some specialists defend. They are

extremely human activities, subject to errors, bias and bad faith as any other, but with an aggravating point: their effects are potentially much more harmful to nature and our culture than most part of other human activities.

Another reason to face the question seriously is that the concept of sustainable development obliges us to see the world as a totality that cannot be fragmented and studied in pieces without our having an epistemological loss. In order for something to develop sustainably, it needs to establish a harmony among all the systems in interaction, in such a way that this interaction is itself the producer of a suprasystem capable of comprising the previous ones to create a new form of organization. In order to understand and apply the concept of sustainable development, we need to adopt an inter and trans-disciplinary approach. One must consider the world no longer as an aggregate of things, but as a result of a process that remains in time thanks to a flux of information that makes all the dimensions of reality communicate. The communication is an ontological phenomenon and the universe may be anything but a narrative (Smolin, 2002, p.59 ff).

The limits of civilization

The long history of the development of human technology begins with the uprising of language, which seems to have started between 2.5 and 3 million years ago (Maturana, 2002, p. 175). It was our capacity of dealing with symbols that differentiated us from our primate relatives and levered what we call civilization. Symbols allow us to compress a great quantity of information in signs easy to memorize and express. Symbolic expressions can also be reprocessed and resynthesized in other unities in a way that it creates an unlimited cascade of significances, which spreads out in all directions and winds up producing a new sphere of reality, no longer anchored in the physical realm but purely symbolic or semiotic. Mythologies, arts, philosophies and science itself are results of this process of the production of the "noosphere" or "semiosphere" (Lotman, 1996).

Studies in cognitive and neurological sciences show that the human capacity of creating symbolic universes is related to the uprising in our brain of the neocortex – the external layer, which recovers the reptilian and limbic brains (MacLean, 1976). The neocortical layer is the source of our self-consciousness, of rationality, of self-controlled logic and complex technology. The function of creating a noosphere (the symbolic sphere)

in the environment around us is in the cortex, in order to expand our minds outwards the braincase. The result is the creation of "collective minds" formed by several individual minds that originate, in their turn, groups and societies, each of them with its technological apparatus adapted to their cultural and historical conditions. From the first rupestrian painting and ceramic utensils of Stone Age up to the modern particle accelerators of the quantic physics laboratories, we see that our neocortical mind has an astonishing plasticity, capable of generating technology and, at the same time, adapt to its own transformations, which performs in nature and in the semiosphere that our own minds created.

Technology has always existed and developed throughout human history, but in the 19th and 20th centuries the accumulation of knowledge allowed an unprecedented jump. There have been more technological changes in the past two centuries than in the previous millennia. As a result, our expectation of life has doubled, diseases were eliminated or controlled, we increased our capacity of producing food, and expanded very much our knowledge about life, about our planet and about the universe. During most part of this period, we were amazed with these undeniable advances without knowing that they could hide risks bigger that the benefits they brought. Only from the second half of the 20th century a critical sense about the science course and about the impacts of technology both in the environment and in human cultures emerged (Bateson, 1972).

The fast deforestation and elimination of the ecosystems and species, pollution in all levels, climate changes, great nuclear accidents and the harmful effects of pesticides and medicine capable of provoking damages in our genetic structure eventually have shown us the bad side of the scientific and technological development. That is why we started a process of global discussion about the courses of human development, which tries to deal with the many faces of this issue. Summit meetings like Rio-92 and Juhannesburg-2002 have gathered world leaders around the idea of sustainable development, but the practical results are poor. The majority of them agree that the problem exists and it is serious, but few have been really willing to give up on their industrial and technologic model to attend the protocols proposed or even already signed.

Meanwhile, science and technology continue to develop in an intense rhythm and to pose even more complex problems, as well as bigger dangers. The genetic manipulation and cloning of live beings, while enhancing the production of food and medicine, allow the

accidental or bad intended creation of viruses and pathogenic bacteria which can be fatal to our species. Nanotechnology, which allows us to produce mechanisms in atomic scale, promises to revolutionize many industrial sectors but also threatens us with micro-robots, which if escaping our control, could destroy life on Earth in a matter of hours. The research in artificial intelligence can radically transform our culture in few decades. The 21st century might be the final test to our species, which could either let us transcend the limits of our planet and solar system, increasing our survival possibilities, or produce an irreparable collapse in environment, condemning us to extinction (Rees, 2003).

Journalism as technology

Journalism itself – as an activity of divulgation, interpretation and orientation based on facts of reality – can be considered a technological sub-product of our civilization. The so-called journalistic techniques of poll, writing, editing and publishing new facts, as well as the group of all instruments used in journalism (computers, internet, printing devices, *media*, etc) compose the mass of technology available to civilized human beings, inserted in complex social relations of power. Journalism on the one hand expands the human capacity of seeing, hearing, knowing and understanding the reality (McLuhan, 1972), whereas on the other hand it serves as a device more and more efficient to the social control and power exercise (cf. Foucault, 2000). News is a package of information about the world, chosen according to certain ideological purposes and processed in order to be digested and attractive to a determined target public.

It seems clearer now why mass communication and technology get along so well. Both share the same nature in essence, which is the processing of useful information to our existence. In a symbiotic way, journalism absorbs technological advances to enhance its performance while technology uses the means of communication to expand its penetration in society. As the technological products and processes can be considered snippets in the continuous flux of scientific knowledge, allowing us the practical domain over some part of the reality, the journalistic news is a snippet of the continuous flux of reality, performed to achieve certain social objectives, expanding or reproducing relations of power. Means of mass communication and technology are therefore systems coupled in their structure, with a high degree of interdependence (cf. Luhmann, 2005).

From simple to complex

These questions related to sustainable development are inserted then in the change of scientific paradigm we are living nowadays. Since Newton, scientists got used to seeing the world as a mechanism ruled by some simple fundamental laws, which sooner or later would be discovered. In the classic science, the universe is a deterministic system whose properties change in time in a linear and predictable way. This illusion persisted until the middle of the 20th century, when quantum physics and thermodynamics showed that reality is neither simple nor linear, but ruled by complex processes based on probabilities (Prigogine, 1996). Today the universe is no longer seen as a continuous block of space-time, but as a dynamic system subject to chaotic floating and ruled by probabilities.

For the problem of sustainable development, the novelty is that the environment and human societies began to be studied as naturally open and complex systems, which self-organize through chaotic dynamics. One of the main characteristics of these systems is the hypersensitivity to the initial conditions (Ruelle, 1993), i.e. they can exhibit a completely unpredictable behavior even if affected by minor alterations. The internal dynamic of these systems causes small fluctuations to amplify, resonate with others until a break of symmetry is produced and the whole system changes. This hypersensitivity is usually exemplified with the climatic system of the Earth, also complex and probabilistic. The so-called "butterfly effect" shows that the flapping of the wings of an insect in the Amazon basin may produce, after a few weeks, a terrible snowstorm in Alaska.

Another important characteristic of the open dynamic systems is the possibility of their going through abrupt changes of phase, i.e. of causing a sudden emergence of properties that did not exist before. A classic example is the transformation of the states that water goes through, according to its temperature. For instance: at zero Celsius degree, the water does not start to freeze smoothly, but at once – and in a way that physicists are still not able to unveil. For some mysterious reason, millions and millions of molecules gather to produce a crystal in a very synchronized way, as if there was a conductor coordinating the whole process. Phase transition phenomena are fundamental in nature, responsible for the appearance of all physical properties of matter. It was a great surprise, for the scientists,

to find out that the fundamental processes of the universe are not subject to determinist laws but to probabilities.

Finally, open dynamic systems show a third characteristic that is worthy of attention: they are irreversible. When a complex system goes through a transformation, it never returns to be exactly what it had been in the past. According to expert scientists in thermodynamics, this is the characteristic that guarantees the existence of an arrow of time in the universe. In other words, time flows because the universe is an open dynamic system ruled by probabilistic laws. This was the final blow in classic physics and reached even the equations of relativity. In Einstein's world, time is an illusion and can even be spacialized as an extra dimension, as effectively came to be done. Still in the 20th century, however, Prigogine (1996) showed that irreversibility is a fundamental property of reality and science must change radically its paradigm to accept the reality of time and return its dialogue with nature.

This new paradigm, which some theorists call Epistemology of Complexity (Morin, 1977, 1982, 1986), gives us the possibility of returning to the cognitive path abandoned when science opted for mechanicism, the neutrality of the observer and the strict realism as epistemological presuppositions. The sciences of life - as biology, etology, ecology and sociology - were the most damaged by this option, for the straightjacket of mechanicism eliminated any possibility of understanding the processes that allowed the emergency and the development of live beings on Earth, including the human beings and their most essential qualities, as consciousness, intelligence and cultural diversity. Thinking the sustainable development in the old Newtonian paradigm was something impossible, whereas in the Epistemology of Complexity it rises as a natural question.

Bridge to the future

The paradigm of complexity also opens the possibility for us to build, in the future, a bridge between the two scientific traditions that have remained separated since at least Galileo and Descartes: physics and mathematics, on the one hand, and humanities on the other (Snow, 1959). For a long time, human sciences pursued methods of research and analysis that could be as rigorous as those used by physicists and mathematicians – methods that would allow them to eliminate the bias by contamination of the observer and

present their results in a quantitative dressing (Ginzburg, 1991, p. 115). What surprise the entry of the 20th century reserved to us, when physicists and mathematicians announced that there is no absolute certainty in the universe, the scientific objectiveness is a chimera and there is always a portion of uncertainty in every knowledge process. Prigogine also talks about creativity and sensitivity appearing in the most elementary levels of the matter as chemical reactions.

The most interesting factor for us, communicators, is that this bridge can be made of a fundamental concept of our day-by-day: information. Everyone can perceive intuitively the presence of important information. As we have seen, perception evolved in order to guarantee the selection of necessary information to our survival. In Bateson's saying, one of the formulators of Cybernetics, information is "the difference that makes the difference" (1999, pp. 271-272), i.e. distinctions that have the capacity of further selecting new distinctions in a process apparently unlimited of *feed-back*. However, nobody is able to explain exactly how information acts (this would be the triumph of artificial intelligence), although we can already understand some of its properties and implications. Not by chance, the most known properties of the information are those useful under the technological point of view. They were discovered in the middle of the 1940's by an engineer, Claude Shannon, interested in solving problems of data transmission through telephone wires.

Shannon understood that the mathematical laws that rule the transmission of information were identical to the ones that rule the behavior of thermodynamic systems: there was the presence of probabilities and irreversibility in its evolution. As we have seen, Physics says that a system, when evolving in time, can never return exactly to its previous state. This is the essence of the so-called Second Law of Thermodynamics. Similarly, the information that leaves a source can never be recovered again and with absolute precision by any receptor. Which hinders the recovery is the growth of entropy – a physical quantity that expresses the level disorder present in any systems, including messages. The increase of entropy explains a series of phenomena, from genetic mutations to the loss of quality we observe when we copy a videotape. It also explains why our organism ages and the reason of the wastage of our car. Or why journalists always fail when they use second-handed information, inevitably full of mistakes due to the action of entropy.

Is everything information?

For some reason still not entirely understood, the concepts of energy and information are linked in a so fundamental depth that some theorists risk to affirm that, in the future, there will only be one of them: information. This idea, proposed for the firs time by the physicist John Wheeler, in 1989, may seem strange at first sight, because it challenges the world vision built from our senses, wherein reality seems made by existent concrete objects. But if we admit the world as a net of relations based on information, we might have a chance to find a radically new theory about reality, which would finally allow us to conciliate the equations of quantum physics with those of general relativity, which today are incompatible. In this new theory, there would no longer be energy or matter, but only information being exchanged among parts of the universe. Time and space would no longer be fundamental concepts of physics, but the result of the transmission of information processes by the universe (Smolin, 2000).

It was discovered afterwards that the kind of information described by Shannon was just one of the many facets of the issue. Not all systems and messages are wearing down according to the Second Law of Thermodynamics. Some of its important classes, called by Prigogine "dynamic systems away from equilibrium", have the capacity of inverting the flux of entropy and, instead of moving towards thermodynamic equilibrium, initiate a process of self-organization or *autopoiese* (cf. Maturana, 1980) towards higher and higher levels of complex organization. Instead of degrading in time, these systems get organized through a progressive internalization of relations developed among their parts and between these systems and their environments (Uyemov, 1975).

However, this does not mean that the law of the increasing entropy was violated. To compensate their process of internal organization and decrease of disorder, these systems eliminate (dissipate) entropy from the environment where they live - that is, they disorganize whatever is around them. To survive, therefore, autopoiethic systems need environments full of information and capable of supporting the load of entropy, which will be thrown over them. According to Prigogine, these systems may not be exceptions in nature, as it was firstly supposed, but may be the rule. Actually, the entire universe seems to behave as a great system formed by the enchainment of countless sub-systems, all of them dissipating energy in global scale while seeking organization locally. Planets, stars, solar

systems and galaxies are the channels wherein the organization of the universe expresses itself, while the dissipation of the energy causes its limits to continuously expand.

Life on Earth is a good example of this process. From the entropy dissipated from the sun in the form of heat, life explores the possibilities of combination among the chemical elements present in the planet (small loose portions of information still not related), generating more complex sequences of elements until the phase transition occurs: life is born and achieves a certain grade of autonomy, coming to regulate its own processes. Evolution, the genetic mutations and the natural selection are part of the mechanisms that allow life to remain in time as a continuous process. The messages contained in the genes are always recombining among themselves to allow new forms of life. The key to this is the already mentioned butterfly effect: small internal changes, thanks to resonance processes, amplify themselves to produce new and amazing results (Churchland. 1998, p. 259 e ff).

Where are we going?

We can now come back to the relation between technology and sustainable development. Technological processes and tools generally do not belong to the category of the open dynamic and are distant from the thermodynamic equilibrium systems described by Prigogine. Technology, in order to reach its efficiency aim, cannot adopt the self-organization strategy, which demands expanded temporalities and uncertain results. Good technology, from the point of view of the user, is what works in a determinist and predictable way, what gives the expected results. To fulfill these requirements, the technological systems and processes have to be necessarily closed to the environmental fluctuations. Nobody would like to have a car or appliance, or a work routine, or even a cake recipe, which produced unpredictable results when tried. The butterfly effect cannot rule technology because it would lose its immediate efficiency.

Technology is formed by processes and instruments well arranged, rich in information synthesized usually in the binary form, which is the most elementary one. In these systems the answers and possible behaviors are already catalogued in their own interior. They create closed circuits, which guarantee their predictability. As a consequence, there is always a great friction between the natural dynamic of the environment and the dynamic of technological processes – as it is evident in any place or time wherein

civilizations have achieved high levels of technological development. This friction can once more be interpreted as the production and dissipation of entropy in the environment. In order to work better, technology dissipates entropy at greater rates, disorganizing the environment around in an irreversible way. If this rate reaches a critical level, we have the risk of a an irremediable collapse, a violent transition of phase capable of radically changing the properties of the system and launching it towards a new equilibrium, where the current forms of life may not have the chance of permanence.

There is no escape from this equation. If we move in the current direction of our civilization, we will have extreme options ahead of us: either we leave quickly from Earth, burning the resources of organization of our planet for us to project ourselves to other environments of the universe, exploring new sources of information, or the wonderful technological advances of the next decades could be the melancholic swan tune of mankind, a sort of fugacious shine, which will make us disappear suffocated by our own intelligence. This is a decision we must make now, before the situation gets out of control. The question is: are we mature enough for that? Is it possible that the reptilian part of our brain, which gives us the sensations of fear and anger, aggressiveness and will of pleasure and conquest, has already been sufficiently shaped to permit the emergency of a global feeling of responsibility and fraternity? Are our societies ready to take measures that might lead to a decrease of our load of immediate pleasure to produce an increase in the chances of our future generations to continue our steps? The physician and mathematician David Ruelle, one of the formulators of the Chaos Theory and its consequences in the sphere of information, leaves the question opened:

> It is difficult to judge what are the really opened options to humanity. Will the apocalypse be tomorrow? Or could the human genre proceed indefinitely on its way? The brain that we use is the same of that our stone age ancestors and gave proof of an amazing flexibility. Instead of running on foot and hunting with the spear, the modern human drives a car and sells insurance policies. And, unless there is a cataclysm around, there will be other changes, new progresses. For many technical works faster and more reliable machines will replace our paleolithic and obsolete brains. And science will come in assistance to our old fashioned mechanisms of genetic copy, letting avoid every kind of terrible diseases. And we will not be able to say NO. By sociologic reasons, we do not have the option of refusing

all these magnificent improvements. But will the humanity be able to survive the changes that we cannot help making in our physical and cultural environment? We know nothing about that. Now, as in former times, the obscurity about our future remains impenetrable, and we do not know if the humanity moves to a more noble future or to an inevitable self-destruction (Ruelle, 1993, p.223).

Tenderness and the abductive method

In *The right to tenderness* (2001), the Colombian thinker Luis Carlos Restrepo makes a strong defense of the adoption of the feeling of tenderness as an antidote against violence, which permeates the human relationships both in private and public spheres. Restrepo shows how this feeling has been depreciated through centuries by a society lined by the intellectual and physical dispute among its members. He proposes a more tender way of seeing and relating to the world – and, therefore, of producing meanings and speeches – permeated by a kind of amorous affection. In the ambit of academic and scientific production, this proposal implies an important change both in the way of making science and of communicating the scientific results to society.

The discourse of tenderness that Restrepo proposes represents a counterpoint to the discourse of violence that, according to the interpretation given by Freud, is installed in the human being with the same symbolic order that internally organizes our psyche. Freud called "the narcissism of small differences" this process of symbolic organization: the ego overestimates other people's distinctive details to produce the reactive affirmation of the own ego. Thus, our self-affirmation is usually made from the disqualification of the differences of people around us, a disqualification that can assume many facets, either as an open physical violence or as a subtle exclusion by prejudice.

Restrepo proposes us to free ourselves from the feeling of indisposition generated by violence and by the sense of guilt with a call for tenderness. By tenderness he understands a permeability of the spirit in order to let in the influences coming from the environment and other human beings that are around you. In the scientific field, Restrepo proposes us to balance the excessive doses of rationalism and empiricism, which mark the traditional scientific method, with a bigger dose of a type of inference still little known

among the scientists, although it plays a fundamental role in every scientific discovery: abduction. This type of thinking, discovered by the North-American philosopher and logic Charles S. Peirce, is essentially hypothetical. It starts from plausible a hypothesis given in the experience. These conjectures have a low degree of certainty, but seem reasonable enough to justify their provisional adoption in concrete situations, when we can test their truth.

> "The abduction is the intuition of context, fundamental to the captivation of the germinal environment wherein emerges the adventure of the search. In this context the scientific thought is born and to it, it must return, integrating its discoveries to a pragmatic of knowledge. Without it, no hypothesis could be formulated, no evidence built. It opens and closes the investigating dynamics. It turns the experience communicable, allowing that the knowledge connects the dynamic of a time" (Restrepo, 2001, p. 44).

This is the logic wellspring from where a tenderness feeling dawns. Tenderness is the abduction itself given as an internal perception of the spirit, which sees empathy (contiguity) and affinity (resemblance) in the beings around it, but also in the nature. Tenderness is the recognition that there is no dry cut between our ego or our body and the egos and bodies of people and things to which we are related. What we find is continuity full of resemblances and mutual identifications. Peirce affirmed that only love could produce a science towards man and its true necessities – a doctrine that he called agapism (from Greek *agapè*, love). In this context, abduction is a sort of sensitive antenna, which allows us to tune in to the desires and wishes of the whole mankind, seen as communities without limits of people interested in reaching the truth and common good. Communication unifies such community in a collective mind, which Peirce calls commens or co-mind (EP2: 478).

This is a fundamental dimension of the pragmatic theory of communication, a multidisciplinary field of study that has been gathering disciplines like semiotic, cybernetics (or systems theory) and sociology (cf. Brier, 2006). Besides being one of the founders of the Theory of Signs, Peirce was also the first formulator of the pragmatic philosophy. Note, however, that the pragmatism of Peircean extraction has little to do with the popular versions popularized throughout the 20th century, wherein the emphasis is given to its practical consequences resultant of the adoption of a determined belief. Peirce saw

pragmatism as a method to achieve the truth based on some important metaphysical principles and in close connection with the concept of Semiosis, or sign action. We cannot discuss here these principles in detail, but we can outline its central ideas:

1) Reality is not restricted to the dimension of existents, but includes possibilities (latent qualities) and virtualities (in the form of active final causes).

2) The universe is of the nature of a mind. What we understand as matter is nothing but effete mind – mind that has lost its freeness by the constrictions of laws.

3) There are no merely mechanic relations in the universe. All relations involve some degree of indeterminism and of intelligent purpose.

4) Our ability to guess the laws of nature is due to the filiation of our mind to the universal mind.

5) The universal laws are habits of the universal mind, as well as the beliefs are habits of the human mind.

6) There is an evolutional principle, a sort of super order, coordinating the evolution of the universe, and which we are also part of. This evolving principle Peirce called "evolutionary love", basis to its agapism.

7) Chance exists objectively in nature, being responsible for the creativity and for the growth of information in the universe, but also in our minds.

8) The substratum of reality is the continuous, which allies all the things in lower or higher degree. These allied minds are called *commens* or co-mind. Communication is based on this principle.

9) Knowledge is always fallible but also naturally inclined to the truth because reality forces us to correct our hypothesis and shape our ideas to the forms of the universe.

10) Another name for communication is semiosis, or action of signs, which organizes the chaos and allows the creation of complexity and the emergency of life.

The concepts of semiosis, evolution based on agapism and *commind*, which emerges in the process of communication may help us to find answers to many problems linked to the sustainable development – the ones that, as well denounces Wittgenstein in the epigraph of this article, cannot be solved only within close analytical logic, which has ruled our scientific researches and the behavior of our governors throughout the past centuries. The answer to the early and a bit nihilist questioning expressed by Ruelle, about the destiny

of mankind, can be glimpsed in the type of pragmatism proposed by Peirce. After all, as affirms Nathan Houser (1992, p. xl) when explaining some of the consequences of adoption of the peircian pragmatism:

> There are many ways to live in the world, and intellect does not constrain us to a single path. There is far more to an intellect than the mere representation of external objects: there are plans and purposes and ideals, all of which can be infixed in intellectual habits that predetermine future behavior. And, of course, future behavior will shape the world that is to come. What is so interesting about Peirce's views is that we as individuals, we as humanity, have some measure of control over our intellectual habits. We have a choice. We can deliberately, though with effort, change our intellectual habits—which means that we can change our minds: and that means that we have some measure of control over which of the many possible futures will be ours.

Social communicators, journalists in special – for being in front line of the communication process – are, therefore, invited to abandon the *naive* enchantment with fruits of a science many times directed to satisfy the needs of the solipsist individualism, which contaminates our modern societies and to assume a critical and responsible role in front of the technologic paraphernalia of our time, attentive to the implications in short and long term to the destiny of humanity and life on the Earth. The human species, seen now as a co-mind producer of information and knowledge, has to assume with responsibility the reins of its actions in search of development models, which are not destructive of life, but that know how to drink from the source of its complexity. This is sustainability.

APPENDIX II

Summarized chronology of Peirce´s life[1]

1839	Born in Cambridge, Massachusetts (USA), on September 10th, son of Benjamin and Sarah Hunt Peirce.
1850	At 11 years old, writes a Chemistry history.
1855	Admitted in Harvard.
1859	Graduates, but remains for one more year in Harvard as a resident post-graduation student.
	Hired as assistant at the U.S. Coast Survey scientific agency, specialized in geodesic and metrologic research.
1860	In Harvard, studies zoology classifications with Louis Agassiz.
1861	Enters the Scientific Lawrence School, in Harvard.
1862	Post-graduates in Harvard.
1863	Works as temporary assistant at the U.S. Coast Survey.
	Marries his first wife, Harriet Melusina Fay (October 16th).
	Graduates *summa cum laude* in Chemistry at Scientific Lawrence School.
1865	In the spring, holds a series of conferences in Harvard about "The Logic of Science".
	Begins his Logic brochure on November 12th, which will receive notes until November 1909.
1866	From October to December, gives a series of lectures at the Lowell Institute about "The Logic of Science; or Induction and Hypothesis".
1867	Elected to the Sciences and Arts American Academy on January 30th. Publishes the article "About a new list of categories", his first major philosophic work, which some people would consider the most important.
1868	Publishes his "series about the cognition": three articles about the limitations of human knowledge and their logic consequences.
1869	Writes approximately the first 300 reviews for the *Nation* (last published in December, 1908).
	Takes over the position of assistant at the Observatory in Harvard (from October 1869 to December 1872)

Gives lectures in Harvard about the "British Logics".

1870   Sent to Europe for the first mission of *Coast Survey*.

Publishes an important article about the notation of the Logic of the Relatives.

1872   Participates in the foundation of Cambridge Metaphysical Club.

Put in charge of the Coast Survey Office.

Carries out experiments of determination of the gravity through pendulums.

Promoted to Assistant at Coast Survey.

1875   Takes the second trip to Europe by Coast Survey.

Attends the International Geodesic Association in Paris as the first official delegate of the United States.

1876   In October, separates from Melusina Fay.

1877   Elected to the National Sciences Academy.

Third mission of Coast Survey in Europe.

Represents the USA in the conference of the International Geodesic Association in Stuttgart, Germany.

1878   His *Photometrics Researches*, result of his work in astronomy, are published.

1879   Invited to give conferences in Logics at the Johns Hopkins University (activity which will perform until 1884).

Participates in the first Johns Hopkins University Metaphisical Club encounter.

1880   Elected to the London Mathematics Society.

Fourth mission of *Coast Survey* in Europe.

Designs and supervises the construction of the first of four gravitational pendulums, which takes his name.

Drills the members of the expedition of Lady Franklin Bay to use the Peirce 1 pendulum before their departure to the Artic.

Elected to the American Association for the Advance of Science.

Benjamin, Peirce's father, passes away on October 6th.

1883   Edits the book *Studies in Logics*, with articles produced by him and his students from Johns Hopkins.

Gets divorced officially from Melusina Fay on April 24th.

Marries Juliette Froissy (Pourtalès) on April 30th.

Fifth and last mission of *Coast Survey* in Europe (May to September)

1884-86 Directs operations with pendulums to determine the relative gravity in Washington (D.C.) and many other places.

1884 The contract with Johns Hopkins University ends. Peirce and Juliette move to Washington.

Begins to head the Coast Survey Weights and Measures office, position in which will remain for few months.

1886 Moves to New York and starts to prepare the reports regarding his field work on gravity.

1887 Continues preparing the reports about the determination of gravity.

Writes scientific and philosophic entries to the *Century Dictionary* throughout the year.

The necessity of increasing his income and his frustration with his superiors at Coast Survey makes Peirce start a course by correspondence about "The Thinking Art".

Discusses his intention of quitting Coast Survey, but is advised to stay until the end of his reports about the gravity measurements.

Moves with his wife first to rooms in hotels in Milford, and then to a rented house. Peirce maintains the rented rooms in New York, where occasionally goes to research in libraries.

Peirce's mother passes away on October 12th, leaving an inheritance which Peirce uses to buy a rural estate near Milford and initiates there the construction of a house.

1888 The president of the United States, Grover Cleveland, designates Peirce to the U. S. Assay Commission, which would gather prestige men to evaluate the quality of the money produced by the Mint of the country.

An aunt of Peirce passes away in March, leaving a small inheritance.

Buys a cottage near Milford and, in the two following years, dedicates to reforming the existing house and the acquisition of new estates. Names his new abode "Arisbe".

Keeps himself very busy with the preparation of the reports about the expedition to the Arctic and his gravimetric determinations.

1889 Gets a leave of absence at work to take Juliette to the doctor due to her worsening health condition. The diagnosis reveals tuberculosis.

Sends Juliette to Europe to recover.

Hands in the major part of his report to Coast Survey. Despite important theoretical and mathematical contributions, the work does not fulfill all the goals Peirce had proposed.

The scientific and philosophic definitions written by Peirce start to appear in the volumes of *Century Dictionary*.

1890	The Report about Gravity is rejected by Coast Survey, which demands revision and conclusion of the work.

In the spring, Juliette comes back from Europe.

Ends a major reform and expansion of his house in Arisbe.

1891	In January, Juliette undergoes a surgery due to gynecological problems.

Peirce is dismissed from Coast Survey on December 31st for not completing his report.

1892	Gives lectures at the Lowell Institute about "Science History".
1893	The book *Petrus Peregrinus* is announced, but only his prospect is published; "Search for a Method" is announced by Open Court, but never written.
1894	The collection "The Principles of Philosophy", programmed to comprise 12 volumes, is announced by Henry Holt Co., but never completed.

"How to Reason" is rejected by two publishers, Macmillan e Ginn Co.

1895	"New Elements of Mathematic" is rejected by the Open Court publisher.
1896	Starts to work as a Consultant Chemical Engineer for St. Lawrence Power Co. (until 1902).
1898	Gives lectures at Cambridge about "Reasoning and the Logic of Things".

The book "Science History" is announced by G. P. Putnam's publisher, but it is not completed.

1901	Contributes to the *Dictionary of Philosophy and Psychology*.
1902	Despite the efforts of influential friends, his request for scholarship at the Carnegie Instituition to write his "Proposed Memoirs in Minuta Logic" is rejected.
1903	Gives lectures in Harvard about "Pragmatism".

Gives lectures at the Lowell Institute about "Some Topics of Logic". In the syllabus published for these lectures, Peirce formulates for the first time his classification of 10 signs from three tricotomic divisions.

1904	Writes "New Elements", which some critics consider the best exhibition of his signs theory.
1907	Gives lectures about "Logic Methodeutics" at the Harvard Philosophic Club.

1908   Researches intensively his signs theory.

1909   Publishes his last article, "Some Amazing Mazes".

1914   Passes away from cancer in Arisbe, Milford, on April 19th.

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[1] This biographic summary is based on the chronology published in the EP1 and EP2 volumes, also available at Peirce Edition Project site (www.iupui.edu/~peirce/peirce/chron.htm), and in QUEIROZ (2002).

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