

UC Irvine

2016 Conference Proceedings

Title

Sacred Reptiles and Native Worldview: Enactive Aesthetics in Ancient Mesoamerica

Permalink

<https://escholarship.org/uc/item/7548b88w>

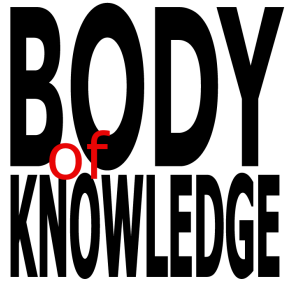
Author

Wright-Carr, David Charles

Publication Date

2018-01-08

Peer reviewed



**Sacred Reptiles and Native Worldview: Enactive Aesthetics in Ancient
Mesoamerica**

Proceedings of A Body of Knowledge - Embodied Cognition and the Arts conference
CTSA UCI 8-10 Dec 2016

David Charles Wright-Carr

Introduction

Representations of serpents are ubiquitous in the iconography of pre-Hispanic and early colonial Mesoamerica. Snakes, and reptilian features combined with other symbols, are found in visual and verbal expressions of the experience of a sentient cosmos, including the surface of the Earth, the heavens, and the underworld. Reptilian attributes were worn by rulers and priests as manifestations of their sacred status, legitimizing their social and political power. In this paper serpent symbolism is framed in embodiment theory and evolutionary aesthetics, drawing on concepts developed by scholars from a wide range of disciplines.¹

Enactive aesthetics

Cognition, in humans and other animals with nervous systems, emerges from the interplay between the body and its environment. In humans, the environment includes a cultural dimension that makes this interplay especially complex and dynamic, as we collectively project patterns of symbolic meaning onto ourselves and our surroundings. This process is both conscious and unconscious.²

Gallese provides a potentially useful concept for understanding the enactive aesthetics of visual expressions: *embodied simulation*, in which the experience of images is understood in enactive, relational terms. He advocates a program of experimental aesthetics, incorporating

¹ I shall avoid using the word 'art' here, since the images that I will be discussing were created in a cultural context that was alien to the West, where the concept of 'art' evolved over the last two and a half centuries (Rancière, 2016). When I use the word 'aesthetic' I am using it widely, in a biological sense, to refer to certain kinds of extraordinary experiences caused by the interaction of an organism with its environment. Another dichotomy that muddles our understanding of visual communication and aesthetics in ancient Mesoamerica is 'art/writing;' these concepts were inseparable in pre-Hispanic times, melding into a broader concept in which material expressions of visual and verbal thinking were interwoven (Wright, 2011).

² Varela/Thompson/Rosch, 1993: 9-12, 37-43, 206-207, 213.

recent findings in cognitive science that clarify the relations between cognition, perception, and action. He suggests considering not only the biological aspects of the body and its interactions with the environment, but also the intersubjectivity between maker and viewer, mediated by the image.³

Evolutionary aesthetics

The embodied, enactive dimension of aesthetics and visual communication obliges us to look back at our evolutionary heritage, as our bodies carry the molecular history of the enactive coupling of our ancestors with their changing environments.

Hodgson and Helvenston have looked at the evolutionary aspects of aesthetic creation, emphasizing the application of the neuropsychology of perception to the study of images. This line of research provides a cognitive foundation for essential aspects of image creation, such as the aesthetics of symmetry and the tendency to find inspiration in pareidolia.⁴ The enaction resulting from humans coupling with their environments requires people to depend for survival on innate cognitive mechanisms that are shaped over time by evolutionary processes. One of these is predator recognition, accompanied by emotions like “fear, awe, admiration, veneration, and a rapid, largely automatic behavioural response such as when flight is required.” These mechanisms expand into more complex domains that involve planning, greater flexibility in cognition and behavior, and cultural practices, including the creation of images.⁵

³ Gallese, 2016: 238, 239.

⁴ See, for example, Helvenston/Hodgson, 2010; Hodgson, 2000; 2003; 2008; 2012; Hodgson/Helvenston, 2006.

⁵ Hodgson/Helvenston, 2010: 175, 176.

Malafouris has also approached the problem of constructing an enactive conception of Paleolithic images, again drawing on cognitive science and the psychology of perception to understand these works and the circumstances of their creation. He explains that Upper Paleolithic cave paintings are best understood not so much as abstract or symbolic thinking, but in embodied, sensorimotor terms, a sort of perceptual learning that involves bringing forth images by enhancing what is seen in the mind's eye in natural rock formations.⁶

Fear of snakes and other dangerous animals

Snakes, spiders, raptors, felids, and canids have coexisted with primates for millions of years. It is to be expected that primate species, including humans, should have evolved effective corporal strategies for avoiding lethal encounters with these potentially dangerous creatures. I shall focus here on the evolutionary pressures snakes (figure 1) have brought to bear on primates, particularly on their visual systems, as species of this order depend more on sight in their structural coupling with the world than other mammals. The ability to detect snakes and other dangerous animals would have increased chances for survival and reproduction, so that processes of natural selection would favor the development of this ability over time.

⁶ Malafouris, 2007: 295.



Figure 1. Mexican lance-headed rattlesnake (*Crotalus polystictus*) (Krisp, 2012).

Animals commonly elicit intense feelings of fear (or disgust) in humans, and among animals, snakes are the most feared. About half of the human population reports feelings of anxiety about snakes, and around two or three percent of people meet the criteria used by psychiatrists to diagnose ophidiophobia, the fear of snakes.⁷

A growing body of research has shown that people visually detect dangerous animals, especially snakes, more rapidly than nonthreatening species. During the last two decades, studies have been conducted with adults, children, and infants. The most relevant findings, by Öhman and Mineka;⁸ LoBue, DeLoache, and colleagues;⁹ and Yorzinski, Penkunas, Platt, and Coss¹⁰ are summarized below. Isbell's "snake detection theory" is relevant to this study, suggesting that

⁷ Polák/Sedláčková/Nácar/Landová/Frynta, 2016.

⁸ Öhman/Mineka, 2003. See also Öhman, 2007; Öhman/Flykt/Esteves, 2007.

⁹ DeLoache/LoBue, 2009; LoBue/Buss/Taber-Thomas/Pérez-Edgar, 2016; LoBue/DeLoache, 2008; 2010; 2011.

¹⁰ Penkunas/Coss, 2013; Yorzinski/Penkunas/Platt/Coss, 2014.

snakes have been an important part of primate environments since the emergence of this order around 60 million years ago (figure 2), and that snakes had a direct causal effect on the change to diurnal living, the expansion of the mammalian fear module, and the development of vision.¹¹



Figure 2. *Purgatorius unio*, an early primate-like mammal (Tamura, 2008).

Having reviewed the more relevant findings regarding serpents and human phenomenology, I have drawn up the following list of human responses to snakes that may contribute to the aesthetic impact of serpents in art:

- Snakes make a lot of us anxious.
- The fear of snakes is the most common of phobias.
- We have a propensity, from infancy, for learning to associate snakes with other fearful stimuli.
- We can learn not to fear snakes through nontraumatic exposure to them.
- We detect snakes more rapidly than many other visual stimuli.

¹¹ Isbell, 2006; 2011.

- Snakes are detected more quickly than lizards, despite their morphological similarities.
- The initial detection of snakes may occur on an unconscious level.
- Scale patterns and color contrasts in snakeskin probably aid in snake detection.
- The undulating locomotion of snakes can arouse fear.
- Coiling is a relevant feature for snake detection.
- Our visual systems respond selectively to contours, occlusion, short lines, corners, spots, diamond shapes, patterns like checkerboards and plaids, and long, moving forms.

The latter responses may be understood as the biological consequence of the interactions of snakes and primates since the emergence of this order of mammals over 60 million years ago.

Snake aesthetics

Reptile iconography, particularly involving snakes, characterizes much of pre-Hispanic Mesoamerican imagery, perhaps more than any other culture. Given the potency of snakes in human cognition, representations of these animals contribute in unique ways to the aesthetic impact of the objects in which they appear, even when viewers have little knowledge about the meanings originally assigned to the images.

The first Europeans to experience Mesoamerican images responded with a mixture of admiration and repulsion. The innate, embodied fear of snakes was intensified in the minds of Spanish colonists by the cultural association of the snake with the Devil, and by representations in European iconography of a reptile head with a gaping mouth as a portal to Hell. These mixed feelings continued to manifest themselves throughout the colonial era and after Mexican independence. During the postrevolutionary period of the early twentieth century, there was an intensified interest in pre-Hispanic Mesoamerican culture, within Mexico and beyond its borders.¹²

Mexican art historian Salvador Toscano, in a book originally published in 1944, expresses the aesthetic emotions inspired by pre-Hispanic Mesoamerican images, with the dual concept of “the terrible and the sublime.”¹³ He was particularly moved by a colossal Aztec sculpture of a deity called Coatlicue (figure 3); his words express feelings elicited by the innate ancestral fear of serpents that is common in humans:

¹² Fernández, 1990: 33-110.

¹³ Toscano, 1984: 15-17.

Among the statues of deities that have always attracted attention in a powerful way is the Earth goddess, Coatlicue, “she of the skirt of serpents,” the masterpiece of American sculpture. [...] This is the most hallucinatory sculpture ever conceived by the native mentality, a work of art that cannot be judged using the serene canons of Greek art or the pious elements of Christian art: the goddess expresses the dramatic brutality of Aztec religion, its solemnity and its magnificence.¹⁴



Figure 3. Coatlicue (photograph: Wright-Carr, 1980).

¹⁴ Toscano, 1984: 112 (English translation by Wright-Carr).

In native Mesoamerican worldview humans, animals, plants, and other classes of sentient beings inhabit the surface of the Earth, thought of as the scaly back of a reptile swimming in the primordial sea, with four cardinal directions. The sky, with its cosmic wheel of stars, has thirteen levels, through which the Sun, the Moon, and the planets journey from east to west. Below the Earth is an underworld with nine levels, where astral beings travel from their disappearance under the western horizon until their rebirth in the east. Mountains are a potent part of the sacred landscape: they contain and give forth water in the form of clouds and springs, caves are portals to the underworld, and their peaks and crevices align with astral events. Time is interwoven with space to create a complex and dynamic symbolic environment (figure 4).¹⁵ Mesoamerican deities personify features of this environment.¹⁶

¹⁵ For a detailed interpretation of the image reproduced in figure 4, see León-Portilla, 2003: 228-239.

¹⁶ For a recent treatment of Mesoamerican worldview, see López Austin, 2016a-c.

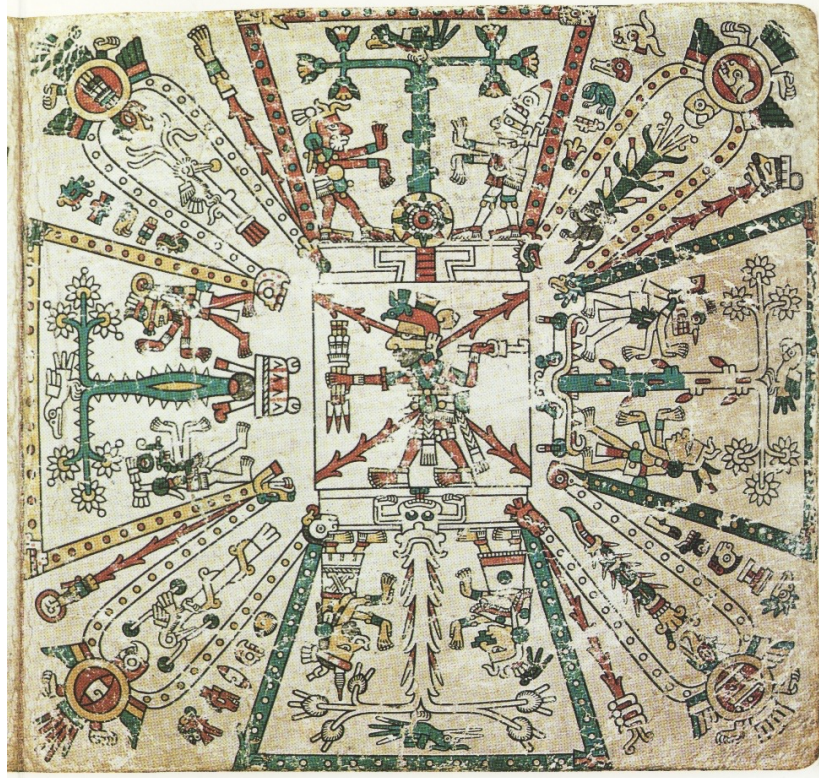


Figure 4. The interweaving of time and space in a Mesoamerican cosmogram (*Códice Fejérváry-Mayer*, 1994: 1).

Snakes and limbed reptiles slither and creep through the Mesoamerican cosmos in myth, ritual, images, and daily life. The border between reptiles with limbs and snakes can be blurry: snakes with forelimbs and claws are common, and the bodies of limbed reptiles often stretch into snakelike bands. In pre-Hispanic iconography, many deities have reptilian attributes: long bodies that undulate, coil or extend; prominent snouts; round or bulging eyes; prominent teeth; fangs; and bifurcated tongues. Serpent bodies frame compositions, forming sky and Earth bands. The Milky Way is thought of as a cloud serpent. Caves are represented as reptilian faces with gaping maws, providing portals to the underworld. Serpents with quetzal feathers are associated with wind, clouds, rain, fertility, vegetation, the planet Venus, and war. Deities personifying rain and lightning have hybrid faces combining human and snake features. Solar rays are represented as

fire serpents. Maize is associated with serpent imagery in many ways. Humans wear serpent attributes in headdresses, masks, clothing, jewelry, and sandals. Women weave diamond patterns, reminiscent of the dorsal scales of rattlesnakes, into textiles. The abundance of snake imagery in a wide variety of contexts makes it hard to assign a precise meaning to the serpent, beyond a generalized sacred essence permeating the sentient cosmos, providing a channel for the interaction of humans with their environment.¹⁷

Representations of snakes and other reptiles

La Venta was one of the major centers of power in Mesoamerica during the late Middle Preclassic period, or Olmec horizon (1200-600 B.C.). One of the sculptures from this site, Monument 19 (figure 5), was carved in low relief on the smooth, slightly curved surface of an irregular chunk of basalt. It depicts a seated man superimposed over an undulating, partially coiled rattlesnake. The archaeologists who discovered this piece called the zoomorphic figure “beyond a doubt one of the meanest-looking reptiles in Mesoamerican art,” giving voice to their innate fear of snakes. The seated man wears the attire of a member of the Olmec elite, including a snake mask with an open mouth from which his face emerges. In his hand is what looks like the incense bags of later images, associating him with ritual activity. The serpent, seemingly poised to strike, is represented with an open mouth; it has a crest on top of its head, perhaps representing a feathered ornament.¹⁸

¹⁷ Junco and Vigliani (2012) provide a brief but profound explanation of the role of serpents in the sacred Mesoamerican landscape. The iconography of fire serpents is discussed by Hermann (2011).

¹⁸ Drucker/Heizer/Squier, 1959: 197-200, plate 49.



Figure 5. Monument 19, La Venta (photograph: Wright-Carr, 1980).

Temple platforms in Mesoamerica were thought of as architectural metaphors for mountains. A prototypical example is the Temple of Quetzalcoatl, in the central Mexican metropolis of Teotihuacan, built in the second century A.D. (figure 6). This stepped temple platform was originally covered on four sides with carved stone representations of undulating feathered serpents, slithering among sea shells, their bodies in low relief, their heads jutting forth as three-dimensional sculptures. At regular intervals, reptile heads with scales resembling grains of corn, bearing attributes of the storm deity, emerge from the snake bodies. Mass burials with sumptuous offerings, apparently sacrificed warriors, are associated with this monument. The idea of a sacred mountain covered with feathered serpents, reptilian heads, and marine life speaks to us of essential aspects of Mesoamerican worldview: Earth, sky, clouds, rain, agriculture, fertility,

sustenance, and elaborate rituals that enabled the culturally determined enactive coupling of humans with the cosmos.¹⁹



Figure 6. Temple of Quetzalcoatl, Teotihuacan (photograph: Wright-Carr, 1978).

Caves were thought of as portals to the underworld and, as such, were used for ritual activities.²⁰ The zoomorphic facades built in central Yucatán during the Epiclassic period (A.D. 600-900) are among the most spectacular and aesthetically potent examples of reptilian mountain and cave imagery in Mesoamerica (Figure 7). Sculptural representations of eyes, snout, and teeth over the doorway transform the facade into a huge reptile with a cavernous mouth capable of ingesting humans. Profile serpent faces flank the doorway. Breath scrolls emerge from the mouth, expressing the living, agentive quality of the sacred mountain. The sides and corners of

¹⁹ Sugiyama, 1992.

²⁰ Brady/Prufer, 2005a; 2005b; Heyden, 2005; Prufer/Brady, 2005; Vogt/Stuart, 2005.

these facades often have stacks of reptile faces that fuse into complex ornamental patterns. Exceptionally well preserved examples of zoomorphic facades may be seen at Chicanná, Hochob, and Hormiguero, all in the state of Campeche.²¹ These facades appear in a variety of contexts, marking the buildings as sentient mountains, the interior spaces behind them as caves. Similar images, reduced to their iconic essence, are used in Maya script to write the word *wits* ('mountain').²²



Figure 7. Facade of Temple II, Chicanná (photograph: Wright-Carr, 1986).

The Great Temple of Tenochtitlan, the remains of which stand in the historical center of Mexico City, deserves special attention. It was built from the fourteenth to the early sixteenth

²¹ Gendrop, 1983.

²² Stuart, 1987: 16-25; 1997; Taube, 2010: 89-95.

centuries, and was in use at the time of the Spanish Conquest. On the summit of this immense platform were two temples, one dedicated to *Tlaloc* ('Lain on the Earth' or 'Covered with Earth'), a rain and lightning deity, the other to *Huitzilopochtli* ('Left Hand of the Hummingbird'), the solar deity of the Mexica people, a branch of the Aztecs. Twin stairways on the western facade led to these temples. Stone snake heads and full-bodied snakes adorn the platform (figure 8).²³ Historical evidence suggests that the famous Coatlicue sculpture, mentioned above, stood on top of the platform, one of a set of related sculptures.²⁴



Figure 8. Snake sculptures, stage IVb, Great Temple of Tenochtitlan (photograph: Wright-Carr, 1980).

²³ León-Portilla, 1987; López Luján, 1993; Matos, 1987.

²⁴ López Luján, 2009: 220-229.

According to an Aztec cosmogonic myth, *Cōātepēc* ('On Snake Mountain') was near Tula, in the Mezquital Valley, to the north of the Valley of Mexico. This was the home of *Cōātl Īcue* (usually written 'Coatlicue'), a deity who personified the Earth and whose name means 'Snake Is Her Skirt.' *Cōātl Īcue* was the mother of the *Centzonhuitznāhuah* ('Four Hundred Near the Spines'), the stars of the southern sky, and of *Coyolxāuhqui* ('Person Adorned with Bells'), a feminine lunar deity. Snake Is Her Skirt was sweeping on Snake Mountain when a ball of feathers fell from the sky. She placed it under her skirt and became pregnant. The Four Hundred Near the Spines were angered and embarrassed by this situation, and Person Adorned with Bells advised them to kill their mother for shaming them. Snake Is Her Skirt was afraid when she heard about her children's plan, but the voice of her unborn child *Huitzilopochtli*, 'Left Hand of the Hummingbird', comforted her, telling her that he knew what to do. The stars armed themselves and prepared to do battle with the Earth, but one of them betrayed his brothers, telling the news to the infant Sun, who was still in the Earth's womb. Left Hand of the Hummingbird repeated that he knew what he was going to do. Person Adorned with Bells led the Four Hundred Near the Spines in an attack on Snake Mountain to kill their pregnant mother. The turncoat star served as eyes for the unborn Sun, informing him of the advance of the celestial army. When it reached Snake Mountain the Sun was born, adorned and armed for battle (figure 9). He cut the Moon into pieces with a fire serpent. Her head remained on Snake Mountain. The rest of her body tumbled to its foot. The Sun drove away the southern stars, killing most of them.²⁵

²⁵ Sahagún, 1979: vol. 1, 202 *recto*-204 *verso*.



Figure 9. The solar deity vanquishes the star warriors at Snake Mountain (Sahagún, 1979: vol. 1, 204 verso).

In 1980 a large oval stone was unearthed at the foot of the stairway leading to the temple of the solar deity *Huitzilopochtli* in Mexico City.²⁶ It bears a relief carving of *Coyolxāuhqui* with bells on her cheeks, decapitated and dismembered, a snake tied around her waist, with fanged reptilian faces on her knees and elbows (figure 10). This sculpture was located at the place where the headless corpses of sacrificed warriors fell after their hearts were offered to the Sun. The relation between this relief and the cosmogonic myth shows that the Aztecs were reenacting the

²⁶ García/Arana, 1982.

victory of the Sun over the nocturnal deities with each human sacrifice. The serpent imagery at the base of the temple platform shows that the Great Temple was an architectural metaphor for *Cōātepēc*, Snake Mountain, birthplace of the solar deity *Huitzilopochtli*.



Figure 10. *Coyolxāuhqui*, 'Person Adorned with Bells' (photograph: Wright-Carr, 1989).

Final remarks

I have used an enactive perspective to explain the aesthetic force of reptilian imagery in ancient Mesoamerican visual culture, considering recent research that reveals that fear of –and fascination with– snakes is deeply encoded in our bodies, as a result of the evolutionary interaction of primates and snakes for millions of years. Ancient Mesoamerican image-makers recognized and harnessed the emotional impact of representations of snakes and snakelike

reptiles. While the potency of these images continues to resonate across the gulf of time on a visceral level, an understanding of native culture can enhance our appreciation of these works. On a more profound level, knowledge of the enactive, evolutionary aspects behind their aesthetic appeal –or repulsion– can provide insights to the feelings produced by these objects in people with distinct cultural backgrounds.

These reflections open paths for future research on the enactive aesthetics of Mesoamerican cultural productions. The psychological studies reviewed at the beginning of this essay provide a point of departure, but further tests are needed to understand the phenomenology of snakes and other reptiles in humans. It would be interesting to repeat these experiments with images of Mesoamerican representations of reptiles.

Beyond visual images, the presence of snakes in verbal culture should also be explored, as oral and written narratives induce mental images linked to emotional and aesthetic responses. Possible snake sounds in music –rattles come to mind– and serpentine movements in dance should also be considered. We are looking separately at parts of the problem, but in the context of Mesoamerican ritual settings, images, words, music, dance, aromas, and flavors combined – and continue to combine– to produce profound aesthetic experiences in the embodied minds of the participants.

References

BRADY, James E.; PRUFER, Keith M.

2005a “Introduction: A History of Mesoamerican Cave Interpretation,” in *In the Maw of the Earth Monster: Mesoamerican Ritual Cave Use*, James E. Brady and Keith M. Prufer, editors, Austin, University of Texas Press, pp. 1-17.

2005b “Maya Cave Archaeology: A New Look at Religion and Cosmology,” in *Stone Houses and Earth Lords: Maya Religion in the Cave Context*, Keith M. Prufer and James E. Brady, editors, Boulder, University Press of Colorado, pp. 365-379.

CÓDICE FEJÉRVÁRY-MAYER

1994 *Códice Fejérváry-Mayer*, facsímil del ms., Graz/Mexico City, Akademische Druck- und Verlagsanstalt/Fondo de Cultura Económica.

DELOACHE, Judy; LOBUE, Vanessa

2009 “The Narrow Fellow in the Grass: Human Infants Associate Snakes and Fear,” in *Developmental Science* (Blackwell Publishing), vol. 12, no. 1, pp. 201-207.

DRUCKER, Philip; HEIZER, Robert F.; SQUIER, Robert J.

1959 *Excavations at La Venta, Tabasco, 1955*, Washington, Bureau of American Ethnology, Smithsonian Institution.

FERNÁNDEZ, Justino

1990 *Estética del arte mexicano: Coatlicue, El retablo de los reyes, El hombre*, 2nd ed., Mexico City, Instituto de Investigaciones Estéticas, Universidad Nacional Autónoma de México.

GALLESE, Vittorio

2016 “Bodily Framing,” in: *Experience: Culture, Cognition and the Common Sense*, Caroline A. Jones, David Mather, and Rebecca Uchill, editors, Cambridge/London, Center for Art, Science & Technology, Massachusetts Institute of Technology/MIT Press, pp. 236-247.

GARCÍA Cook, Ángel; ARANA A., Raúl M.

1982 *Rescate arqueológico del monolito Coyolxauhqui: Informe preliminar*, 2nd ed., Mexico City, Instituto Nacional de Antropología e Historia.

GENDROP, Paul

1983 *Los estilos Río Bec, Chenes y Puuc en la arquitectura maya*, Mexico City, Universidad Nacional Autónoma de México.

HELVENSTON, Patricia A.; HODGSON, Derek

2010 “The Neuropsychology of ‘Animism:’ Implications for Understanding Rock Art,” in *Rock Art Research* (Australian Rock Art Research Association/International Federation of Rock Art Organisations), vol. 27, no. 1, pp. 61-94.

HERMANN Lejarazu, Manuel A.

2011 “La serpiente de fuego en la iconografía mesoamericana,” in *Arqueología Mexicana* (Editorial Raíces/Instituto Nacional de Antropología e Historia), vol. 19, no. 109, pp. 67-70.

HEYDEN, Doris

- 2005 “Rites of Passage and other Ceremonies in Caves,” in *In the Maw of the Earth Monster: Mesoamerican Ritual Cave Use*, James E. Brady and Keith M. Prufer, editors, Austin, University of Texas Press, pp. 21-34.

HODGSON, Derek

- 2000 “Art, Perception and Information Processing: An Evolutionary Perspective,” in *Rock Art Research* (Australian Rock Art Research Association/International Federation of Rock Art Organisations), vol. 17, no. 1.
- 2003 “The Biological Foundations of Upper Paleolithic Art: Stimulus, Percept and Representational Imperatives,” in *Rock Art Research* (Australian Rock Art Research Association/International Federation of Rock Art Organisations), vol. 20, no. 1, pp. 3-22.
- 2008 “An ‘Aesthetic’ Explanation for the Symmetry of Acheulian Handaxes: Some Neuropsychological Insights,” in *Plasticités Sciences Arts* (<http://www.plasticites-sciences-arts.org/PLASTIR/Hodgson%20P12.pdf>, uploaded: 22 September 2008, accessed: 2 April 2015).
- 2012 “Cognitive Evolution, Population, Transmission, and Material Culture,” in *Biological Theory* (Springer), vol. 7, no. 3, pp. 237-246.

HODGSON, Derek; HELVENSTON, Patricia A.

- 2006 “The Emergence of the Representation of Animals in Paleoart: Insights from Evolution and the Cognitive, Limbic and Visual Systems of the Human Brain,” in

- Rock Art Research* (Australian Rock Art Research Association/International Federation of Rock Art Organisations), vol. 23, no. 1, pp. 3-40.
- 2010 “The Neuropsychological Basis of Rock Art: Hyperimagery and its Significance for Understanding the Archaeological Record,” in *Archaeological Invisibility and Forgotten Knowledge: Conference Proceedings, Łódź, Poland, 5th-7th September 2007*, Karen Hardy, editor, Oxford, Archaeopress, pp. 172-179.
- ISBELL, Lynne A.
- 2006 “Snakes as Agents of Evolutionary Change in Primate Brains,” in *Journal of Human Evolution* (Elsevier), vol. 51, no. 1, pp. 1-35
- 2011 *The Fruit, the Tree, and the Serpent: Why We See So Well*, Cambridge/London, Harvard University Press.
- JUNCO, Roberto; VIGLIANI, Silvina
- 2012 “Paisajes de serpientes y montañas: Estudio de objetos de madera del Nevado de Toluca,” in *América tierra de montañas y volcanes I: Huellas de la arqueología*, Margarita Loera Chávez y Peniche, Stanislaw Iwaniszewski, and Ricardo Cabrera, coordinators, Mexico City, Escuela Nacional de Antropología e Historia/Instituto Nacional de Antropología e Historia, pp. 190-210.
- KRISP, Holger
- 2012 “File:Crotalus polystictus Mexikanische Lanzenkopf-Klapperschlange.jpg,” in *Wikimedia Commons* (https://commons.wikimedia.org/wiki/File:Crotalus_polystictus_Mexikanische_Lanzenkopf-Klapperschlange.jpg, uploaded: 20 January 2013, accessed: 27 November 2016).

LEÓN-PORTILLA, Miguel

1987 “The Ethnohistorical Record for the *Huey Teocalli* of Tenochtitlan,” in *The Aztec Templo Mayor: A Symposium at Dumbarton Oaks, 8th and 9th October 1983*, Elizabeth Hill Boone, editor, Washington, Dumbarton Oaks, pp. 71-95.

2003 *Códices: Los antiguos libros del Nuevo Mundo*, Mexico City, Aguilar.

LOBUE, Vanessa; BUSS, Kristin A.; TABER-THOMAS, Bradley C.; PÉREZ-EDGAR, Koraly

2016 “Developmental Differences in Infants’ Attention to Social and Nonsocial Threats,” in *Infancy* (International Congress of Infant Studies/Wiley), early view (https://www.researchgate.net/publication/308804239_Developmental_Differences_in_Infants%27_Attention_to_Social_and_Nonsocial_Threats, uploaded: 12 October 2016, accessed: 24 November 2016).

LOBUE, Vanessa; DELOACHE, Judy

2008 “Detecting the Snake in the Grass: Attention to Fear-Relevant Stimuli by Adults and Young Children,” in *Psychological Science* (Association for Psychological Science), vol. 19, no. 3, pp. 284-289.

2010 “Superior Detection of Threat-Relevant Stimuli in Infancy,” in *Developmental Science* (Blackwell Publishing), vol. 13, no. 1, pp. 221-228.

2011 “What’s So Special about Slithering Serpents? Children and Adults Rapidly Detect Snakes Based on their Simple Features,” in *Visual Cognition* (Psychology Press), vol. 19, no. 1, pp. 129-143.

LÓPEZ AUSTIN, Alfredo

- 2016a *Arqueología Mexicana* (Editorial Raíces/Instituto Nacional de Antropología e Historia), special ed. no. 68, *La cosmovisión de la tradición mesoamericana: Primera parte*.
- 2016b *Arqueología Mexicana* (Editorial Raíces/Instituto Nacional de Antropología e Historia), special ed. no. 69, *La cosmovisión de la tradición mesoamericana: Segunda parte*.
- 2016c *Arqueología Mexicana* (Editorial Raíces/Instituto Nacional de Antropología e Historia), special ed. no. 70, *La cosmovisión de la tradición mesoamericana: Tercera parte*.

LÓPEZ LUJÁN, Leonardo

- 1993 *Las ofrendas del Templo Mayor de Tenochtitlan*, Mexico City, Instituto Nacional de Antropología e Historia.
- 2009 “La Coatlicue,” in *Escultura monumental mexicana*, José Ignacio González Manterola, editor, Mexico City, Fundación Conmemoraciones 2010, pp. 114-229.

MALAFOURIS, Lambros

- 2007 “Before and Beyond Representation: Towards an Enactive Conception of the Paleolithic Image,” in *Image and Imagination: A Global Prehistory of Figurative Representation*, C. Renfrew and I. Morely, editors, Cambridge, McDonald Institute for Archaeological Research, pp. 289-302.

MATOS Moctezuma, Eduardo

- 1987 “Symbolism of the Templo Mayor,” in *The Aztec Templo Mayor: A Symposium at Dumbarton Oaks, 8th and 9th October 1983*, Elizabeth Hill Boone, editor, Washington, Dumbarton Oaks, pp. 185-209.

ÖHMAN, Arne

- 2007 “Has Evolution Primed Humans to ‘Beware the Beast’?,” in *Proceedings of the National Academy of Sciences* (National Academy of Sciences), vol. 104, no. 42, pp. 16396-16397.

ÖHMAN, Arne; FLYKT, Anders; ESTEVES, Francisco

- 2007 “Emotion Drives Attention: Detecting the Snake in the Grass,” in *Journal of Experimental Psychology* (American Psychological Association), vol. 130, no. 3, pp. 466-478.

ÖHMAN, Arne; MINEKA, Susan

- 2003 “The Malicious Serpent: Snakes as a Prototypical Stimulus for an Evolved Module of Fear,” in *Current Directions in Psychological Science* (Sage Journals), vol. 12, no. 1, pp. 5-9.

PENKUNAS, Michael J.; COSS, Richard Gerrit

- 2013 “Rapid Detection of Visually Provocative Animals by Preschool Children and Adults,” in *Journal of Experimental Child Psychology* (Elsevier), vol. 114, no. 4, pp. 522-536.

POLÁK, Jakub; SEDLÁČKOVÁ, Kristýna; NÁCAR, David; LANDOVÁ, Eva; FRYNTA, Daniel

2016 “Fear the Serpent: A Psychometric Study of Snake Phobia,” in *Psychiatry Research* (Elsevier), vol. 242, pp. 163-168.

PRUFER, Keith M.; BRADY, James E.

2005 “Introduction: Religion and Role of Caves in Lowland Maya Archaeology,” in *Stone Houses and Earth Lords: Maya Religion in the Cave Context*, Keith M. Prufer and James E. Brady, editors, Boulder, University Press of Colorado, pp. 1-22.

RANCIÈRE, Jacques

2016 “Aisthesis,” in: *Experience: Culture, Cognition and the Common Sense*, Caroline A. Jones, David Mather, and Rebecca Uchill, editors, Cambridge/London, Center for Art, Science & Technology, Massachusetts Institute of Technology/MIT Press, pp. 309-312.

SAHAGÚN, Bernardino de

1979 *Códice florentino*, facsimile, 3 vols., Mexico City, Secretaría de Gobernación.

STUART, David

1987 “Ten Phonetic Syllables,” in *Research Reports on Ancient Maya Writing*, no. 14, Washington, Center for Maya Research.

1997 “The Hills are Alive: Sacred Mountains in the Maya Cosmos,” in *Symbols* (Peabody Museum/Department of Anthropology, Harvard University), pp. 13-17.

SUGIYAMA, Saburo

1992 “Rulership, Warfare, and Human Sacrifice at the Ciudadela: An Iconographic Study of Feathered Serpent Representations,” in *Art, Ideology, and the City of Teotihuacan:*

A Symposium at Dumbarton Oaks, 8th and 9th October 1988, Janet Catherine Berlo, editor, Washington, Dumbarton Oaks, pp. 205-230.

TAMURA, Nobu

2008 “File:Purgatorius BW.jpg,” in *Wikimedia Commons* (https://commons.wikimedia.org/wiki/File:Purgatorius_BW.jpg, uploaded: 16 January 2017, accessed: 16 January 2017).

TAUBE, Karl Andreas

2010 “Gateways to Another World: The Symbolism of Supernatural Passageways in the Art and Ritual of Mesoamerica and the American Southwest,” in *Painting the Cosmos: Metaphor and Worldview in Images from the Southwest Pueblos and Mexico*, Kelley Hays-Gilpin and Polly Schaafsma, editors, Flagstaff, Museum of Northern Arizona, pp. 73-120.

TOSCANO, Salvador

1984 *Arte precolombino de México y de la América Central*, 4th ed., Beatriz de la Fuente, editor, Mexico City, Instituto de Investigaciones Estéticas, Universidad Nacional Autónoma de México.

VARELA, Francisco J.; THOMPSON, Evan; ROSCH, Eleanor

1993 *The Embodied Mind: Cognitive Science and Human Experience*, Cambridge/London, The MIT Press.

VOGT, Evon Z.; STUART, David

- 2005 “Some Notes on Ritual Caves among the Ancient and Modern Maya,” in *In the Maw of the Earth Monster: Mesoamerican Ritual Cave Use*, James E. Brady and Keith M. Prufer, editors, Austin, University of Texas Press, pp. 155-185.

WRIGHT-Carr, David Charles

- 2011 “La tinta negra, la pintura de colores: Los difrasismos metafóricos translingüísticos y sus implicaciones para la interpretación de los manuscritos centromexicanos de tradición indígena,” in *Estudios de Cultura Náhuatl* (Instituto de Investigaciones Históricas, Universidad Nacional Autónoma de México), no. 42, pp. 285-298.

YORZINSKI, Jessica L.; PENKUNAS, Michael J.; PLATT, Michael L.; COSS, Richard Gerrit

- 2014 “Dangerous Animals Capture and Maintain Attention in Humans,” in *Evolutionary Psychology* (Sage Journals), vol. 12, no. 3, pp. 534-548.