

Intersemiotic Translation from Rural/Biological to Urban/Sociocultural/Artistic; The Case of Maguey and Other Cacti as Public/Urban Decorative Plants.”

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Abstract.

This paper proposes, from a semiotic perspective on cognition and working towards a cognitive perspective on semiosis, an analysis of the inter-semiotic translation processes (Torop, 2002) surrounding the maguey and other cacti, ancestral plants that now decorate public spaces in Mexico City. The analysis involves three semiotics, Peircean semiotics, bio-semiotics, and cultural semiotics, and draws from other disciplines, such as Biology, Anthropology, and Sociology, in order to construct a dialogue on a trans-disciplinary continuum.

The maguey and other cactus plants are resources that have a variety of uses in different spaces. In rural spaces, they are used for their fibers (as thread in gunny sacks, floor mats, and such), for their leaves (as roof tiles, as support beams, and in fences), for their spines (as nails and sewing needles), and their juice is drunk fresh (known as *aguamiel* or *neutli*), fermented (a ritual beverage known as *pulque* or *octli*), or distilled (to produce mescal, tequila, or *bacanora*). In urban spaces, cacti are used as an element of identity in the Mexico City coat of arms, as decorative plants, and as plant/objects for everyday uses – coat-hooks, trash receptacles, and as refuge for street vendors (under-employment). Cacti are also used with religious significance, at the feet of the Virgin of Guadalupe, who protects passers-by.

Cacti are plants that grow naturally in Mexican rural spaces – ideal environments and habitats for them – but which are planted and cared for by human hands in urban spaces – creating a socio-cultural landscape. This transition from rural to urban spaces is what we consider to be the inter-semiotic translation from rural to urban, from natural to cultural, from biological to socio-cultural (artistic, literary, cinematic, and pictorial).

We arrive at the interesting conclusion that in Mexico, these plants hold importance today (in the 21st century) because they are inscribed in a biological/natural/rural – human/cultural/urban responsive and cyclical process, with all the biological, sociological, anthropological and economic meaning that is produced in that cycle.

Keywords.

Cultural semiotics, inter-semiotic translation, bio-semiotics, cognitive semiotics, spatial semiotics

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1 Regarding the Concept of Biosemiotics

Biosemiotics has been understood as a concept, a perspective, a doctrine of signs and signals (Eder & Rembold, (1992), a discipline, and a paradigm. For its creators – J.V. Uexküll, T.A. Sebeok, J. Hoffmeyer, Emmeche, and K. Kull – biosemiotics is at the interstices of biology and semiotics.

Eder & Rembold (1992) hold semiotics to be a doctrine of signs and signals. “The central concern of semiotics is, simply, messages and their meanings. Given that any message is made up of signs, semiotics is the doctrine of signs, and is therefore part of linguistics.” To further develop that thinking, we would point out that both semiotics and linguistics fall within the science of language. Both disciplines are independent, but are not mutually exclusive; we could say that they complement each other, but neither of the two should be subordinated to the other.

Although Roland Barthes (1970) argued that Linguistics is subordinate to semiotics, and Saussure (2001 [1916]), for his part, subordinated semiotics to linguistics, we cannot agree with either of those stances, given that, from a complex thought and trans-disciplinary perspective, semiotics, fundamentally the semiotics of culture proposed by Iuri Lotman (1979), affords us a trans-disciplinary reflection on a dialectical continuum that extends from the verbal to the nonverbal, and also from the biological to the cultural.

In that sense, Morin’s (2004) theoretical contributions are important because they view man as a bio-psycho-socio-cultural being. It is therefore from this complex and recursive perspective that we reexamine biosemiotics, which has taken semiotics and the concept of the semiosphere as a metaphor to explain the behavior of biology in general and of molecular biology in particular as a system of information and a system of signs, signals, and messages that are produced between cells, animals, and plants. However, Morin does not move beyond the biological sphere into the cultural sphere.

In the past 60 years, very important contributions have been made as the discoveries of DNA, the human genome, stem cells, cybernetics, information technologies, and computers have given the world new perspectives, methods, and methodologies that have opened new paths for scientific exploration. It is in this context that biosemiotics has emerged.

Biosemiotics as an inter-discipline is the coming together of Semiotics and Biology, both considered to be information systems. In this respect, Kull (1999) points out that:

“Biosemiotics can be defined as the science of signs in living systems. A principal and distinctive characteristic of semiotic biology lays in the understanding that in living, entities do not interact like mechanical bodies, but rather as messages, the pieces of text. This means that the whole determinism is of another type. Semiotic interactions do not take place of physical necessity (however not contradicting this, or as stated by W.Elsasser (1982): laws of quantum mechanics hold), but because some of the interactors have learned to do so (using the notion of ‘learning’ in a broad sense here). The phenomena of recognition, memory, categorization, mimicry, learning, communication are thus among those of interest for biosemiotic research, together with the analysis of the application of the tools and notions of semiotics (text, translation, interpretation, semiosis, types of sign, meaning) in the biological realm. However, what makes biosemiotics important and interesting for science in general, is its attempt to research the origins of semiotic phenomena, and together with it, to pave a way of conjoining humanities with natural sciences, culture with nature, through the proper understanding of the relationships between ‘external and internal nature’ (Hoffmeyer 1993: 155).

Biosemiotics has been declared a (new) paradigm for biology (or theoretical biology) in several papers (Anderson et al. 1984; Hoffmeyer & Emmeche 1991; Eder, Rembold 1992; Kull 1993a; cf. Anderson 1990). ‘What we propose, then, is that the traditional paradigm of biology be substituted by a semiotic paradigm the core of which is that biological form is understood primarily as sign’ (Hoffmeyer & Emmeche 1991: 138). Therefore, biosemiotics can be seen not only as a branch of semiotics, but also as an approach in theoretical biology.

Biosemiotics is conceived as an integrating concept whose object of study is the semiotic relationships of any system of communication – based on recognition – among cells, plants, and animals, but it also leads to problems such as complexity, diversity, and interconnection. (Eder & Rembold, 1991 [1992]) Therefore, Hoffmeyer (1998) offers some tools to help solve the problems of Biosemiotics:

“The problems which biosemiotics can solve, according to Hoffmeyer, are among the deepest known in science and philosophy. Hoffmeyer has listed some of them: (a) to reformulate the concept of information; (b) to transcend (overcome) the dualism of mind and matter, i.e. the mind-body problem (p. 69, 94, 124); (c) to solve the incompatibility of humanities and natural sciences (p. 94); (d) to unite cultural history to natural history (p. 95); (e) to give humanity its place in nature (p. 94).”

The interesting contributions made by biosemiotics, according to its creators, are that it uncovers the communication that exists between living beings, a semiotic system, and the importance of the information they accumulate, revolutionizing the Darwinian evolution theory that holds that the strongest is the one who survives. From a biosemiotic perspective, then, the one which survives is the one which accumulates the most information. Nevertheless, they are still closed, autopoietic systems, in which organisms or living beings auto-eco-organize themselves. Kull (1998) contributes to our understanding with the category *Umwelt*, which he defines as:

[...] the semiotic world of organism. It includes all the meaningful aspects of the world for a particular organism. Thus, Umwelt is a term uniting all the semiotic processes of an organism into a whole. Indeed, the Umwelt-concept follows naturally due to the connectedness of individual semiotic processes within an organism, which means that any individual semiosis in which an organism is functioning as a subject is continuously connected to any other semiosis of the same organism. At the same time, the Umwelts of different organisms differ, which follows from the individuality and uniqueness of the history of every single organism.

Umwelt is the closed world of organism. The functional closer, or epistemic closer, is an important and principal feature of organisms, and of semiotic systems. This has been described by Maturana and Varela (1980) through the notion of autopoiesis.

Kull (1998), taking Uexküll's concept of Umwelt and Lotman's semiosphere, states that the "Semiosphere is the set of all interconnected Umwelts. Any two Umwelts, when communicating, are part of the same semiosphere." Such systems are biological, but they are not cultural in the way Lotman sets forth and as we will explore further in part 4 of this paper.

2 Magueys and Mexican cacti

Before moving on to Peircean and Lotmanean semiotics and inter-semiotic translation, it is important to explain the origin of Maguey cacti, their usefulness, their names in different indigenous languages, and how they constitute religious and identity symbols in Mexico.

Magueys belong to the Agavaceae family and first appeared in agriculture between 8,000 and 12,000 B.C. Mexico is one of the six or seven countries of origin, domestication, and diversification of plant species fundamental to human subsistence.

(Ramirez et al., 2001) The FAO (2006) reports that a little over 10% of plant species (128) were domesticated in Mexico. Many species are still harvested, after having been favored and cultivated in highly humanized environs. Mexico also has the greatest diversity of species; out of 205 species, 151 are endemic. The states richest in species are Oaxaca, Chihuahua, Sonora, Durango, and Jalisco.

The earliest codices mentioning these plants date from the 17th century, and document their cultural presence before the arrival of the Spanish in Mexico. Three important studies of the species utilized by the ancient Mexicans are known of, Fray Bernardino de Sahagun's *Florentine Codex (Códice Florentino)*, Francisco Hernandez's *Natural History of New Spain (Historia Natural de Nueva España)*, and the *Libellus de Medicinalibus Indorum Herbis*, originally written in the Nahuatl language and translated into Latin by Juan Badiano, also known as the *De la Cruz-Badiano Codex*. (Pico & Nuez, 2000)

In our ancestors' tongues, these plants were known as **metl** or **mexcamedl** in Nahuatl, as **tocamba** in Purepecha, and as **guada** in Otomi, their names being related with the benefits they provided. With the arrival of the Spanish, they would come to be known as maguey, a word they adopted from the Antilles in the 16th century. Agave, from the Greek word for "admirable" or "noble," eventually became their scientific name, coined in 1753 by the Swedish naturalist Carl von Linneo in his *Species Plantarum*.

These plants have been used for a wide variety of purposes, including as food, in the preparation of beverages, for their fibers, in the preparation of medicines, as materials for construction, and as symbols of Mexican religions and identities. They have become most famous for their use in culturally important beverages, *aguamiel (neutli)*, the fermented drink *pulque (octli)*, and later, the distilled mescals (mescal, tequila, and *bacanora*).

The agave cacti are used in a variety of ways, including the preparation of nutritive beverages, due to their high fructose content. They have glycemic index of 33%, according to Glycemic Index Laboratories in Toronto, Canada. They also contain fructo-oligosacharides, vitamins A, B, B2, and C, iron, niacin, phosphorus, and proteins. Another of their properties is that they reduce cholesterol levels (triglycerides) and

improve the metabolization of toxins. Their niacin content cleans, drains, and detoxifies veins and arteries. It also increases the absorption of calcium and magnesium, and therefore helps to prevent osteoporosis. A variety of drinks are prepared from the agave cacti, including *aguamiel* (agave nectar), sweet juice, syrup, pulque, agave honey, vinegar, liqueur, mescals, tequila, and *atole* (a sweet and thick beverage served hot).

They are also important in the preparation of foods and condiments for human consumption, such as white worms, red worms, worm salt, condiments for *barbacoa* (a roast lamb dish), Gualumbo guiso (a stew of agave flowers), different desserts, sweeteners, flavoring for breads and tamales, mixiote (spiced meat wrapped in a maguey film), egg dishes, leavening, tortillas, sweet mescal, and as an ingredient in some medicinal preparations.

From the maguey's leaves, the fibers are extracted to make thread, twine, burlap cloth for sacks, bags, belts, blankets, and other types of fabric.

Using the cacti's dried and hollowed flower stalks, leaves, or the entire plant for construction, beams, posts, pilings, fences, roofs, roof tiles, water channels, beehives, and bird cages are made.

Also used for general domestic items, the cacti's dried roots, leaves, spines, and fruits are utilized to produce soap, brushes, brooms, baskets, nails, needles and thread, containers, scouring pads, wedges, and fuel.

For livestock, the leaves, the flowers, the chaff and bagasse of the fruit, the juice, and the waste from pulque production are given to cows, pigs, and poultry as feed.

Lastly, magueys are used in urban spaces, and have served as symbols of identity in Mexico City, as well as for decorative purposes and as religious objects, both for the ancestral cultures, in their reverence to gods such as Mayaguel, the goddess of the maguey, and for Catholics, in decorating altars dedicated to the Virgin of Guadalupe.

3 Peircean semiotics and the maguey

Biosemiotics has returned to the theoretical foundations set by Charles Sanders Peirce to explain the communicative and informational phenomenon that exists among living beings. He defines a sign with the following definition:

A sign, or representamen, is something which stands to somebody for something in some respect or capacity. It addresses somebody, that is, creates in the mind of that person an equivalent sign, or perhaps a more developed sign. The sign which it creates, I call the interpretant of the first sign. The sign stands for something, its object. It stands for that object, not in all respects, but in reference to a sort of idea, which I have called the ground of the representamen. (Peirce. 2.228)

Thus, a peircean sign constitutes, in itself, a dynamic and continuous process, and is made up of three parts: a) a sign or representamen, b) an object, and c) an interpretant. The three are interrelated; between the representamen and the object, there is a relationship that resounds in the interpretant, such that the three are related.

In that way, the process of signification, or semiosis, is produced in the interconnection of the three elements:

- a) The sign, or representamen, is the maguey itself. It is the potentiality or the possibility, “that which can be.”
- b) The semiotic object is the object related to the representamen. It is the infinite number of possible derivatives of the maguey discovered by the person or interpreter in his or her experience with the plant.
- c) The interpretant is the meaning or interpretation of the representamen through its relationship with the semiotic object. Thus, both the representamen and the semiotic object are closely related or interconnected with the interpretant, in such a way that the sign is necessarily produced triadically.

Beginning with this division of signs, Peirce (1931) establishes a triadic interrelationship of three categories, firstness, secondness, and thirdness. These categories are ideas so general, that they can be understood as something similar to inclinations or tendencies towards thoughts are addressed to.

- a) Firstness: the mode of signification of what is, as and how it is; it is the maguey as it is, in its natural form without the mediation of the hand or mind

of the human being. This is the quality of the sign, or representamen. It is singular because there is nothing before it. It is simply a quality, with no connection with its surroundings. Its time is the present, the maguey at its origin, with nothing before it.

- b) Secondness: the mode of signification of what is, as and how it is, with respect to something else, although without reference to a third; it refers to a concrete fact. It is something that exists in the “here and now,” and refers to an event, something that has really occurred, such as the discovery of all the properties and uses of the maguey. Its time is the past.
- c) Thirdness: the mode of signification of what is, as and how it is, in conjunction with a second and third element – a representamen and an object – in interrelation with the first. It is also defined using three terms, mediation, transformation, and evolution. Thirdness instruments a transformation, in that its function is to translate-interpret one semiotic entity into another. The maguey plant, because of its properties and uses and its relationship with man, becomes the sacred plant of the ancient Mexicans and the goddess Mayaguel. Its time is the future.

In an attempt to identify the process by which the agaves’ meaning is produced in their complex interrelation – biological-natural-rural and human-cultural-urban – we have observed the following textual interconnections:

- a) Firstness: the agaves as natural-biological objects,
 - a1) the intrinsic interconnection and communication among the plant’s cells constituting the biological Umwelt-Semiosphere as a closed system the contains information;
- b) Secondness: the agaves as socio-cultural-biological objects – the cultural semiosphere,
 - b1) the interconnection between the internal and external nature of the agave and its simultaneous interconnection with the hand and mind of man, the interpreter;
- c) Thirdness: the agaves as religious objects – the laws of the biological-cultural Umwelt-semiosphere,
 - c1) the interconnection between firstness and secondness to produce symbolic meaning, allowing the general law that governs knowledge,

feeling, and action through the social convention of establishing the plant as sacred because of its intrinsic properties.

Figure 1. Shows the distribution of the sign, or representamen, the object, and the interpretant.

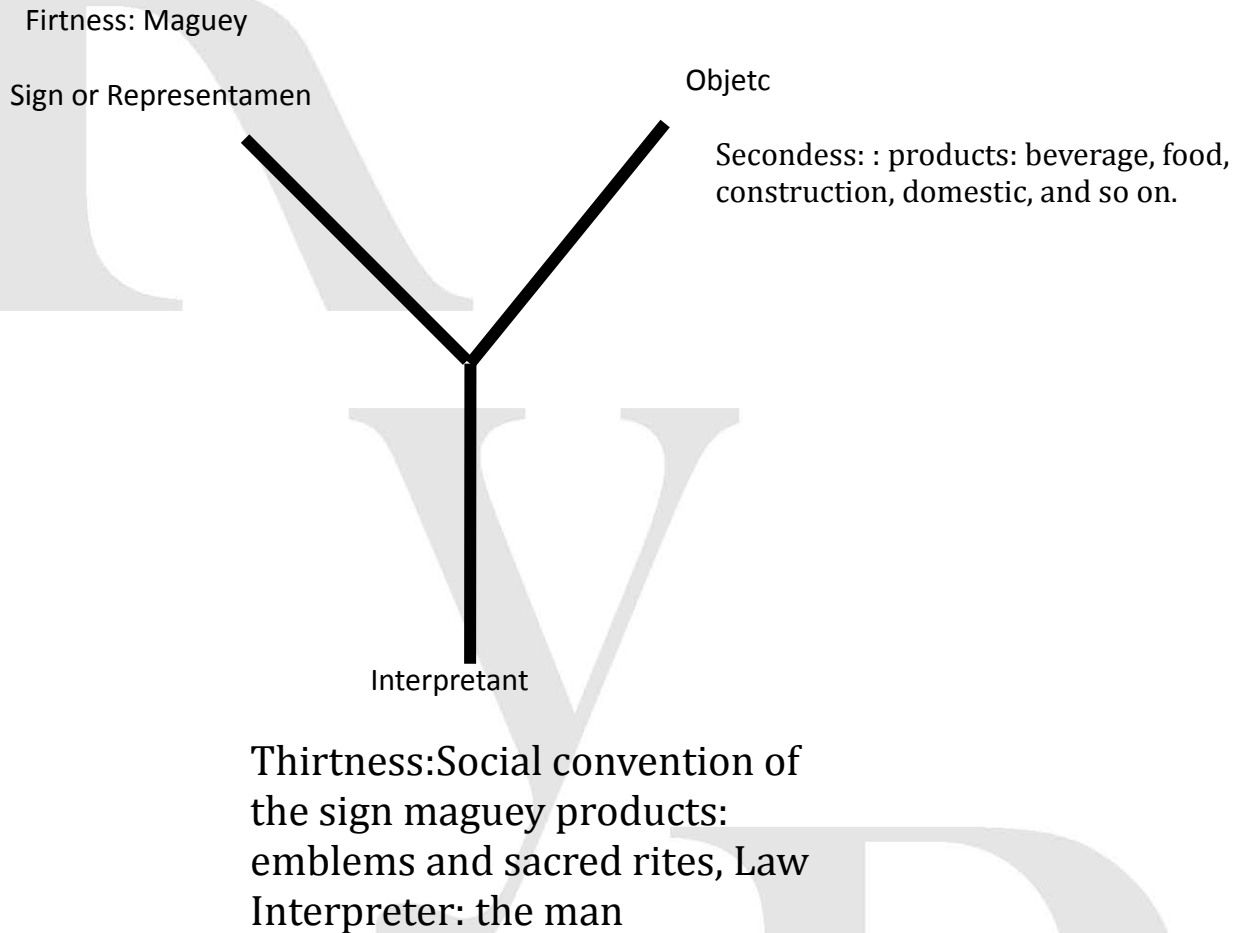


Figure 2. The following table synthesizes the characteristics of the triadic sign using the example of the agave or maguey plant.

<i>Firstness</i>	<i>Secondness</i>	<i>Thirdness</i>
A potentiality, a possibility	A concrete fact	General law that governs feeling and action
“That which can be” (CP: 7.538)	“An event, something that really occurs” (CP: 7.538)	Represents the general law that governs firstness (feeling) and secondness (action) (CP: 1.342)
The plant maguey Nature	The discovery of <i>aguamiel</i> and <i>pulque</i> and all the other maguey products Culture	Because of its natural attributes, the maguey represents the sacred plant that is venerated. Nature ⊃ Culture ⊃ Nature Recursiveness
Attribute	Experience	Law
Singular Sign as firstness is the first, with nothing before	Dual Relationship between the sign, or representamen, and the experience of the interpreter	Plural (triadic) Implicit relationship between the sign-object and the social conventions of the interpreter
Abduction (hypothesis) Inference: the maguey is beneficial to man	Induction Through experience, the interpreter induces that the products of the maguey are beneficial to man.	Deduction All the products of the maguey are beneficial to man.
Attribute	Reaction/individuality	Meditation
Present (the present and atemporal moment before the thought)	Past (what has been)	Future (what will be)
SIGN	OBJECT	INTERPRETANT
Icons	Indices	Symbols



4 The natural-cultural semiosphere of the agaves

Lotman coined the concept of semiosphere in analogy with Vernadski's concept of biosphere, defining it as the domain in which any sign system can function, the space in which communicative processes are carried out and new information is produced, *the semiotic space outside which the very existence of semiosis is impossible*.³ (Lotman, 1984: 22)

In that semiotic space, the sign and the subject-individual – or in Peirce's terms, the interpreter, the person who mediates between the sign or representamen and the object – interact, both of them being substantial elements of any semiotics, since without them, the semiosis or production of meaning cannot be produced. Therefore, the sign, for this author, is always located at the heart of a collectivity where information is interchanged.

The sign has the capacity to exercise replacement, and for a phenomenon to become a sign and a bearer of information, it must be part of a system where there is a relationship between a sign (2000: 15-16)⁴ and a non-sign.⁵

Kull and Hoffmeyer take Lotman's definition of the concept to define, in biological terms, the semiosphere that we identify as the biological semiosphere, with the same characteristics as Lotman's socio-cultural semiosphere. There is, then, an exchange of

information among living beings, cells, plants, and animals, and in that exchange, the information is communicated and transformed, although they never go beyond the biological world. That is why these authors hold the semiosphere to be “the set of all interconnected Umwelts. Any two Umwelts, when communicating, are part of the same semiosphere.” (Kull, 1998)

“The semiosphere, as a notion used by Hoffmeyer (who came to it independently), seems to have a slightly different meaning than the definition given above. Namely, his expressions (for instance, p. 59: “the semiosphere imposes limitations on the Umwelt of its resident populations in the sense that, to hold its own in the semiosphere, a population must occupy a ‘semiotic niche’”) seem to show that semiosphere is something which may be partially independent of the organisms' Umwelts. On the contrary, I think it is entirely created by the organisms' Umwelts. Organisms are themselves creating signs, which become the constituent parts of the semiosphere. This is not an adaptation to environment, but the creation of a new environment. I can see here the possibility for a more positive interpretation of Hoffmeyer's statement - namely, the concept of ecological niche as it is traditionally used in biology, can be essentially developed according to the semiotic understanding of the processes which are responsible for the building of Umwelt.” (Kull, 1998)

With the creation of the inter-discipline biosemiotics, a new concept has come into being, namely, the biological semiosphere in analogy with the socio-cultural semiosphere, the two of which share the same categories but have different objects of study. One is biological and autopoietic, dealing only with living beings (cells, animals, and plants), and the other is socio-cultural, dealing with man's relationship with nature and from which spring laws, such as myths, rituals, legends, and symbols regarding the maguery cacti.

5 Intersemiotic translation

In this final section, we look at how intersemiotic translation, from rural/biological to urban/socio-cultural/artistic or from the biological semiosphere to the socio-cultural semiosphere, comes about.

Another important concept to take into consideration in understanding intersemiotic translation is the text, which Lotman (1979: 82) defines as “[...] a complex mechanism with several codes which have the capacity to transform received messages and create

new ones; therefore it is a creator of information.” Text also has other characteristics, such as:

- a) it is a mechanism that preserves socio-cultural (and biological) memory – the exchange of biological information allows the plant to preserve its genetic memory, and from a socio-cultural point of view, memory is preserved in the ceremonies conducted for the extraction of the *aguamiel* and the preparation of *pulque*, as well as in the stories, legends, and codices;
- b) it is a creator of meaning – the biological text is a fabric of several codes of that plant’s genetic information, creating meaning in its internal nature (J. Hoffmeyer, 1996a: 96, in Kull, 1998: 344-371);
- c) it is heterogeneous, polyphonic and polyglot – the systems of biological and cultural signs dialogue intersemiotically with their environments, both in the biological-natural and in the socio-cultural-religious-economic;
- d) it supports the production and reproduction of the symbolic; and
- e) it sets the ground for cultural change.

These last two are characteristic only of the socio-cultural text of humans.

With regards to Peeter Torop’s understanding of intersemiotic translation, he makes reference to an “ordering of the ontological characteristics of the translation.” This means that the translation begins with a source text or origin text and establishes in turn a virtual taxonomic process of translation based on the general characteristics of the text and the communication. (Torop 2002: 13)

Thus, beginning with the maguey in its firstness, as a sign-representamen, the first intersemiotic translation occurs in the secondness-object in the moment the first sign enters into a relationship with a fact in the “here and now,” for example, when the base of the maguey is scraped so that the *aguamiel* can be extracted and later processed and fermented to produce *pulque*. The third intersemiotic translation occurs when the firstness-secondness pair is mediated by the thirdness-interpretant and its interpreter, such that with the discovery of the plant’s potential in its totality, it becomes sacred, leading to the symbolic production of the gods and goddesses of the maguey. Thirdness is where another intersemiotic translation and the semiotic process happen through social convention.

In verbally naming a natural text (Umwelt) such as the maguey plant, we are faced with an extra-textual intersemiotic translation (Torop, 2002: 13), as is the case when the plant is represented visually or in relation to the goddess Mayaguel and to men and women. The recursive relationship between the biological-natural text (Umwelt-biological semiosphere) and the socio-cultural-artistic text is also an extra-textual intersemiotic translation.

Throughout the Mexican capital city, large magueys can be found in parks and along streets as an emblem of Mexican identity, undoubtedly a part of the preservation of the Mexican cultural memory.

Lastly, inter- and trans-disciplinary study allows us to reflect on the phenomena integrally, to not only examine the behavior of living beings – cells, animals, and plants – in their biology, but also the interrelation, intrarelation, and interconnection the human living-beings establish in their own biology and in their socio-cultural existence, making anthropological work fundamental in this type of research.

In her essay “Worldview and observation of nature: the example of the Mesoamerican mountain cult,” Broda (1991) compares archeological and ethno-historical data with ethnographical data. The study examines how the initial observation of nature, as a practice rooted in agricultural necessity, led to the development of scientific knowledge in the areas of astronomy, architecture, medicine, and zoological botany, among others. That body of knowledge became deeply interwoven in the worldview, such that the experience of observing nature as part of an agricultural practice became a process that, over time, fed and vitalized an ordered conception of the world.

The comparisons Broda (2001) made were based on a premise of the continuation today of the fundamental traits of the Mesoamerican worldview through the permanence of similar material conditions of an existence particular to the rural Indians.

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² Seventh Conference of the Northic Association for Semiotic Studies Towards Cognitive Semiotics. A Semiotic perspective on cognition. A cognitive perspective on semiosis. Cognitive science and Semiotics.

³ Our italics.

⁴ The sign is seen as something conventional, created by human culture, whereas the thing is assigned a non-conventional character and a sensory reality that places it outside the limits of the world of social conventions.

⁵ A non-sign is that which is not accepted as a sign by the collective laws held by a certain community.