

The Role of Abstraction in the Evolution of Semiotic Systems

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Abstract

The action of signs in human lives and in the evolution of cultures is to be understood in the light of semiosis, the process by which a meaning is given to all things in the world. Writing systems, as a sort of semiotic creation, evolve according to the laws of semiosis and the rhythm of human stepping ahead. This paper is an attempt to afford evidence of three relevant facts: a) A close contact, or at least a remarkable coincidence, of writing cultures in ancient times. b) An apparent and undeniable process of divergence of writing systems over centuries. c) A tendency to a new convergence of writing systems, as an ongoing process inferable from the new symbols of an increasingly globalised world. We propose that one of the elements that push these processes forward is abstraction, and we suggest that abstraction might be the leading factor in the evolution of writing and semiotic systems.

Keywords: semiotics, semiosis, abstraction, evolution, system, history of writing

1. Introduction

Supposing the Cosmos were a book written by an omniscient supernatural being, we would call *semiosis* the process by which the words in it would be given a meaning and the book itself would acquire a sense. In the writing plan of the author, the emerging of human life and language and writing systems would merit a few words more or less in the middle chapters. But, from that moment forth, this special universe would become a meaningful target-oriented system. As John Deely states in the founding issue of *Language and Semiotic Studies*:

Semiosis in nature and in culture seems to provide the only means we have really for

explaining how you can get ‘something more’ from ‘nothing but’: semiosis is at the heart of evolution throughout our universe from its beginning. (Deely, 2015, p. 84)

Upon this premise we may ask ourselves the following question: What makes evolution possible?

According to our understanding, one of the driving factors of evolution is abstraction, as it is one of the tools used by the human mind to appropriate the world.

Maybe, in this sense, Thomas Sebeok was right when he said that “language in its root sense has nothing to do with communication” (Deely, 2015, p. 80). Applying this to the particular field of carvings and chromatic figures painted by our ancestors on the walls of caves, we could suggest that the goal of these primitive writing systems was not in its origins to communicate but to create suprasubjective representations. Moving a step further we could take as a hypothesis that not only writing systems, but also semiotic systems in general, are pushed forward by abstraction.

2. General Assumptions

- a. A system is an organized set of data.
- b. The world is a system. Galaxies are systems in a global holistic universe.
- c. The human being is a part of this universe and is also a system in itself.
- d. The products of human thinking are systems of signs and they reflect the basic structure of humanity.
- e. The world, the humans and the human creations are all merged in a global movement that is called evolution.
- f. Semiotic systems and more specifically writing systems, as a sort of semiotic creation, evolve following the pace of mankind stepping forward.
- g. One of the driving forces of evolution is abstraction.
- h. Abstraction is the process by which the image of an object is reduced to a few of its essential features.

3. Semiotics as a General Mapping of Reality

It is a hypothesis we are now working with that all semiotic systems, not only writing systems, respond to the law of abstraction. In order to illustrate this idea, we will bring up a few examples¹ borrowed from the field of toponymy.

During a linguistic inquiry in the northwest region of Spain, we were shocked by the name of a place that people called *La Llengua del Tambor*. In an attempt at explanation we could translate it into *The Tongue of the Drum*. Why was this precisely the expression chosen? Among all possible aspects only two were selected when the name was created, one referring to a visual characteristic and the other to its acoustic behavior. It could be seen there a huge stone stuck in the rocky wall of the mountain, reminding us of

the tongue of an animal in an open mouth. We were told that children, when becoming adults, had to prove their maturity by climbing on that stone and striking it with a pebble. In doing so the stone sounded like a drum and everybody knew that another child had achieved adult status. The naming of the place had overlooked a large number of features, color, composition, size, and chemical properties. ...Only two were chosen: shape and sound effect. That's what we call abstraction.

We will add a new example. Not far from the place mentioned above is a mountain called *Broc6 de Canada*. The meaning in the local language ought to be explained as 'the pipe of the kettle'. Is there a direct semantic relation between a mountain and a kettle? Assuredly not. In this case, the skyline of the valley gives the mountain an outward appearance that resembles vaguely a kettle. The kind of vegetation, the color of the ground and the geographical situation are all ignored. Only the mountain profile has been taken into account. And many cases like this could be adduced: *The Lion Head*, *The Sleeping Woman*, *The Bell Mountain*.

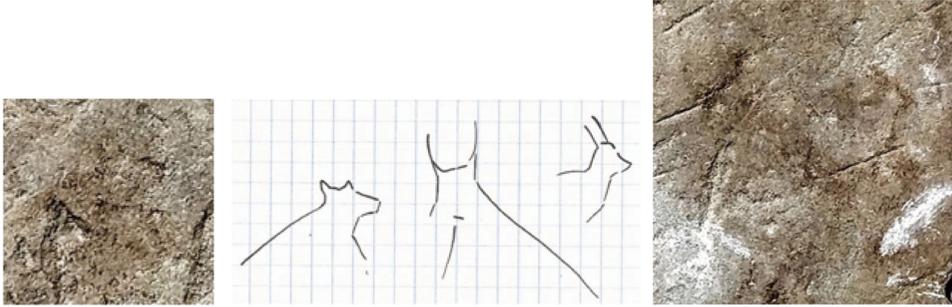
In ancient times a kind of astrological toponymy gave birth to the names of European or Chinese Zodiac. Why did the ancients give the constellations names such as *Leo*, *Scorpius* or *Draco*? Was there any need to compare these apparent star associations with a lion, a scorpion or a dragon?

Semiosis consists in giving a meaning to all things in the world. And with this aim we have to leave aside dozens of possible features and pay attention to only a few. In doing so, we set up abstract representations that can be applied to a great number of actual tokens. It occurs as in algebraic or numerical expressions. Their laws can be applied to an infinite number of objects.

The process of semiosis, using abstraction as a tool, across time and cultures has achieved a mapping of reality. Our generation is indebted to all previous generations because this heritage today is entrusted to us.

4. From Realistic to Schematic Representations in Writing

In the history of human cultures, we can observe a way leading from detailed graphical representations to abstract symbolizations² of the world. Those symbolizations are what we call writing systems. We became aware of this fact the day on which we found in our garden³ a carved stone with small incisions on its surface, and at the same time showing traces of previous realistic paintings. We copy hereby a detail of the figures painted on the stone and a rough draft based on them.



The study of paintings on the stone surfaces throughout the world evidences that ancient cultures created similar systems based on pictograms. If our interpretation of the pictures shown above is right, our stone might provide one more⁴ evidence.

Upon this basis, semiosis evolved to divergent systems of ideograms, that we sometimes call characters. A few of them may be illustrated by the raw pictures shown below. The fact that on the same stone we can appreciate a few abstract signs side by side with pictographic representations seems to support this.



A third stage must be signalled: the evolution to phonographic systems. These phonographic systems belong to a different order of representations. The ideas cannot come into being unless they are mediated by phonological forms. And the visual transfer of these forms is called alphabet systems.

It is well known that Chinese writing has remained, to some extent, close to ideographic systems and that this fact constitutes one of the identity signs of Chinese culture. But it could have been otherwise, if Chinese society had bet on phonographic writing.

Imagine that someone decides that the character used to signify a person 人 ‘rén’ will receive in all circumstances and contexts the phonematic value of /r/. This character would be used to write the initial phoneme of ròu ‘flesh’, rì ‘sun’ and hundreds of other words. Imagine that the character used to express a little child 子 ‘zǐ’ were used to explain in

all words of the language the phoneme /z/. In this case it would enter in words as *zòu* ‘to play music’, *zuǒ* ‘left hand’ and many others. Applying this procedure to the whole set of phonemes of Chinese language, we would obtain an alphabet based on Chinese traditional characters. Taking into account the simplicity of the syllabic structure of Chinese language, maybe it would be advantageous not to use a phonemic system, but a syllabic one. Or maybe a hybrid system, as was the case with the ancient Iberic language in use before the Roman conquest of Spain, which contains syllabic and phonemic characters.

Although the alphabetical writing has dominated the last 3000 years in European regions, the previous systems have coexisted with it in Europe and all over the world. At the end of this essay we will try to give evidence that new ideogram systems are coming upon scene. And these newly born ideograms play a strong role in the newly globalised world.

5. The Evolution of Semiotic Systems

No scientist today would deny evolution. Charles Darwin set the ground for modern biological sciences. Edwin Hubble made in 1929 a decisive contribution to our understanding of the evolution of Universe. Pierre Teilhard de Chardin, a scientist who worked in China for many years, was an evolutionist as well and he proposed the idea that all human beings constitute an integrated living body on earth, which he called *noosphere*. Beyond the *geosphere* and the *biosphere*, it could be discerned on the planet Earth as a net of information and meaning to which we all belong.

If evolution is the general law to which all things in the Universe are subject, semiotic systems must be subject to it as well. The stone that we have adduced in the previous paragraphs may help to explain how pictographs gave way to characters.

One of the characters carved onto the stone is very similar to one of the most frequently used Chinese characters: 人 ‘rén’, which means the human being, or people in general. The comparison with the ancient pictograms represented on rocky walls show a strong affinity.



Our assumption is that this character, in Europe or in Asia, can be considered as the simplification of a picture showing a walking man, that is, a man being alive. Abstraction, once more, has spared only two features of the former representation: the upright position in the vertical longer stroke and the movement implicit in the shorter stroke. What is relevant here is the fact that the figure is moving, and the man is not dead. If the man were dead, he would be lying on earth.

But not all ideas were as simple as this. Characters may have formed combinations in order to represent complex ideas. Chinese writing is in this respect very illustrative. The

basic notion of ‘good’, ‘welfare’ and ‘well-being’, which oral Chinese pronounces *hǎo*, can be written by joining two characters 女 ‘nǚ’ ‘woman’ and 子 ‘zǐ’ ‘child’, thus forming 好. The concept of ‘good’ was linked in ancient Chinese culture to the idea of a woman carrying a little child on her back. Ideographs are culture-dependent creations. In this respect, see in the third number of *Language and Semiotic Studies* (2015) the excellent essay of Ersu Ding entitled “Semiotics Turning Cross-Cultural”.

6. Conditions for Abstract Semiotic Systems

According to Louis Hjelmslev (1943), any scientific description must satisfy three conditions:

- a) Self-consistency. There must be no incongruity nor contradiction between its principles.
- b) Exhaustiveness. It must explain all facts under consideration.
- c) Simplicity. It must explain facts relying upon the least possible number of categories.

Accepting Hjelmslev’s empirical principle, we consider that it can be applied in a stronger sense to every theory. And as we think that writing systems can be considered as theories of the world, we can observe to what extent writing systems fulfill the conditions mentioned above.

The passage from pictographic systems to ideographic ones was grounded on the principle of arbitrariness of the sign, formulated by Ferdinand de Saussure in his posthumous work *Cours de linguistique générale*.

There is no reason why the idea of ‘good’ and ‘welfare’ has to be explained by means of the pictogram representing a woman and a child associated with her. There is no reason why the notion of family has to be associated to the representation of a roof giving shelter to a pig. But at a certain moment it was decided to perform these and many other systemic relationships. And from this moment on, the Chinese writing began to diverge from other systems based upon other cultural assumptions. Ideograms are arbitrary complex signs and every system has to establish the rules that bring order to arbitrariness.

Our hypothesis is that writing systems all over the world have in their origins an ideogramatic basis and that each one could probably be self-consistent. But the complexity of the world and the ideas to be expressed made the condition of exhaustiveness difficult. So it was necessary to multiply and diversify the characters and their combinatory rules, thus giving to writing an extreme complexity and endangering the condition of simplicity.

7. The Crisis of Ideographic Systems and the Phonographic Revolution

Because of the need of exhaustiveness a conflict arose, both with self-consistency and

simplicity.

First of all, exhaustiveness demanded a large number of characters. And the increasing number of characters and rules had the effect of diversifying the different systems, evidencing the varied ways of mapping the reality, according to different cultures.

Moreover a greater number of characters impaired the systematic simplicity, and the expense of memory required to manage the more complex system made it difficult to be competent in the writing skills.

And in spite of the complications of the system, it was difficult to express an infinite number of ideas by means of a finite number of characters. One single character might express different ideas and one idea could be expressed by different characters. Graphical synonymy and homonymy could be seen as a problem for self-consistency.

In this context, a scientific revolution, according to Thomas S. Kuhn, took place. In several regions of the world the decision was not to represent the form of content of signs, but their form of expression. Let us call this decision the *phonographic revolution*. From that moment on people in the world began to learn the ways to represent not the *iconicity* of ideas, but the phonic shape of words through which ideas receive a suprasubjective representation, their *phonicity*.

This transcendental decision re-established self-consistency and simplicity conditions, allowing exhaustiveness to depend on languages. The era of linguistics started.

The phonematic-based systems present the merit of being very simple: only two or three dozens of symbols (alphabetic characters) are needed to express the entire phonic pattern of a language.

The simplicity condition would require, in order that the system would be theoretically perfect, that for every phoneme one and only one graphic symbol be used. But the principle of 'biunivocity' between phonemes and graphemes is seldom guaranteed. Phonological systems evolve in the course of time and the ancient graphemes do not always respond to the new phonemes. Hence the need of periodical reviews called *orthographic reforms*, which are the attempts to adjust graphemes to the phonematic repertoire. The Spanish language, for instance, has experienced at least two orthographic reforms, one in the XIIIth century, the other in the XVIIIth.

8. Towards a New Ideographic System

The phonographic systems have proved to be very useful in many respects. It has been said, for instance, that they do not require a long time nor much effort to learn. The difficulty for beginners lies in learning the language, not in the small set of characters needed to represent that language. In addition, they avoid hesitation in reading, for there is little place left for free pronunciation of a text. Furthermore, a sequence of alphabetical characters can be easily read by an optical scanner and can generate the corresponding chain of sounds. And besides that, phonographic systems seem to be economical from the point of view of the physical processes needed to codify, transfer and decodify information.

Accepting these and other advantages, several disadvantages ought to be pointed out. One of them is the multiplicity of alphabetical systems in use: Roman, Greek, Cyrillic, Arabic, Hebrew... Another one is the distance they set between the person and the world.

There is no doubt that alphabetical systems are very simple and this is an argument in their favour, but in contrast they have the drawback of losing footing in the actual representation of the world. There is a gap, an immense distance between the graphic representation of sounds and the mental image suggested by words. And this gap can only be filled by the knowledge of the language.

Nowadays a new semiosis is getting ahead in a world more and more interconnected, in our *noosphere*. Public buildings, hospitals, museums, motorways, airports, etc. show a complete series of ideographical signs in juxtaposition with alphabetical notices and announcements. A passenger can travel around the world using international airports, without experiencing the need of the natural languages spoken in the countries he goes through. Let us provide a few examples.

Everybody will realize the meaning of a drawing showing a person sitting on a schematical wheelchair: ‘this is a place or a service for physically disabled people’. We show down here the signs for ‘disabled person’, for ‘disabled path in Canada’, for encouraging to use wastebaskets and to forbid smoking. No matter if we are Spaniards, Chinese, Italians or Indians, we can know the meaning of these ideograms, even if they are set in Canada, Algeria or Australia and we do not understand the languages spoken there.



Disabled person



Disabled path (Canada)



Use the wastebasket



Do not smoke here

And now we come back to the leading topic of this essay: abstraction. If we observe attentively the first sign, it can be stated that only the essential features have been retained: profile position, a small circle for the man’s head, a horizontal stroke for both the arm of the man and the arm of the chair, a broken line for the body, the leg and the foot, and a curved line for the wheel. We could also talk here about a simplicity principle inspiring the procedure to build up new ideographic signs using abstraction as a tool. This takes us back to the 好 and 人 signs and to the origins of our writing systems. And we

become aware of a new reality: the universalization of signs, a phenomenon of which we can show a few symptoms: the generalization of Western Arabic numbers (1, 2, 3...), the general use of mathematical symbols (+, -, =, ≠, ∞, ∑, %) and writing marks (&, ?, !) and even the use of what is called *emoji* or *emoticons* (😊, 😞).

9. Conclusion

1) *Semiotics* is a mapping of reality and *semiosis* is the process through which this mapping is achieved and renewed. *Semiosis* is the procedure by means of which new meanings are given to the different aspects of the world.

2) Semiotic systems are subject to evolution, keeping pace with the everchanging conceptions about the human and physical world.

3) Languages are physical devices to express semiotic systems, using acoustic waves, perceived by the ear, or light waves, perceived by the eye. And languages admit transpositions to other ways of expression, as can be seen in the “sign languages” for the deaf and the “Braille language” for the blind.

4) Writing systems use light waves to get a representation of content and these physical devices have endured many changes all along the history of mankind.

5) The study of ancient cultures shows a first stage in which figurative systems were developed. Carvings and paintings on stone, wood, clay tablets, ivory or bone are evidences of this initial moment. We might call it *figurative writing*.

6) We assume that a new era emerged and evolved, on the basis of this first stage, into a subsequent one which relied on more schematic representations. And this procedure we might call *character writing*. The discovery in the Spanish village of Areny of a stone showing the superimposition of characters upon previous figurative paintings affords evidence for this assumption.

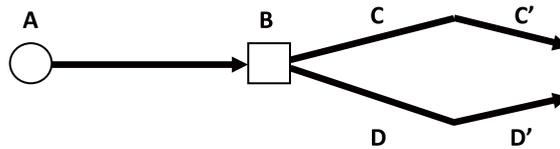
7) The resemblance of characters in different and distant regions of the world is remarkable and apparent. The study of the Areny stones, that we have brought to light in the present essay, serves as one more evidence of it.

8) The passage from the first stage to the second one must be attributed to the action of what we call *abstraction*. The comparison between ancient figurative paintings and Chinese characters may be illustrative in this respect.

9) Systems based on characters diversified in the course of time, giving place to what has been called conceptual characters, logographic characters, syllabic characters and phonemic characters. Hence the diversity of writing systems all over the world.

10) It is our guess that in the future writing systems will come closer, so that the divergences will be reduced. In the graphic below we represent in A the figurative writing stage, followed by a stage B of character writing. From this platform two divergent branches emerge, one of concept-dependent characters [C] and another of sound-dependent characters [D]. But in the course of History the C-branch generates sound-dependent characters, and the D-branch admits concept-dependent characters. And thus,

all systems tend to become mixed.



Maybe humanity is beginning the way back to a new semiosis that will take people beyond national borders, social differences, cultural barriers, linguistic boundaries and diversified writing systems.

Notes

- 1 *Toponomastics*, the research on the origins of place names, can be of great help to explain the evolution of semiotic systems. A further explanation is to be seen in Terrado, 1999.
- 2 The similarities between characters in different and distant regions of the world set out a problem that scientists have to solve in the future years. Similar characters can be found in neolithic European sites (in Spain, in the Danubian region of Tartaria, in the French village of Glozel) and in definite regions of China, such as Shaanxi, where the Yangshao Culture produced the Banpo symbols, some of them similar to those found in Europe. For more information about recent research in Europe, see Merlini, 2004; Merlini, 2005; Vázquez-Hoys, 2008; and Lazarovici, 2011.
- 3 What we found were two pieces of sandstone about 25 cm wide and 25 cm high. One of their sides was polished, so that writing could be easily made, using color pigments to paint, or chisels to engrave on them. A photograph of such stones is to be seen in the images below:



The village where the discovery was made is named *Aren* in Spanish and *Areny* in the local Catalan language. The name Areny refers to the sandstone upon which and from which the houses there are built. Megalithic gravesites and archaeological remains dating back to Neolithic times are well known in the surroundings. See Utrilla, 1992.

- 4 The mixing of such signs and figurative paintings in neolithic times is not rare in the Iberian Peninsula, as Pedro Bosch-Gimpera pointed out many years ago: “Pero lo que presta a los hallazgos de estos dólmenes un interés grandísimo son unos signos que tienen todos los caracteres de un sistema de escritura. Aparecen unas veces aislados, otras en unión de figuras de animales y otras alineados en grandes grupos, de manera que permite hablar de verdaderas inscripciones” (Bosch-Gimpera, 1911, p. 315).

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