

A Play on Dimensions: Miniaturization and Fractals in Mesoamerican Ritual

DANIÈLE DEHOUE, *Laboratoire d'ethnologie et de sociologie comparative, CNRS-University of Paris X Nanterre, Maison René Ginouvès, 21 allée de l'Université F-92923, Nanterre, France. Email: Daniele.dehouve@gmail.com*

The use of small objects in ritual contexts has been observed in many civilizations and is usually considered from the perspective of miniaturization. This article aims to broaden this perspective and address the issue in terms of manipulation/modification of dimensions. Based on archaeological and ethnological evidence from Mesoamerica from the fifteenth century to the present, I lay the foundations for a typology of the referent: the person, object, action, or abstract idea to which a symbol refers. First, I examine the forms of miniaturization (with geomorphic and dual referents) and metaphoric miniaturization. I then consider the self-referential system provided by fractals, a system in which each shape is the referent of the pattern represented in the subsequent iteration.

Key words: Mesoamerica, play on dimensions, miniaturization, symbolic referents, fractals

The use of small objects in ritual contexts has been observed in many civilizations. Archaeological examples of these objects have been found, for example, in Greece and Egypt (Marangou 1992; Marchand and Baud 1996, cited in Gómez Gómez 2016; Perlès 2001; Smith 2004:224–27). In the New World, the Inuit have long fashioned miniaturized objects, easy to transport and perceived as having protective properties (Laugrand 2010). Although the abundant evidence from precolumbian Andean cultures has only recently begun to be studied (see Gómez Gómez 2016:484–87), Mesoamerican archaeology has already shed considerable light on small-scale objects used over the course of two thousand years of history (Gómez Gómez 2016).

The use of small-scale representation of entities and objects in ceremonies can be readily explained within the framework of a theory of ritual “performance,” such as that which has been posited based on proposals taken from Hubert and Mauss (1968 [1899]) and Hocart (1933). Following these authors, ritual can be defined as “a religious practice through which a group or an individual seeks to ward off evil and obtain prosperity.” All rituals have an objective, which is *life* in the broadest sense: ritual is *life-giving* (Hocart 1933:135). To achieve this objective, ritual uses a special type of language. As Tambiah (1968:175–76) pointed out, that language

Published online: October 17, 2016

Journal of Anthropological Research (Winter 2016). ©2016 by The University of New Mexico.

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combines words, acts, and ceremonial objects. The latter two means of expression—acts and objects—allow representation on a small scale of processes that take place in nature and life on a much larger scale.

Even this very broad definition is insufficient to account for the wide variety of empirical cases of miniaturization. The term “ritual miniaturization” has not been precisely defined. What is the threshold for the use of the term? Should it be reserved for non-functional objects, and should true miniatures be differentiated from functional objects such as small vessels? Archaeologists have raised these questions (Clayton 2009:141–55; Gómez Gómez 2016:11; Linné 2003:97) and have acknowledged the difficulty with setting criteria for a typology. Those classifications are generally based on the type of context (ritual or funerary) or nature of the “prototype” that is reproduced on a reduced scale (i.e., figurines, landscapes and edifices, or objects from daily life) (Marangou 1992:2). It therefore follows that they can only apply morphological criteria and not, for example, those based on the meaning of the reduction in scale. Furthermore, the notion of miniaturization is but one of numerous ways of playing with changes in scale. Varying the dimensions of the ceremonial objects within maximal and minimal limits enables a wide range of symbolic shades of meaning to be expressed. Accordingly, there is not just one manner of manipulating the change in dimensions during ritual acts, but many. For all the above reasons, this article seeks to provide elements of reflection in order to contribute to establishing a typology of those changes in dimension.

The notion of a referent is central in this undertaking. In fact, all ritual representations have a referent: a person, an object, an action, or an abstract idea to which a symbol refers, or what a symbol stands for. An object is thus miniaturized in terms of its referent, but this does not mean that its dimensions will necessarily be reduced relative to the human body. In fact, as Lévi-Strauss (1962:34) noted, “Again, the definitions must be agreed upon: the paintings of the Sistine Chapel, despite their imposing dimensions, are a reduced model since the theme they illustrate is the end of time. The same is true in the case of the cosmic symbolism of religious monuments.” And, as he added, “one can ask if the esthetic effect, for example, of a larger-than-life equestrian statue, stems from the fact that it enlarges a man to the size of a rock, or reduces a rock to the proportions of a man” (my translation). Thus, one would do well to consider that a dual set of comparisons defines the dimensional character of an object—that is, *the referent and the human body*. Each act of miniaturization reflects the tension between these two terms—since an object can be miniaturized while at the same time being gigantic—which allows numerous plays of meaning.

Furthermore, self-referential systems offer an additional possibility of playing on the change in scale: these systems are known as fractals. This term refers to geometric objects with specific properties, particularly the retention of patterns of shapes throughout changes in scale that tend to repeat themselves ad infinitum. In other words, a fractal system is not merely the duplication of a shape on a variable scale, but a system in which each shape is the referent of the pattern represented in the following iteration (Dehouve 2014b).

The setting in which I develop this reflection on typology is the Mesoamerican cultural area, both past and present. The prime examples used here are from the Aztecs, who occupied central Mexico in the fifteenth and sixteenth centuries (at the time of the Spanish conquest), known through archaeological evidence—such as the Great Temple of Tenochtitlan, located in what is now the historical center of Mexico City—and from pictographic documents and Nahuatl-language (Aztec) texts compiled by early missionaries. Other examples are from contemporary Indian populations, particularly the Tlapanecs or *me'phaa* from the Mexican state of Guerrero, whom I have studied (Dehouve 2007).

In both the archaeological and ethnological contexts, the objects whose dimensions are ritually manipulated are often—but not always—found in the context of “offerings” or “dedicatory caches.” I have proposed the term “ritual deposit” for this act and define it as follows: the ritual deposit is a figurative ritual, based on material and miniaturized representations, generally accompanied by the sacrifice of animals or humans and/or an offering of food. The origin of Mesoamerican ritual deposits is extremely ancient; the earliest evidence dates to perhaps 1600 BC in the Olmec area (Ortiz and Rodríguez 1999). Anthropologists have provided many descriptions of ritual deposits.¹ A ritual deposit is a story told with the help of ceremonial objects and words, and deciphering its meaning is a complex process (Dehouve 2007).

My purpose, therefore, will be to list—by the referent’s function—a set of procedures using plays on dimensions in Mesoamerica from the fifteenth century to the present. My aim is not to present an exhaustive bibliography, or an inventory of all instances, but to propose several categories of analysis. Note that I do not situate myself in the line of thought that seeks to connect certain forms of dimensional manipulation (such as miniaturization or fractals) to specific “ontologies” (such as animism or analogism) as proposed by Descola (2005, 2010). I contend that comparative anthropology should first make an analytic reflection—define types of ritual procedures, then seek them out in different contexts and among different peoples—without pigeonholing them in a preconceived typology (Dehouve 2014b, 2015).

Before going further into the reflection I propose to develop here, I summarize the terms that will enable us to treat changes in dimensions. *Dimensions* and *size* are the most general and descriptive terms used to speak of the extension of a ritual representation. In common language, the term *scale* is used in this same sense, but in academic language *scaling* is more precise and designates the relationship between two measures. In cartography it describes the relationship between a real distance, measured in terrestrial space, and its representation in a map. Applied to ritual, it refers to the ratio of reduction or amplification of an object or a real graphic representation (i.e., the referent). The term *miniaturization* refers to the fact that a referent is represented by something that is smaller than its actual size. It is distinguished from the *manipulation of dimensions*, which refers to a spectrum of procedures to change the size. In any case, the recognition of these procedures is inevitably through the identification of the *referent*, which could be of a different nature.

THE GEOMORPHIC REFERENTS

Ritual representations, by definition, stand for a referent. The first class of referent to be considered here is of the “geomorphic” type—that belonging to our physical surroundings: the landscape or some of its particular features, the earth, the heavenly bodies, and the universe.

The Landscape Referent

In the 1990s Johanna Broda developed the notion of a ritual landscape and gathered evidence for the existence of models carved in stone that miniaturize a landscape (Broda 1997a, 1997b, 2015). These models are typical of the Aztec period in the Valley of Mexico (Zimbrón 2010). Their main motifs are terraces, pyramidal structures, pools, and canals carved in miniature in large, otherwise unmodified rocks. According to her hypotheses (Broda 1997b:54–55), they do not represent architectural models or regional maps. Instead, they are cosmological models relating the movement of the sun to the ascending steps, or they served to make water flow down during cult rituals to the mountains and the rain.

Modern models of the landscape have been observed among several groups in contemporary Mesoamerica. For example, the ceremonial representation of the arrival of the rain has been documented among the Zapotecs of Yalalag (Fuente 1949:303–5, cited in López Luján 2006 [I]:234). During the night the sorcerers visit a spring near the town. Following a series of offerings, they construct a small dam, and on its edge they place stones and twigs representing houses, animals, and trees. Next, they describe the natural phenomena that precede the rain, as if they were experiencing them. They then break the dam and pour water from a gourd, exclaiming: “The rain is coming!” López Luján (2006 [I]:234) has shown that during the Postclassic in the Templo Mayor, placement of “Tlaloc vessels” shaped in the form of the face of the rain god Tlaloc in the upper layer of some offerings as if they were pouring water was based on a similar symbolism. The ritual staging to propitiate the hunt among the Huastec of northern Veracruz is another example. Prior to going out to hunt deer, the hunter will say prayers and offer food and alcohol to the “owner of the animals.” Next, he constructs a miniaturized pen fencing off a deer skull and makes an opening in it to show that the “owner” will allow one of his animals to exit and be turned over to the hunter (Alcorn 1984:88).

Several classes of miniaturized objects aimed at assisting natural powers to act have been mentioned in other culture areas, such as the miniature pyramids fashioned by the contemporary Huichol Indians. A pyramid measuring 14 cm high was collected in 1907 by the German ethnologist Konrad Preuss. It is “an object offered to the Sun Father as a staircase for his ascent to the heavens. The miniature is a replica of the heavens which in Mesoamerica is not conceived as a dome but rather as a pyramid with stairs. The sun ascends to the heavens on one of the sides and descends on the other” (Valdovinos and Neurath 2007:50–51, my translation) (Figure 1a). Among the Tlapanec Indians, at the winter solstice, ritual specialists ascend to the summit of one of the mountains



Figure 1. Ritual objects associated with the sun: (a) wooden pyramid in Te'akata, Santa Catarina Cuexcomatlán, Jalisco (drawing by the author after Valdovinos and Neurath 2007:51); (b) Tlapanec solar representation, municipality of Acatepec, Guerrero (photo by the author).

from which the sunrise and other astronomical phenomena can be observed. They use a “racquet” fashioned from a cactus leaf decorated with twelve marigold (*Tagetes erecta*) flowers representing rays (Figure 1b) to symbolize the sun and—thereby—the coming year. The supplicants pray for the lives of their fellow townspeople for the new year. These cases show how different ceremonial objects were (and continue to be) used to represent a natural event and its consequences for human life.

The Cosmic Referent

As the German philosopher Hans Blumenberg (2003) has shown, all societies are faced with the need to name and represent the cosmic whole, even though it is too complex to be conceptually apprehended. Blumenberg notes that the representation of this totality, unattainable through conceptual or scientific means, is of a metaphorical order. To designate metaphors with cosmic referents the philosopher proposes the term “absolute metaphor.” Accordingly, metaphors of this type are those that “provide structure to a world; represent the always non-experiential, the always ungraspable whole of reality” (Blumenberg 2003:63, my translation).

The absolute metaphor to which Mesoamerican peoples recurred to represent the world is known as the cosmogram. The cosmic dimension is generally expressed symbolically under the geometric form of the square or quincunx, and/or the arithmetical forms of the numbers 4 or 5. Associated with the calendar and myths, drawn since prehispanic times in codices or in archaeological contexts (León-Portilla 1992; López Luján 2006 [I]:235), the cosmogram, whose origin is based on observations of sunrise and sunset on the horizon, has served as the framework to express countless notions ranging from different periods of time to astronomical or meteorological phenomena (Dehouve 2011, 2014c: chap. V). Thus, the first frame of the *Codex Fejerváry-Mayer* (in León-Portilla 1992) (Figure 2), produced prior to the Spanish conquest for divinatory purposes, expresses several different calendars in the drawing of the cosmic square: it distributes the 260 days of the divinatory calendar between four trapezia and four oblong figures. In addition, the circles placed at the corners represent the four divinatory signs that serve to begin the year (i.e., four successive years). Thus, this square represents several different durations.²

In addition to the divinatory context, the symbolic shape of the cosmogram is widely found in many types of ritual. As stated above, one of the most typical rituals of the Mesoamerican cultural area is the “ritual deposit.” It consists of placing on the ground in an ordered fashion several ceremonial objects accompanied by human and/or animal remains; in these deposits, the presence of the “arithmetic or geometric four” is a consistent element.

One example of the geometric four can be observed in the stone boxes holding the deposits in the Great Temple of México-Tenochtitlán made at the end of the fifteenth and beginning of the sixteenth centuries (Figure 3a). In contemporary Tlapanec ritual deposits, the arithmetic four is represented in the form

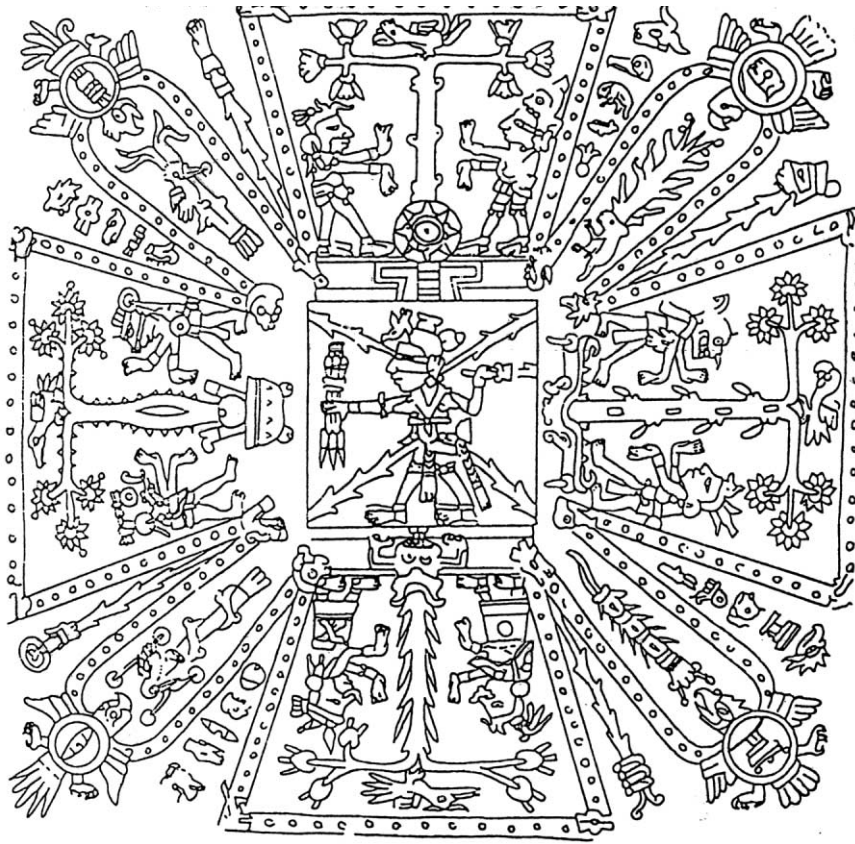


Figure 2. Calendar cosmogram from the *Codex Fejerváry-Mayer* (León-Portilla 1992: pl. 1; drawing by C. Vié, from Dehouve and Vié-Wohrer 2008:240).

of four large pieces of copal bark (Figure 3b). The same pattern is repeated in gestures, and processions frequently make four turns and ritual specialists cense four times with their censers (see Dehouve 2011, 2014c: chap. V for a more detailed explanation).

After examining representations with a geomorphic referent—whether the landscape or the cosmos—we can conclude that the world is referenced by means of a more or less abstract symbolic form. We have seen representations of different elements of the landscape: the figure of the sun symbolizing the coming year, the figuration of an open enclosure to prepare for a successful hunt, the jar pouring water to describe the rain, the steps of a pyramid referring to the daily path of the sun. For its part, the cosmogram is the symbolic form representing the otherwise unreproducible cosmic totality. The upshot of all of this is that what was important for the ritual actors was to replicate a stereotyped shape.



Figure 3. The ritual cosmogram: (a) representation of the geometric cosmogram in Offering 124 (courtesy Templo Mayor Project); (b) representation of the arithmetic cosmogram in a Tlapanec ritual deposit, municipality of Acatepec, Guerrero (photo by the author).

Since the referent in all the cases considered here is the world or a portion of the universe, it can be said that a miniaturization came into play. This is a distinct concept from that of “miniature” since among the figures we have examined several have dimensions that could seem gigantic to us. They are not “miniatures” but are instead “miniaturized” in terms of what is being represented when the referent is the world surrounding us. Miniaturization was exercised within a range of variation between upper and lower limits whose base or standard reference was the size of the human body. In other words, all the ritual representations examined remained within reach of the human senses.

What, then, was the purpose of the variation in size? Its utility is apparent in the case of gigantism, which added a supplementary symbolic meaning to the one contained in the stereotyped form. In fact, “quantitative symbolism” connotes wealth, opulence, old age, and fertility. This procedure consists of designating opulence by means of a large number or a considerable length to advance ritual efficacy (Dehouve 2014c:219–20). An example of gigantism among the Aztecs was a tree raised in honor of Fire in the Xocotlhuetzli feast: it measured 25 *brazas*—nearly 42 m (FC II:112,³ in Dehouve 2014a). Thus, it was the type of ritual that in the final analysis determined the dimension of the representations with a geomorphic referent.

THE DUAL REFERENT OF THE GODS

Let us now consider a case in which the referent (the thing for which the ritual representation stands) was a god. The deities were ideal constructions and related a set of immaterial notions to an anthropomorphic representation. What was important was the type of symbolic ornaments attiring the human form since they identified the god being represented. As the gods incarnate a notion in a human body, they become by definition bearers of a dual referent.

In certain cases, the two referents were man and the cosmos. The paradigmatic case of a cosmic deity is that of the Earth god, known in Nahuatl as Tlaltecuhltli (Lord [Lady] of the Earth). His shape is that of an anthropomorphous monster in the form of a square whose corners are indicated by four claws, in a squatting “toad” or childbirth position with legs open. The claws connote ideas of destruction, and the childbirth refers to creation (Mikulska Dabrowska 2008:162). This deity and its representation have been identified by Matos Moctezuma (1997), and here I draw on his typology: Group A (male anthropomorphic figure), Group B (female anthropomorphic figure), Group C (female zoomorphic figure), and Group D (figures with the face of Tlaloc).

In the examples of sculpture and engravings presented here (Figure 4), the dimensions of the Earth god widely vary. The largest specimen known to date is the Tlaltecuhltli of the Great Temple in Mexico-Tenochtitlán (an anthropomorphic female figure of Group B) measuring 4.17 m long and 3.62 m wide (Figure 4a).⁴ Following in descending order are the female Tlaltecuhltli at the National Museum of Anthropology (Group B), measuring 106 cm (Figure 4b); the Hotel Majestic Tlaltecuhltli con-

served at the National Museum of Anthropology (Group C), measuring 87 by 57 cm (Figure 4c); the male Tlaltecuhltli at the Great Temple Museum (Group A), measuring 55 by 65.5 cm (Figure 4d); and the zoomorphic Tlaltecuhltli sculpted on the Hackmack Box in Hamburg (Group C), which is 33 by 21 cm (Figure 4e).

The image of the Earth Monster was thus built in relationship to its first referent, the world it represented as a cosmogram, and to its second referent, the human body it possessed as an anthropomorphic construction. The deity was at the same time somehow both the World and Human, since all gods possess a human form. However, the dimensions of the divine body ranged widely, between 33 cm and 4.17 m long.

Although less clearly, other gods incarnated natural forces, such as the mountains, the water, and the wind. One of the avatars of the god Quetzalcoatl (the Feathered Serpent) was Ehecatl, the Wind god, with its characteristic ornaments—in particular, different types of shells. This deity could be depicted either with the dimensions of the human body (Figure 5a) or much smaller: in one of the ritual deposits of the Great Temple of Mexico City from the Postclassic period, flint knives attired as gods have been found. Among them is a knife 31 cm long (Figure 5b) with an oblong shape suggesting the human body, covered with ornaments similar to the god in Figure 5a, representing the same entity—Quetzalcoatl Ehecatl—in a smaller size. Comparing the two representatives shows that it was the symbolic ornaments that identified a god, regardless of the dimensions of its representation. Taking into account the two figures of the god presented here, these dimensions ranged from 31 cm to the height of an average man.

In one case the immaterial ideas connoted by the deity referred exclusively to the human body. This was the case of Death, represented by its god, Mictlantecuhltli. Death is effectively first of all that of Man, and its iconography refers to the cadaver. The image of the god contained several symbols pertaining to him, such as a tongue sticking out of his mouth, and claws. The figure shown here is depicted as two to three times the height of the man atop the ladder who is fixing his headdress. (Figure 5c).

Representations of the gods must have been frequent in the ritual deposits: in the Great Temple of Tenochtitlan, archaeologists have found numerous flint knives such as that shown in Figure 5b.

In all respects, the characteristics of the type including the human body referent are fairly close to those with a geomorphic referent: their meaning is contained in the symbolic form, and variations in size do not alter their semantics. The Tlaltecuhltli and the gods did not change identity when their dimensions went from several meters to several centimeters. The variation in size did not affect the semantics of the shape. A sole message was transmitted, regardless of the dimensions of the representation. In this regard, the prehispanic gods examined here recall the use of the cross among Catholics: it can be in dimensions large enough to be erected at the top of a church or a hill, or it can measure only a few centimeters to be worn around the neck of the believer. Its meaning is the same in both cases. The same can be stated with regard to figures of Christ, the saints, and the Virgin, which are all represented at different scales.

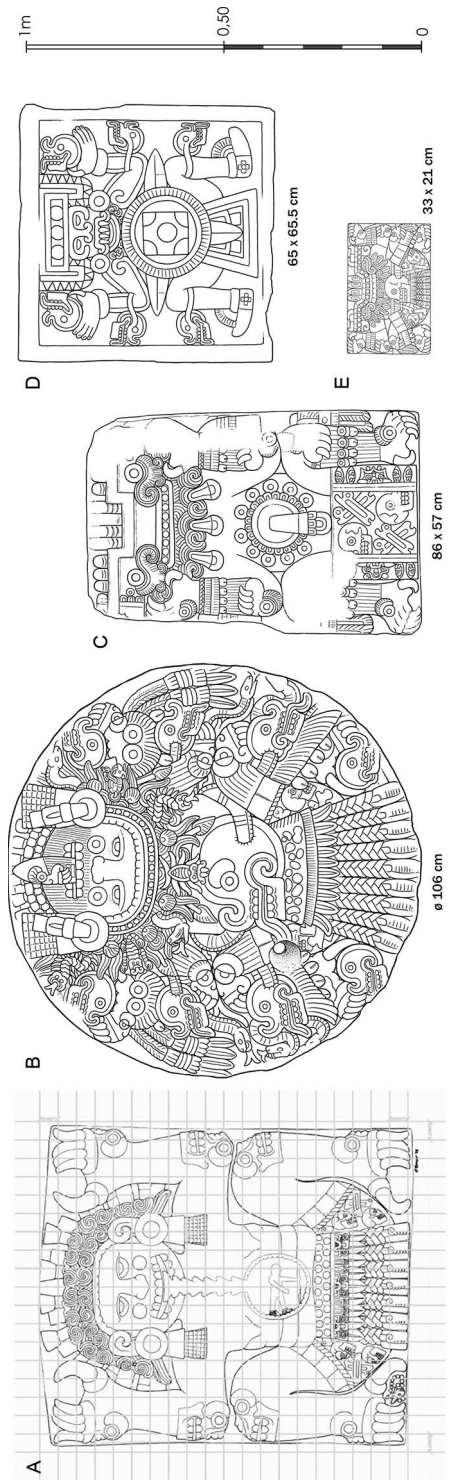


Figure 4. A cosmogram deity, the Tlaltecuhltli Earth: (a) the female Tlaltecuhltli from the Great Temple (courtesy Templo Mayor Project); (b) the female Tlaltecuhltli from the National Museum of Anthropology; (c) the Hotel Majestic Tlaltecuhltli, National Museum of Anthropology; (d) the male Tlaltecuhltli from the Great Temple Museum; and (e) the zoomorphic Tlaltecuhltli from the Hackmack Box, Hamburg Museum (b, c, d, e: drawings by Nicolas Latsanopoulos).

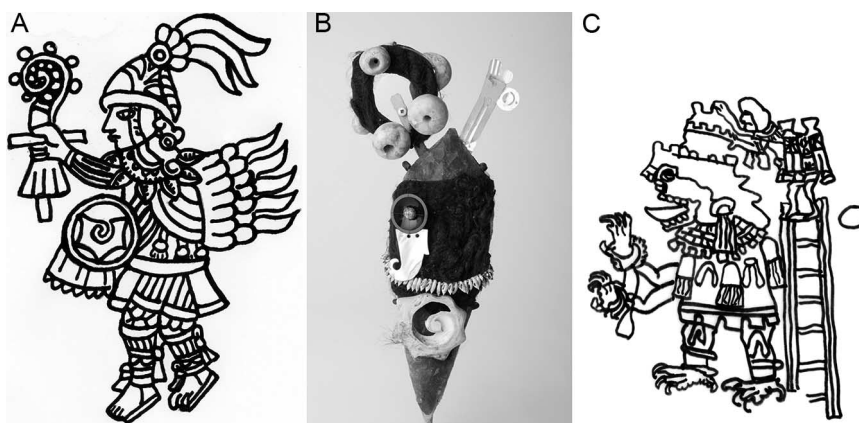


Figure 5. Anthropomorphic forms of different sizes: (a) Quetzalcoatl, *Primeros Memoriales* (León-Portilla 1958: fol. 261 v); (b) flint knife with the attire of Quetzalcoatl-Ehecatl, 31 × 14 × 7.5 cm, Offering 125, Great Temple (courtesy Templo Mayor Project). (c) Mictlantecuhtli, *Codex Magliabechiano* (Anders 1970: pl. 88r) (a, c: drawings by the author).

The size of the representation could, however, add to the symbolic meaning, especially in the case of gigantism, such as the figure of Christ the Redeemer above Rio de Janeiro. Surely, the Aztecs followed this type of procedure when they sculpted the Great Temple Tlaltecuhli. The same occurred in the representation of the destructive force of Huitzilopochtli in the form of a fire serpent made of paper and feathers that descended the steps of the pyramid during the Panquetzaliztli festivities. Since its purpose was to embody its power for warfare and cause fear, its paper tail measured two or three *brazas* in length (between 3.34 and 5 m; *FC* II:147, in Dehouve, 2014c:268–69). But the symbolic meaning of the fire serpent, its role in the identification of the god Huitzilopochtli, so to speak, did not depend on the size of its representation. Representations were always larger or smaller than the human body but within certain limits. What ultimately determined the size of the symbolic form was the type of ritual in which it was used. This contrasts with the case discussed next.

METAPHORIC MINIATURIZATION

A particular miniaturization was based on a special type of referent defined by the ratio between the height of a child and that of an adult. The representations made with this intent were diminutive not for the sole convenience of the ritual, but for the purpose of transmitting a message related to childhood and its metaphoric connotations.

The Child Rain Gods

The ritual association among the rain gods, children, and miniatures is known to be of great antiquity in Mesoamerica. The ritual deposits at El Manatí (Coatzacoalcos,

Veracruz) were made beginning in 1600 BC to control rainfall, and the ceremonial objects excavated there may have been for the infant helpers of the rain gods (Ortiz and Rodríguez 1999:251). We can be certain of the association between fertility and childhood beginning with the Classic period (AD 200). Among the many examples are those published by Domenici (2013) on the find at Cueva del Lazo (Ocozocoautla, Chiapas) of eleven children buried or sacrificed in association with a large number of fertility-related objects. Furthermore, Broda (1971, 2001) has shown for the Postclassic that children sacrificed to Tlaloc (the god of rain and mountains) were identified with the deity's helpers, the *tlaloqueh*, conceived as infants, who were in charge of carrying the clouds and pouring the water. The ritual deposits found in archaeological sites located on mountains frequently contain many miniaturized objects equated with toys. These finds have their counterpart in the sixteenth-century texts: according to Sahagún's informants, in the annual XVI Atemoztli feast, miniscule tamales were prepared to offer to the images of the mountains. "And their *tamalli* were extremely small, extremely miniscule, each with a small width, a very small width; they deposited them in tiny wooden vessels, together with their very small sauce bowls, and the tiny clay bowls were filled with a minimal amount of chocolate" (FC II:152, my translation; see also Román Berrellaza 2010 and Díaz Barriga 2012). An extensive body of literature amply demonstrates the persistence of the association between the rain deities and children (e.g., see Lorente Fernández 2013:386, n. 39 for towns in Morelos and the Sierra Norte de Puebla). The representations of the rain deities are usually small, such as the prehispanic type stones adored in a Tlapanec community (Figure 6). Because the rain gods are infants, they must receive toys and tiny vessels, of the type used by human infants (Joyce 2000). In Morelos, the "winds" are children, which explains why the entire ritual deposit consists of toys purchased in nearby markets, and why the four corners of the cosmogram are guarded by plastic soldiers (Juárez Becerril 2013:348). In the Sierra de Texcoco, the irrigation system is thought to be inhabited by *abuaques*, infant figures under the control of "Queen Xóchitl." The ritual deposits recreate this world of children with figures representing people and objects of their worlds: policemen, soldiers, little nuns, a queen, toy cars, miniature figures of domestic animals, diminutive dishes. All of these miniatures are deposited in the water prior to offering them seeds and fruits (Lorente Fernández 2013:386).

Why are the gods of fertility conceived of as children? Researchers generally appeal to the Mesoamerican "cosmovision." In their view, the "cold" and "water" deities dwell in the mountains and hills, which contain a "storehouse of fertility." Infants of a tender age, conceived as "cold" beings and metaphorically associated with green corn and "unripe," "green," "sprouting" vegetation, would thus represent offerings fitting for the deities of water and the mountains (Domenici 2013, 2014).

This symbolic explanation is current among researchers and is in agreement with what I propose. I suggest that the association of children with rain and vegetation lies chiefly in a cyclical conception: the first rains and first fruits of crops mark the



Figure 6. The miniaturized rain gods among the Tlapanecs, Zapotitlán Tablas, Guerrero (photo by the author).

beginning of the plant cycle, just as infancy is the beginning of the human life cycle. This explains why the rain gods are not the only deities represented as children.

The Other Child Gods

Other gods (or supernatural beings) are also conceived of as children. Archaeologists at the Great Temple of Mexico Tenochtitlan found in Offering 111 the remains of a sacrificed child in the characteristic attire of the patron and war god Huitzilopochtli (López Luján et al. 2010). Researchers were initially surprised since it was thought that the only child sacrifices were in honor of the rain gods. However, a search in the ethnohistorical sources revealed that several child sacrifices frequently preceded war (López Luján et al. 2010:383). In my opinion, this shows that a child Huitzilopochtli was the object of a sacrifice at the start of a war cycle. It can be further argued that the feast of Huitzilopochtli was celebrated on the winter solstice when the short days symbolized the beginning of the war cycle and the solar year.

Another clear case of the same metaphoric construction is the Tlapanec command staffs I have observed in the municipality of Acatepec, Guerrero, Mexico. At the beginning of the year, when the new authorities assume office, investiture ceremonies are carried out, one of which is devoted to the command staffs. Called “children,” the staffs receive small fragments of corn and chicken in tiny vessels fashioned from boiled corn—in other words, tender food in miniaturized vessels. In another town in the same municipality, the ritual deposit made on behalf of the new authorities consists of small wooden sticks bound together to represent stools

(Figure 7) and an offering of miniscule tamales. Furthermore, the animals sacrificed in this deposit should be young, less than a year old in the case of the cat. In effect, power and its manifestations—command staffs and seats (stools)—are conceived of as infants in January because the authorities are just taking office at the beginning of a new cycle of government. Consequently, power is still clean and weak, like a child, prior to growing and becoming strong and corrupted with the passage of time.

Among the Huichols, nearly all the gods are considered to be children. These gods are small but clever, as opposed to the giants, who are huge but clumsy. The former are innocent, whereas the latter are evil and perverted. For this reason the objects offered are miniatures representing human desires and the objectives of the ritual: rifles and bows to prepare for the hunt, sandals to prepare for a journey, and cows and deer to obtain animals. These objects are, at the same time, toys given to the child gods so that they can play and have fun with them (Neurath 2013:577). If we apply to this case my hypothesis that the infant symbolizes the beginning of the cycle, we might think that each human activity is conceived of as a cycle that begins with the ritual enacted for the corresponding child god: the hunt, a journey, and raising livestock are all cycles that begin with the offering of a miniaturized symbol. This case recalls the perspective devel-

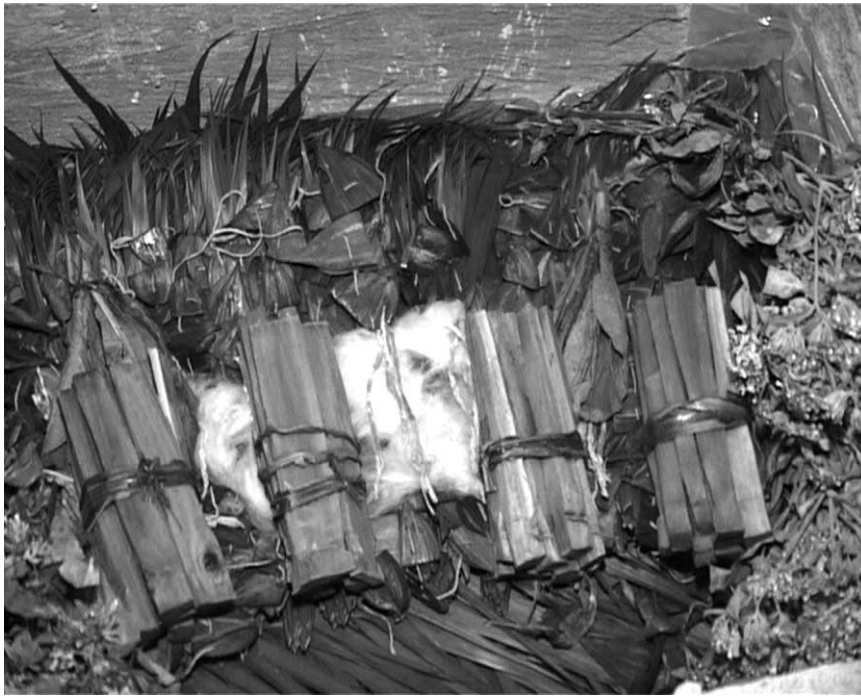


Figure 7. Miniatures for young beings. Miniaturized stools (represented by small bundles of sticks) for the new Tlapanec authorities placed in a ritual deposit (photo by the author).

oped by Pitrou (2012) in a contemporary Indian region of Mexico, according to which human activities are conducted under an arrangement of co-activity with nonhumans.

We have seen that the main axis of ritual is a representation in accordance with the standard of the human body. Since the main corporeal difference in humans is the size difference between adults and children, the notion of childhood is easily represented by means of specific dimensions, and this explains the metaphoric play with infancy as new, pure, innocent, fertile, chiefly concerning the start of the solar, rain, and social cycles.

Other Metaphorical Uses

Smallness could be the bearer of other metaphoric meanings, such as that collected by the ethnologist Alain Ichon among the contemporary Totonacs, with regard to a pot buried next to the umbilical cord of the newborn in the birth ritual: “it was assumed that the appetite of the grownup child would be proportionate to the pot’s dimensions: the use of a large vessel would turn him into a gluttonous eater” (Ichon 1969:285, quoted in Gómez Gómez 2016:536, my translation). On the other hand, according to Gómez Gómez (2016:613), the custom of placing miniatures in a funerary context could be explained in part by the beliefs concerning the dead: their “souls” would have been smaller than that of a living being, which would explain why miniaturized everyday objects accompanied the body. In all cases, the metaphoric miniaturization can be recognized by the fact that its dimensions are necessarily small, in contrast to miniaturizations with a geomorphic and dual referent, which are expressed in a range of dimensions, going from the miniscule to the gigantic without affecting the meaning of the representation.

THE SELF-REFERENTIAL OR FRACTAL SYSTEM

One final possibility of manipulating the scale is provided by fractals, a notion introduced in the 1960s by the Franco-American mathematician Benoît Mandelbrot to designate sets with specific geometric properties. The term is a neologism stemming from the Latin *fractus* (“that which is fragmented into pieces”), from the verb *frangere*, “break” or “fracture.” These patterns are distinguished from those of Euclidian geometry, which are straight lines and flat surfaces, circles and spheres, triangles and cones. Natural shapes, in effect, are more complex. As Mandelbrot once said, clouds are not spheres, mountains are not cones, and lightning does not follow a straight line.

To arrive at a more precise definition of fractals, the process of how they are obtained must be detailed. In the case of a fractal by iteration, a graphic object is transformed by adding an element of complexity. Then the same transformation is applied to the new object just obtained, which increases its complexity . . . and this process of iteration is reproduced at ever-diminishing scales. A classic example of fractals by iteration is Koch’s curve, which is produced as follows: initially—in other words, at iteration 0—we have an “initiator” (initial state), a segment of straight line *L* (Figure 8). In the first iteration this segment is replaced by a broken line, consisting of four segments of length $L/3$, which is called the *starting shape* or *seed shape*. In the second iteration, each of the

four segments is replaced by the seed shape so that each new segment measures $L/9$. At the end of each stage the resulting shape or *output* is brought back as the starting point of the next stage (*input*), a procedure known as *recursion*. In the third iteration, the replacement of each segment continues through a reduced value of the seed shape, producing an increasingly complex pattern of shapes ad infinitum. Accordingly, in recursion by iteration, “there is only one transformation process, but each time the process creates an *output*, it uses this result as the *input* for the next iteration” (Eglash 1999:110).

Eglash (1999:17–18) recognized the existence of fractals based on five criteria:

1. *Recursion*, since fractals are generated through a circular process—a *feedback* or *loop* in which the *output* of one level becomes the *input* for the following level.
2. *Scaling* means that fractals have the same configuration at different scales, within a particular field. Note that fractal theory uses a very precise definition of “scaling” which is different from that used in geography. In fractal theory the term “scaling” applies to the different successive iterations.
3. *Self-similarity* through change of scale.
4. *Infinity*. A fractal such as Koch’s curve is considered infinitely self-similar, but in reality no natural fractal possesses an infinite number of scales.
5. The *fractional (or fractal) dimension* is quantified not with integers but with fractions of whole numbers.

In the field of myth and ritual, the notion of fractals allows us to construct several symbolisms based not solely on the form, but on the movement of the form toward infinity. These topics, however, are still too new for anthropology to have responded to the question of whether systems with an external referent (called miniaturization here) and the self-referential systems (fractals) are represented in all culture areas and, particularly, in Mesoamerica.

In my own work, I have designated as “fractal type” representations a few pre-columbian episodes of myth and ritual in which the four corners of the cosmogram are each replicated once (Dehouve 2014c:134) (Figure 9). We know that the cosmogram represents the quadrants of the universe. Each in turn is duplicated four times. This occurs with the 400 astral deities known as the *mimixcoâ* (“cloud serpents”) associated with North. The 400 human beings associated with them were bearers of the five colors associated with the corners of the cosmogram—yellow, black, white, blue, and red, according to the *Historia de los mexicanos por sus pinturas*.⁵ This, in turn, led Thompson (1934:220) to assert that “each direction could be subdivided into North, West, South, East and the Middle” (Dehouve 2014c:134). In the same vein, the five *huitznabuas*, astral deities associated with South, were painted black, olive green, yellow, red, and brown in plates 47 and 48 of the *Codex Borgia*.⁶ This subdivision in a fractal form also characterized the *macuiltonallêquê* and the

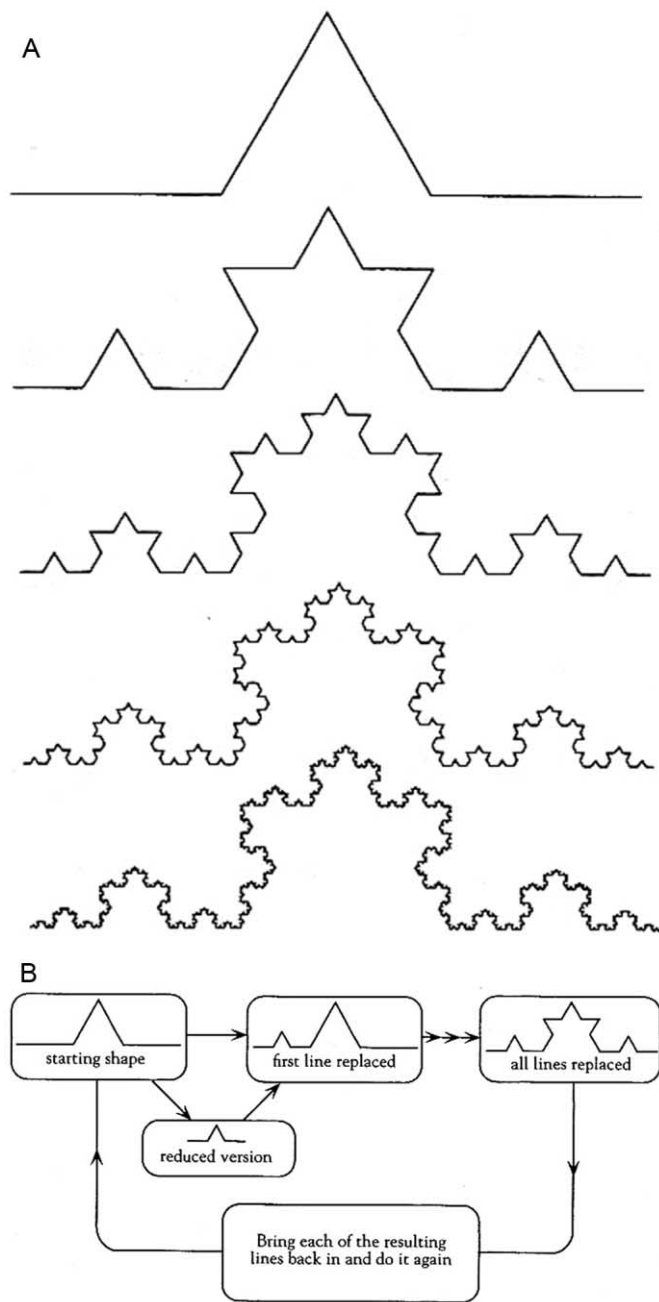


Figure 8. Fractal by iteration: Koch's curve (based on Eglash 1999:10, Figure 1.2; drawings by the author): (a) Koch's curve; (b) recursion or feedback.

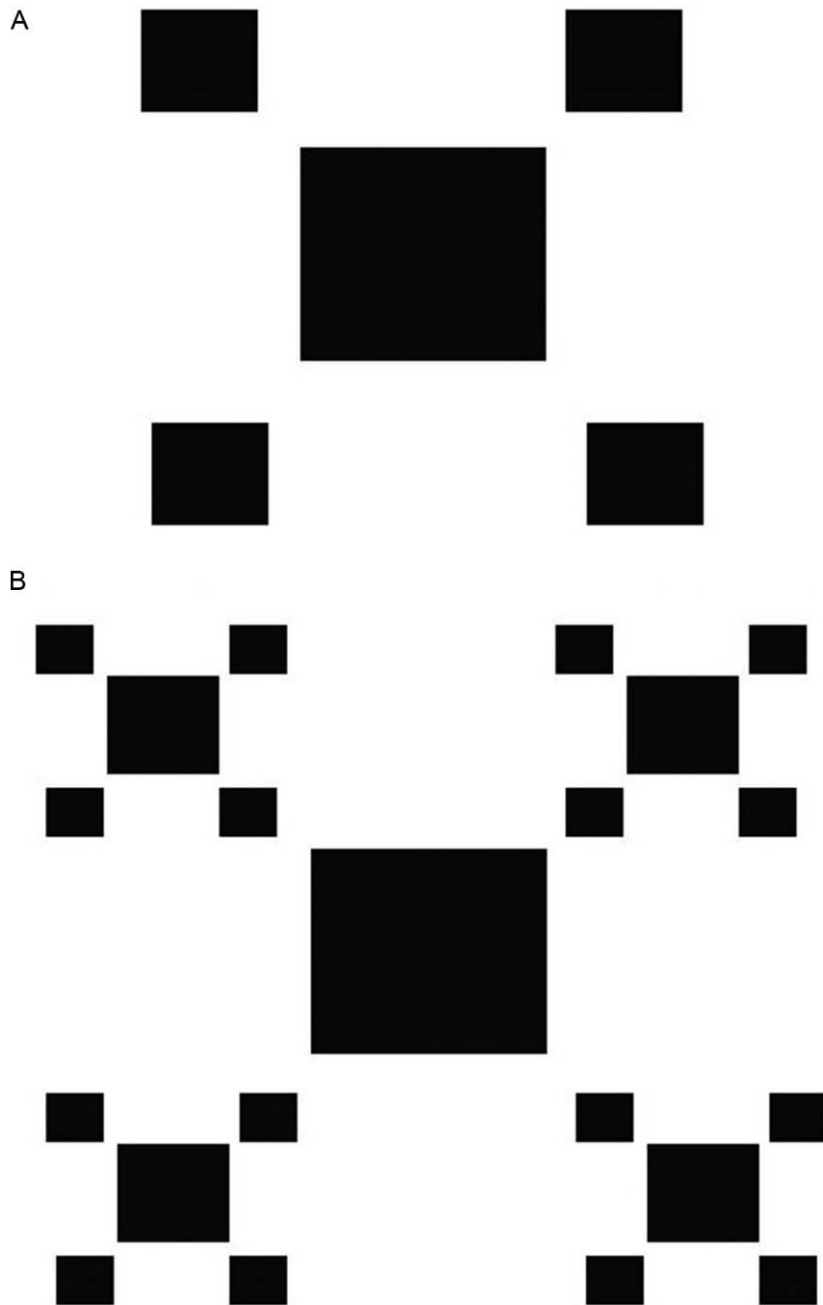


Figure 9. Replication of the cosmogram: (a) the center and the four corners; (b) the center and the four corners reiterated (drawing by the author).

cihuateteô. The former were associated with North and the latter with West. The *macuiltonallèquê* of the South and the *cihuateteô* of the West were in turn subdivided into entities bearing five (*Codex Borgia*, 49B–53B) spatially oriented colors (*Codex Aubin*, p. 20).⁷

Similarly, a ritual dedicated to the four corners of the world followed a replica in fractal form: in an Aztec ceremony the merchants departing on an expedition cut strips of paper in multiples of four, dampened them in blood drawn from their tongue or ears, and presented them four times in several directions, among them the cardinal points of the universe (*HG IX* [3]:494,⁸ in Dehouve, 2014c:264). Thus, instead of presenting the strips once to each of the four cardinal points, they offered them four times to each of the four directions. I have designated this repetition as of the “fractal type,” although it must be admitted that the number of replications of the cosmogram was always limited to two or three iterations and that their purpose was simply that of reinforcing the symbolic efficacy of the cosmogram.

Generally speaking, fractal plastic forms are not widespread in Mesoamerica. It is much easier to cite evidence of plays on Euclidian forms (circles, squares, diamonds) and symmetrical forms that symbolically “miniaturize” an external referent. However, one can look for cases of fractal forms in archaeological contexts. Thus, an offering excavated in the Preclassic Maya site in Cival, Guatemala, though not fractal in the strictest of terms, shows an interesting set of concentric quincunxes with five pottery vessels arranged in a quincunx-shaped pit. At the lower level, at the center of the entire deposit, lies a smaller quincunx-arranged group of axe-heads made of green stone, functioning at the same time as a quincunx and the center of even larger quincunxes (Estrada Belli 2006).⁹

In all these cases, it seems that repetition of the same motif on different scales is aimed at reinforcing the symbolism of the chosen shape and this is different from the use of fractals in the case discussed next.

THE SYMBOLIC FORM OF A NATURAL FRACTAL

The Aztecs reproduced a motif in the form of a natural fractal provided by the cross-section of a seashell. This pattern characterized Quetzalcoatl (the Feathered Serpent) in his manifestation as Ehecatl (Wind god). The seashell consists of a spiral in which the distance increases with each turn (Figure 10b), distinguishing it from the spiral of Archimedes in which there is a constant distance between each turn (Figure 10a). The shell is a logarithmic spiral—a fractal—because it traces an infinite number of turns in a finite space (Eglash 1999:77). Hence, the god Quetzalcoatl-Ehecatl exhibits this spiral in several adornments: the wind-jewel pectoral (*ehēcacozcātl*); the ear pendants (*epcololli*), the curve of which represents the beginning of the spiral (see Figs. 5b and 10c); and the wind-jewel shield (*ehēcacozcachimalli*) (Figs. 5a and 10d).

The motif distinguishing Quetzalcoatl-Ehecatl exhibits several noteworthy characteristics. To my knowledge, it is the only true fractal in Aztec art, and it comes from

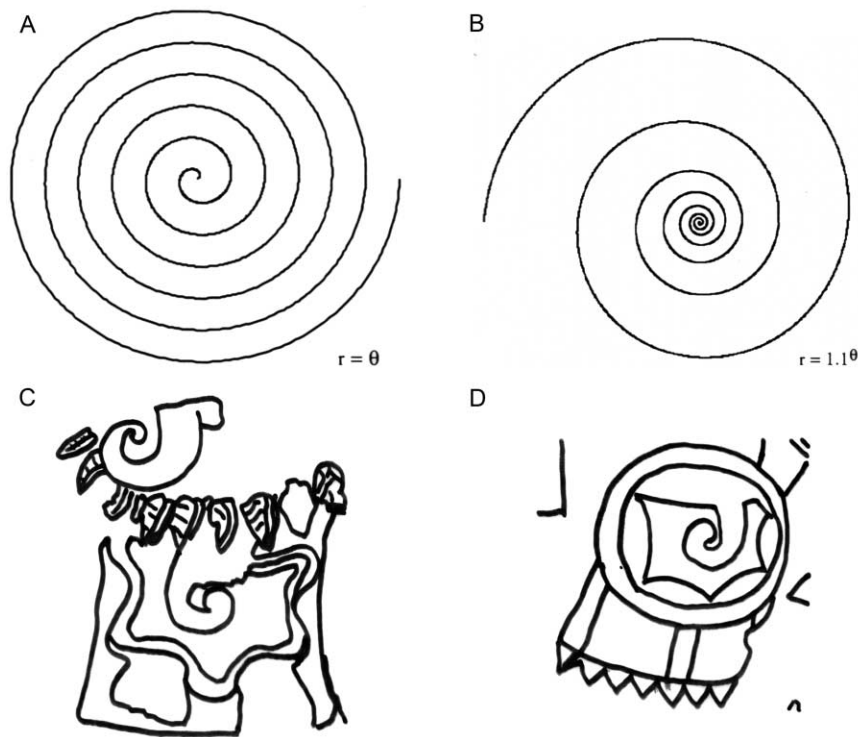


Figure 10. The Wind god spiral: (a) Archimedes' linear spiral and (b) the logarithmic spiral (based on Eglash 1999:77, drawings by the author); (c) Quetzalcoatl Ehecatl (*Codex Magliabechiano*, Anders 1970: pl. 61r) and (d) Quetzalcoatl Ehecatl (*Primeros Memoriales*, León-Portilla 1958: fol. 261v), close-up views of the wind-jewel pectoral and ear pendant (drawings by the author).

the imitation of not one but two natural forms. Indeed, the shell spiral represents another logarithmic spiral, that of the cyclone and whirlwind, attributes of the Wind god (Ortíz 1986). These natural phenomena are also fractals because of the increasing distance between each of their turns. The shell spiral provided a fitting symbol purposely chosen by the Aztecs to express the notions of dynamism and creation. The Wind, in fact, played a dynamic and creator role. Under the evocation of Ehecatl, in the legend of the creation of the Fifth Sun in Teotihuacan, the Wind puts the heavenly bodies in motion (*FC VII:8*). We can thus conclude that the cross-section of the shell appears as the natural miniaturization of phenomena such as cyclones and, as such, offers a synthesis of the notions of miniaturization and fractals dealt with in this article. Thus, generally speaking, the self-referential

system based on fractals offers even greater possibilities than the simple procedures of miniaturization.

CONCLUSIONS

I have based this review of the dimensional manipulation in Mesoamerican ritual on a typology of representational referents. The very common geomorphic referent included several elements in the natural surroundings of humans, such as the landscape and the cosmos. The dual referent pertaining to the gods linked a notion (that might or might not be geomorphous) to the form of the human body. Another referent linked the height of a child with that of an adult. This procedure characterized metaphoric miniaturization, common both among the Aztecs and contemporary Mesoamerican Indian groups, which served to indicate the start of a cycle, such as that of vegetation, war, power (as represented by government officials), and other social activity. Finally, the fractal represents a self-referential geometric form determined by the *recursion* procedure, according to which the *output* of one iteration becomes the referent of the *input* at the start of the next iteration.

But, how does the type of referent influence the dimensions of its representation? In all cases, a representation adheres to a standard provided by the size of the human body since it must be comprehensible to the human senses. For this reason, representations with geological dimensions can always be labeled “miniaturization,” although they necessarily exceed those of the human body. However, the size of the representation can vary (within limits) so as to express an additional symbolic meaning: the gigantic or the miniature. Gigantism intervenes in representations with a geomorphic and dual referent to respond to an objective of ritual efficacy. The miniature represents infancy to metaphorically designate the beginning of a cycle. This shows that the notion of “miniaturization” cannot be equated with that of “miniature.” Ultimately, fractals represent a final procedure that enables a form to be miniaturized by applying to it a proportionate reduction in each successive iteration. The Aztec cases considered here bear witness to the variety of types of symbolism permitted by the fractal form. In a simple use they were limited to reinforcing the meaning contained in a plastic form; a more complex use led to a natural fractal form—the wind cyclone—which at the same time was the object of a miniaturization and represented by another natural form, the seashell. Accordingly, the different plays on dimensions in the course of ritual lend themselves to numerous inventions, far beyond a simple reduction in size dictated by the ease in manipulation of a small object.

NOTES

I thank Olivia Angé and Perig Pitrou for their invitation to participate in the *Miniature Worlds and the Regeneration of Life: Variations of Scale in the Andes and Mesoamerica* conference. My thanks as well to David Robichaux for his translation of this article into English and to Nicolas Latsanopoulos for having drawn Figure 4.

1. For recent reviews of the literature on contemporary Mesoamerican ritual deposits, see Dehouve 2011, 2013a, 2013b, 2014c: chap. XII. Such deposits are also used in Andean religious practices; for a comparison, see Broda 2013:679–68.
2. For a detailed description, see León-Portilla 1992; Dehouve and Vié-Wohrer 2008:238–40; Dehouve 2014c:124, fig. 5.3.
3. *FC* = *Florentine Codex*; see Sahagún 1953.
4. See López Luján 2012:402–3 and Dehouve 2014c:166–68.
5. In *Teogonía e historia de los Mexicanos*, Edited by A. M. Garibay, pp. 23–90. Mexico City: Porrúa, 1996.
6. *Códice Borgia*, 3 vols. Estudio de E. Seler. Mexico City: Fondo de Cultura Económica, 1963.
7. *Historia de la nación mexicana. Códice de 1576*. Edited by C. E. Dibble. Madrid: Ediciones José Porrúa Turanzas, 1963.
8. *HG* = *Historia General*; see Sahagún 1956.
9. I thank the anonymous reviewer who suggested this reference.

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