

Naturing culture: echoes of nature in mind and city

in *Echoes in mind, city and nature Nature and the City Beauty is taking on a new form.* Jale Erzen and Raffaele Milani (eds.) ISBN 978-88-6025-275-3 pp. 229-236.

Dr. Katya Mandoki
Universidad Autónoma Metropolitana México

Abstract

At least four aspects stand out when considering criteria to typify all cultural systems: they are collective, hereditary, involve learning or transmission, and produce artifacts. Evolution of culture has depended on the production of artifacts when labor was imprinted upon durable materials, techniques were cumulatively improved and knowledge was shared within a community.

There is an ongoing debate among ethologists and evolutionary scientists on whether it is possible to include within the concept of “culture” some animal behavior because various species exhibit precisely those aspects mentioned above. Beavers inherit artefacts to their offspring such as twig dams and rats inherit their nests to their families. *Apis mellifera* not only build artefacts like beehives but exhibit and share a referential language.

In this paper we will briefly explore resonances among natural, mental and social configurations in city building, mental mapping and natural morphologies which leave us at least with the sense, I hope, that culture is not a means for dominating nature to serve mankind (as assumed since the industrial revolution) but a natural outcome of evolution and of communal life in various species. As evidence of the relative continuity between nature and culture keeps growing, we can recognize configurations of nature even in the most artificial and sophisticated cultural expressions, In mind, city and body, nature is our culture and culture is our nature ... and not only ours.

o CV

Katya Mandoki has published six books: *Everyday Aesthetics* (2007 Ashgate), the three volumes of *Prosaica* or everyday aesthetics: *Estética cotidiana y juegos de la cultura*, *Prácticas estéticas e identidades sociales*, *La construcción estética del Estado y de*

la identidad nacional (2006-2007 Siglo veintiuno editores), *Estética y comunicación* (2006 Grupo editorial Norma) and *Prosaica; introducción a la estética de lo cotidiano* (1994 Editorial Grijalbo).

She is full time tenured professor of aesthetics and semiotics at Universidad Autónoma Metropolitana where she heads the research area on Aesthetics, Culture and Semiotics of Design at Postgraduate Studies on this field. Presently Second Vicepresident of the International Association for Aesthetics, Honorary President and Founder of Asociación Mexicana de Estudios en Estética, Secretary General and Founder of the Mexican Association of Visual and Spatial Semiotics (2005-07) and member of the International Editorial Board of various academic journals on aesthetics , culture and semiotics . She studied Philosophy and Visual Arts. Her Ph.D. dissertation is entitled *Aesthetics and Power* at the UNAM (1991 *Estética y poder*).

She received two first national arts prizes by the National Institute of Fine Arts (*Tale of a Child*, audiovisual 1982 and *Histogram: income distribution*, monumental installation 1985) and has exhibited at museums and galleries in Mexico and abroad since 1978. Her monumental work *Histogram: Income distribution in Mexico* (1985) is permanently exhibited at the Library Plaza of the university campus UAM at Xochimilco. About 150 articles by K. Mandoki have been published in newspapers and academic journals and she has presented more than a hundred papers at national and international conferences. She is Researcher level II and member of the Sistema Nacional de Investigadores (SNI) since 1995. Her research and teaching areas are: everyday aesthetics, philosophy of culture, semiotics, pragmatism, theory of design.

Naturing culture: echoes of mind, nature and city

Dr. Katya Mandoki
Universidad Autónoma Metropolitana México

- The ubiquity of artefacts

At least four aspects stand out when considering criteria to typify all cultural systems: they are collective, hereditary, involve learning or transmission, and produce artefacts. Even before the elaboration of bifacial axes and female fertility figurines, the evolution of culture has depended on the production of artefacts when labor was imprinted upon durable materials, experience became cumulative and knowledge was shared within a community. All human cultures have produced artefacts such as pottery, scrapers, nets, baskets, picks, knives, ropes, harnesses, axes, chisels, and hooks. Interestingly also, every culture has elaborated a variety of aesthetic items like necklaces, bracelets or earrings and the universality and antiquity of beads for adornment has been confirmed by findings in the five continents.

There is an ongoing debate among ethologists and evolutionary scientists on whether it is possible to include within the concept of “culture” also animal behaviour since various species exhibit precisely those aspects mentioned above. *Apis mellifera* not only build artefacts like beehives but use and share a referential

language. Birds and spiders employ weaving and different avian species learn local dialects. Fish, termites and ants dig wells or tunnels in the sand to catch their preys and caddisfly larvae make silk cases in which they stick sand and plant debris.

If we define culture in terms of artefacts, perhaps no species has produced as many of them as the human species. Yet if an artefact is defined as the making of something that did not exist until produced by some organism, then the production of cellulose by plants or of oxygen by bacteria could be considered artefacts way beyond all human cultural creation and consequently opens the possibility of proto-cultures in plants and animals. This sounds a bit exaggerated but shows at least that a better definition of culture is lacking. If we consider culture as related to artefacts, specially decorative artefacts, the prototypical case of animal construction and ornamentation of artefacts would be bowerbirds that collect shells, fruits and coloured objects for decorating their bower nests. Piling techniques are common in many species especially among black wheatears that gather almost a kilo and a half of stones in their nests. However, only the accumulation of rocks at the Ur ziggurat from 6000 years ago, Stonehenge 5000-years ago or Giza's pyramids 4500 exhibit this obsession for permanency that seems human all too human.

In addition to this search of permanence, there is also the opposite, greater flexibility. With radical climate changes that occurred during the Pleistocene two possibilities were at stake: 1) hominids with fur would be extinct by heat during periods of high temperature in the savannah and desert or 2) hominids lacking thick fur would become extinct by the cold during the ice ages. We naked apes, as Desmond Morris calls us, devised the perfect solution to these extreme changes: to survive the heat we blocked the development of fat and fur, and to survive freezing climates we took them from other animals. We thus evolved body adaptations and invented artefacts which reciprocally influenced each other and enabled more flexibility in dealing with the environment.

- Inheriting culture

Culture is the rule of artefact, a legacy of something by someone who once conceived it, built it, used it, stored it and passed it on. We are totally surrounded and engulfed by artefacts. Such a variety of objects can only be a result of labour division that is directly proportional to the diversity and specialization of artefact production. Unlike the stems found around termite mounds that are used by chimpanzees for fishing these insects or crows putting nuts in highways for cars to crack the shells up, human artefacts are not invented anew in each generation but are inherited. As we artificialize acquired characteristics, we also provoke exponential runaway processes (in Fisher's sense ¹) which pass new developments

from one generation to the next. Such objects can be used expanded, changed, replicated, improved and adapted to other surroundings.

With culture we overcome not only extreme weather but the obstacles that keep our offspring from inheriting acquired characteristics (as Lamarck believed to be the case in biology). In order to safeguard such heritage we also devised collective organizations that evolved from the basic tribal units to greater differentiation and specialization through a variety of cultural institutions. These institutions are to the social sphere what artefacts to the body, and words to the mind: shared objetivations that constitute the building blocks of culture.

While molecular structure of DNA is passed from one generation to another as a form imposed upon matter (a code imposed upon amionoacids to build proteins), culture can also be inherited to future generations not only by direct means through habit and imitation of certain activities, but indirectly by the permanency of matter imprinted in a particular manner and preserved for a specific purpose. Carved stones or cave paintings remain as indexical signs of a life which ontogenetically expressed meaning and sensibility through their very form. Fossils also express meaning phylogenetically that can be read in reverse engineering as evolutionists do. In other words, in fossils we read the environments with which live organisms interacted and adapted.

As far as the hereditary aspect, not only humans are capable of inheriting. Beavers pass their twig dams to their offspring and rats inherit their nests to their families. The bumblebee queen uses empty mice nests to build a vault and form a honeycomb where she deposits a cluster of buds for future bee workers. Crocodiles, caimans and alligators also build nests with leaves, sticks and branches shaped in a clump to breed their eggs on water, and even take advantage of their decomposition to increase nest temperature. ² Salthe states that there are trails in the mountains that have been used by the deer for generations. Plants also inherit environments that have been favourably modified by their immediate parent, as when some trees and shrubs in very dry habitats produce highly flammable leaves to burn their competitors who are unable to survive the flames”. ³

- Cultural transmission

Luca Cavalli-Sforza, Marcus Feldman, Robert Boyd and Peter Richerson, designed mathematical models to describe and observe processes of cultural transmission over time. ⁴ The former propose to analyze these tendencies in statistical quantitative terms in three types: vertical (parents to children), horizontal (peers and friends) and oblique (role models or other authority figures). By vertical transmission we learn from our parents what is correct or undesirable according to social norms. By oblique transmission we may learn from Socrates to think mayeutically (thanks to Plato), enjoy Euripides' plays and admire the horses

painted in the Chauvet cave 30,000 years ago. By horizontal transmission we can gain knowledge from our peers of the latest games, fads or hearsay, as we are doing right now during this congress on matters of common interest. Mass media technology has triggered horizontal transmission to exponential levels through spatial and cultural distances unimaginable a few decades ago.

The use of tools can radically alter lifestyles within a group. It brings to mind the emphasis placed by Needham on the use of the stirrup, the harness, the compass and gunpowder in China which when imported to Europe revolutionized agricultural technology, economy and military tactics catalyzing the transition from feudal to capitalist economy.⁵ A crucial distinctive feature in cultural transmission mechanisms is the possibility of inheriting deliberate individual findings and not only random variations and of accumulating changes or inventions as well as high-speed diffusion that does no longer require the passage from one generation to another.

Similarly to the genetic code that regulates nucleotide sequences in replication, cultural forms regulate replication of social activities by memetic codes involving conventions and traditions through protocols, etiquette, wedding and passage rituals, diplomacy, exchange and trade regulations, ostensive expenditure systems as *mayordomía*, *potlatch*, etc. Cultural transmission consists in mimicking attitudes, signs or gestures as accurately as each species' nervous system allows.

Imo, the female chimpanzee teacher at Koshima Island in Japan who invented potato and wheat washing and transmitted her discovery to her group is a case in point.⁶ Ants (*Temnothorax albipennis*) may learn by imitation from an experienced worker by the mechanism of tandem running the safest way to food sources. These cases cover at least two of the requirements that define the culture: imitation and learning.

The discovery of mirror neurons by Gallese and Rizzolatti gave great hopes for understanding precisely these mechanisms of transmission, imitation, communication, and empathy.⁷ They consist, as shown by fMRI studies, of an individual's activation of neurons when performing an action which occurs also in the exact same area by merely observing that action. We identify with what we observe and perform virtually the action at the neuronal level.⁸ From this perspective, when we hear a symphony we not only enjoy the harmonious combination of sounds but the creativity and imagination of the artists and the musicians' dexterity by a vicarious experience of playing. In other words, artistic experience may well consist of feeling vicariously the skill and emotional intensity of painting like Van Gogh, singing with the warmth and ardour of Diego El Cigala, dancing deftly and passionately as Nijinsky or mastering our fingers on the piano like Glenn Gould. We have the opportunity of in-corporating (integrating to our

body) an artist's sensitivity, elegance, fervour. The transmission of experience, knowledge and even feeling becomes possible by culture.

- The configuration of social territories

It is not enough to build and own artefacts, inherit and learn techniques for producing them and transmitting our acquisitions to following generations. We also need contexts that assign meaning to these artefacts, preserve them and establish a social position to their owners and inventors. Such contexts are delineated by means of institutions or cultural matrices.

Nature appears to be a garden of forking paths into lineages or clades of species derived from common ancestors. Culture is also a garden whose paths descend from a seminal proto-matrix rooted in biological ground which evolved the first division of labour: sexual differentiation. ⁹These paths lead to and configure cultural matrices and submatrices which branch off in rhizomatic patterns and networks without a plan of the entire structure. By habit, certain matricial areas tend to stiffen as soon as explicit and detailed standards are set up in their procedures: these well defined territories are social institutions. The most conspicuous areas of the cultural fabric, equivalent to the five kingdoms in biology (monera, protista, fungi, plantae and animalia) are social institutions like the family, state, church, school, trade etc. By institution we may understand a social

entity collectively established by explicit regulations with clear boundaries. Unlike a matrix which spontaneously grows from the bottom up, an institution is set from the top to bottom with well defined rules and hierarchical segmentation in commissions, boards, leaders and subordinates (as in clerical, governmental or educational organizations). A group of individuals consolidate these hard institutional tissues of culture through legitimizing their procedures by consensus or inertia in out certain tasks considered more important than others, often quite arbitrarily. The prototypical case is a civil association whose statutes are agreed, notarized and certified from the start.

- Mapping the mental, the urban and the natural

Cities are the fossils of culture; they are to the collective and cultural fabric as skeletons to the individual and biological. From fossils we learn about the growth and evolution of each animal species, and from the social configuration of space we can infer and interpret the activities and conventions that had significance for their inhabitants. If we look at mental, urban and biological traces and outlines, we will find remarkable echoes and structural coincidences. At least six types of patterns resonate in morphological similarities among nature, mind and city:

1. Radial: spreading out centrifugally from a central point,
2. Rhizomatic: non hierarchical with offshoots anywhere along the line.

3. Modular: not hierarchical with repetitive elements amassed by simple addition
4. Fractal: precise reiteration and similarities across scales
5. Arboreal: hierarchical patterns bifurcating or depending from a single source
6. Concentric: centripetal confluence

Mental maps, snowflakes, transactional sales data schemes, the city plan of Medina, work groups' organization, tri or pentadimensional models, jellyfish, flowers, tree roots, the Notre Dame rosette, the urban design around the Arc du Triomphe in Paris, starfish, the London Tube, all exhibit a radial structure.

Brazilian fabelas and squatter settlements, the Tokyo metro, choral reefs, Adis Abeba city plan, Arab medinas like Tanger, ant colonies all grow in *rhizomes* with irregular offshoots.

These patterns sharply contrast with modular institutional cities orthogonally planned in detail from above by the state or an assigned authority, as Baron Haussman's plan for Paris with its honeycomb of rigidly segmented perpendicular streets.¹⁰ Bauhaus revolutionized design with the concept of modules, but modularity is present also at the repetition of similarly formed and aged trees in forests, or at the Knossos palace, in beehives, as well as minimalism and serialism in art, histograms, and in all skyscrapers and city plans from Miletus to Manhattan.

Concentric patterns are found in stems and tree trunks, in ant nests or city plans of the antiquity like Khirbet Adben, Babylon and Lachich. The discovery of

fractal geometry by Mandelbrot revealed similar patterns in meteorological, vegetal and animal designs as found in skeletons, fern leaves, broccoli, thunders and peacock tails. Fractals are also found in the construction of a text, where sentences must present similar logic to paragraphs, sections and chapters of a book, and each volume of a series or collection.

Arboreal patterns can be found in maples or beech trees as well as in corporation hierarchies, computer software, the designed islands of Dubai, alpha male groups and their mates and descendants, rivers and their derivatives, clades of biological descendants, and the phylogenetic tree of life.

More often is finding hybrid combinations, as and the Niches pyramid at Tajin that combines modular and fractal,

This is a first approximation to resonances among mental, natural and urban configurations which leave us at least with the sense, I hope, that culture is not a means for dominating nature to serve mankind (as assumed since the industrial revolution) but a natural outcome of evolution and of communal life. In mind, city and body, culture is our nature ... and not only ours.

○ References

Cavalli-Sforza, L. L., & Feldman, M. W. (1981). *Cultural transmission and evolution: a quantitative approach*. Princeton University Press.

- Fisher, S. R. A. (1999). *The genetical theory of natural selection: a complete variorum edition*. (J. H. Bennett, Ed.). Oxford University Press.
- Gallese, V., Fadiga, L., Fogassi, L., & Rizzolatti, G. (1996). Action recognition in the premotor cortex. *Brain*, *119*(2), 593–609. doi:10.1093/brain/119.2.593
- Iacoboni, M., Molnar-Szakacs, I., Gallese, V., Buccino, G., Mazziotta, J. C., & Rizzolatti, G. (2005). Grasping the intentions of others with one's own mirror neuron system. *PLoS biology*, *3*(3), e79. doi:10.1371/journal.pbio.0030079
- Kawai, M. (1965). Newly-acquired pre-cultural behavior of the natural troop of Japanese monkeys on Koshima islet. *Primates*, *6*(1), 1–30. doi:10.1007/BF01794457
- Krebs, J. R., & Dawkins, H. (1978). Animal signals: Mind Reading and Manipulation
Animal signals: information or manipulation. *Behavioural ecology: An evolutionary approach*.
- Maran, T. (2009). John Maynard Smith 's typology of animal signals : A view from semiotics. *Sign Systems Studies*, *37*(33-4).
- Needham, J., Robinson, K. G., & Huang, R. (2004). *Science and Civilisation in China: General Conclusions and Reflections*. Cambridge University Press.
- Rizzolatti G., C. L. (2004). The mirror-neuron system. *Annual Review of Neuroscience*, *27*, 169–92.
- Salthe, S. N. (2008). What is the scope of biosemiotics? Information in living systems. *Introduction to Biosemiotics; The New Biological Synthesis* (pp. 133–148). Springer.
- Wilson, E. O. (1980). *Sociobiology*. Cambridge: Harvard University Press.

○ Notes

¹ (Fisher, 1999)

² (Wilson, 1980) 201-2, 212.

³ (Salthe, 2008)143.

⁴ (L. L. Cavalli-Sforza & Feldman, 1981).

⁵ (Needham, Robinson, & Huang, 2004): 20

⁶ (Kawai, 1965).

⁷ (Rizzolatti G., 2004) (Gallese, Fadiga, Fogassi, & Rizzolatti, 1996)(Iacoboni et al., 2005)

⁸ The mirror neuron system can probably explain what Krebs and Dawkins defined as "mind reading" which implies endowing others with intentions by interpreting their gestures. (Krebs & Dawkins, 1978)

⁹The most basic forms of self-organization to the more complex take a reticular configuration. In terms of physics the tendency of matter to be organized in harmonious forms as the Bénard hive effect or Belousov-Zhabotinsky reaction is remarkable. The baby animal is a web of immune, neural, endocrine, digestive, and circulatory interconnected networks by chemical messengers such as hormones, enzymes and peptides flowing throughout the body to regulate perception, emotion, memory, metabolism, balance and health. At the next scale, the human organism is grouped into social networks of communities, societies, civilizations. All these processes are not expressions of hierarchical systems with a central control brain sending electrochemical signals to control operation of the individual or social body, but heterarchical crosslinked systems operating horizontally. Even the selection units are networks in epigenetic development which the predominant atomistic view of the isolated genes simply neglected until recent research. (Maran, 2009) 489.

¹⁰ Such formations are exemplified by the typical urban structure with Roman *Cardo Maximus* and *Decumanus Maximus*, the precise location of the Forum, the Curia (council chamber), the Comitium, the basilica, the macellum, the palaestra (wrestling school), and the Odeum (concert hall). Tenochtitlan was originally a lake with cornfields and emerging communities connected by trajineras through water channels. It was later institutionalized as capital of the Aztec empire, which established a political and social reinforcement from the Plaza Mayor and two walkways along nearly the same orientation slightly deflected north-south *cardo maximus* (Tepeyac-Iztapalapa) and east-west *decumanus* (Texcoco-Tacuba).