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# Evolutionary Universal Aesthetics in Ecological Rationality

Mimi E. Lam
*University of British Columbia*

Roberto Gonzalez-Plaza
*Northwest Indian College*

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Mimi E. Lam and Roberto Gonzalez-Plaza

**Abstract**

*We contend that individual reactions to universal aesthetics were critical in adapting human brain structure and evolutionary cognition. Emotional responses to aesthetics and reflexive judgments by prehistoric people may have evolved an ecological rationality with intimate pragmatics of survival. In North American Pacific Northwest ecosystems, complex indigenous societies flourished for millennia, developing strategies that allowed them to co-adapt with locally varying, productive landscapes. They evolved 'societal phenotypes' based on cultural belief systems fostering ecosystem balance. Their detailed contemplation and experience of natural phenomena, including other organisms' behaviors, were formalized as traditional ecological knowledge. For example, pre-contact Pacific Northwest societies co-evolved with periodic salmon migrations and blooming gardens of camas lilies, aesthetic events that we suggest inspired awe, captured attention, and motivated memory in individuals. Sharing and collectively storing this ecological information as traditional knowledge enhanced the group's survival. The natural endowment of judging the sublime and the beautiful through an aesthetic or spiritual connection with the place likely contributed to the success of these indigenous societies, before reservations disrupted their local environmental relationships and cultural transmission of millennial place-based knowledge. Today, the subjective experience of evolutionary universal aesthetics may drive human affinities for natural phenomena and scientists' preferences in ecological research. We motivate an argument for such unique adaptations by proposing an evolutionary relationship between the biophysical environment, aesthetic responses, and cultural belief systems.*

## Introduction

In the diverse and productive North American Pacific Northwest human ecosystems, indigenous societies co-adapted with their landscapes for millennia (Trosper 2002, 2003). While these societies have been much studied (Ames and Maschner 1999; Suttles 1987), their "remarkable properties;" i.e., the (specific) manifestations of human cognitive and behavioral abilities in these ecosystems (Stepp et al. 2003), have not. Facing variable climate and recurrent environmental disturbances, they evolved as resilient complex adaptive systems (Gunderson and Holling 2002; Holling 2001) with 'phenotypes' expressing belief systems that preserved relatively harmonious relationships with the animate and inanimate ecosystem elements. The millennial continuity of place, culture and resource use that distinguishes indigenous societies (Kempton 2001) manifests a sophisticated cognition of the natural world; i.e., an "ecological rationality" (Gigerenzer and Selten 2001). Relocation of aboriginal communities to reservations disrupted complex cultural and environmental practices emerging from this traditional place-based knowledge (Gonzalez-Plaza and Lam 2004).

Here we propose an inherent basis for aesthetic discrimination, which supports the biophilia hypothesis that humans have an innately emotional affiliation to natural phenomena (Wilson 1984); its potential consequences in ecological research are explored by Kovacs et al. in this issue. Mental constructs or cultural models (Holland and Quinn 1987) of indigenous societies—formalized as traditional knowledge (Berkes 1999; Pierotti and Wildcat 2000)—regulated human activities toward sustainable ecological management by fostering respectful

ecosystem relationships. Captured in historical data, reconstructed oral stories, chronicles and archeological evidence, survival strategies evolved through detailed contemplation and experience of natural phenomena and behavior (Laird 2002; Maffi 2001). Though mostly undocumented, two examples of the panoply of observations by indigenous societies to orchestrate strategies sustaining resource use are: in the high Andes, the influence of El Niño on Pleiades visibility was accurately interpreted to determine potato plantation time (Orlove et al. 2000); in another ecoregion, the Blackfoot imitated wolf bison-hunting strategies (Barsh and Marlor 2003). We suggest that many indigenous societies sustained integrated human ecosystem services and functions with cognitive mechanisms embedded in cultural belief systems and an ecological rationality predicated on evolutionary universal aesthetics.

**Evolutionary Universal Aesthetics**

We view evolutionary universal aesthetics or "Darwinian aesthetics" of nature (Voland and Grammer 2003) to be a key psychological human adaptation based on an ecological rationality deeply cast in our brain biology. We suggest that ecological rationality; i.e., a logic system mapped to the structure of the biophysical environment and motivated by emotional responses to universal aesthetics, was a *sine qua non* condition for human survival. We argue that environmental knowledge evolved from individual responses to universal aesthetics of natural or Kantian kinds, such as the beautiful and the sublime (Kant 1952, 2004). By instigating an intellectual activity or reflexive judgment of the order or balance of the world, emotional responses to universal aesthetics may have catalyzed the first individual learning events. In contemporary socio-cultural environments, aesthetic preferences may be implicitly influencing our belief systems, thinking and knowledge—such as how and what science is conducted (Kovacs et al., this issue)—by biasing judgments and decisions made regarding the biophysical information in human ecosystems.

At the evolutionary onset of human learning, when the biophysical environment was the primary information source, we contend that the individual experience, not its social context, was likely critical. Without rationality, the mammalian visual system evaluates the environment to respond adaptively; it discriminates and reconstructs information based on complex neuronal sets that synthesize the input into coherent patterns for rapid processing. Early mammalian representations mediated by affective processing via basal brain nuclei were rewired in humans to higher cortex-based centers. Emotionally pleasing and captivating our senses, universal aesthetics may have attracted humans to beautiful and sublime natural events, which aroused the "promise of function" (Greenough 1958) with ecological information used to survive. This adaptation of cognitive mechanisms in a "biophilic" ecological rationality offers an evolutionary perspective for the aesthetic judgments central to the biophilia hypothesis (Kellert and Wilson 1993). As behaviors adapted to ecological challenges selecting early brain biological adaptations, this data was mapped in the brain structure, enhancing individual learning and fitness.

As individuals processed specific ecological information to file a survival database that maximized fitness, evolutionary universal aesthetics likely prompted improved attention, memory and learning. Categorizing information by Kantian kinds created referential databases, with the adaptive value that pattern recognition constituted learning events from which future outcomes could be predicted. Exploiting the statistical structure of the environment, fast and frugal heuristics (Gigerenzer and Selten 2001) devised simple decision mechanisms with ecological rationality to interpret biophysical data quickly and successfully. Ecological rationality, coupled with logical cognition; i.e., the capacity to infer (Houdé and Tzourio-Mazoyer 2003), may have evolved as *de facto* adaptive mind tools. Logical cognition, used in conjunction with the innate capacity to handle numerical data (Snyder and Mitchell 1999; Hauser 2005), could statistically average environmental information to recognize spatial and temporal periodicity for predictive comparison. By instantiating learning events with survival benefits, perception of nature's harmony and pattern coherence may have been selected as aesthetics-mediated human adaptations.

## Pacific Northwest Traditional Ecological Knowledge

Five millennia ago, plentiful yet variable salmon migrations stabilized, which together with cultivated camas gardens and temperate coastal rainforests (Boyd 1999), consolidated the cultural archetype of Pacific Northwest societies (Finney et al. 2002). Recurring aesthetic natural events, such as salmon migrations and blooming camas lilies, were phenomena that we propose precipitated a local ecological rationality. The upriver migration of spawning red sockeye salmon, *Onchorhynchus nerka*, likely impressed the inhabitants with their majesty and magnitude. The annual sockeye cycle then became environmental information used to anticipate and plan the future. Another beautiful natural event was the blue expanse of blooming gardens of camas lilies, *Camassia quamash*, cultivated by the Coast Salish. We suggest that such periodic events of universal aesthetic properties awakened attention mechanisms and irreversibly locked memory, learning and knowledge.

The First Salmon Ceremony practiced by Pacific Northwest tribes exemplifies the intimate coupling of emotional responses to aesthetics and cultural belief systems, preserving ecosystem balance. The first salmon caught of the season was respected as an honored guest; its flesh was ceremonially cut and eaten by the community and its bones returned to sea. Its spirit was believed to revive, communicate its good treatment, and bring about an abundance of salmon, whose bones were similarly recycled (Gunther 1926). Such societal phenotypes or collective behaviors venerating animal and plant 'spirits,' through ritualized ceremony, beliefs, taboos and mythology, promoted abundant seasonal food harvests. We suggest that the natural endowment of judging the sublime and beautiful, through an emotional connection with the place and its constituents, fostered a life's logic that increased the overall fitness of indigenous societies.

The balance perceived in universal aesthetic properties and processes; e.g., animal group dynamics, may then have reflected a 'social aesthetic.' The evolutionary dynamics between individual learners may have transitioned to favor cooperative social learners (Lam and Gonzalez-Plaza 2005), stabilized by a social rationality reflecting reciprocal relationships and fair judgments. As humans transcended ecological niches to 'eco-cultural niches,' (Lam and Gonzalez-Plaza 2006) universal aesthetics likely mediated individual cognitive adaptations to configure social adaptations, which heightened awareness of the self, its biophysical environment and its social interactions.

Inextricably rooted to experience in eco-cultural niches, the adaptive cognition and behavior that form the cultural belief systems of indigenous societies are manifest in place-based language, nomenclature, technology, rituals, world views and spirituality (Lewis-Williams 2002; Mithen 1996). Elders bequeath culturally embedded wisdom—"meta-heuristics" or theories of living (Baltes and Staudinger 2000)—with practical survival algorithms. Cultural belief systems emphasizing the "functional and structural coupling" (Maturana and Varela 1980) between humans and the biophysical environment were perpetuated as traditional knowledge. Beauty, harmony and symmetry in nature were reflected in socio-economic practices, such as cooperation, reciprocity, common resource management, community governance and the potlatch system, thus stabilizing Pacific Northwest societies and sustaining their resources (Gintis and Bowles 2004; Singleton 1998). We anticipate that the biological basis of human indirect reciprocity (Nowak and Sigmund 2005) and altruism (Fehr and Fischbaher 2003; Panchanathan and Boyd 2004) will reveal critical evolutionary cognitive mechanisms.

## Conclusions

We have suggested that evolutionary universal aesthetics may have adapted an ecological rationality, which formed the basis of a social rationality predicated on harmonious relationships and balance. The consonance between universal aesthetics and social practice in indigenous societies is viewed as an evolutionary adaptation or way of knowing. Traditional ecological knowledge that is prompted by emotional responses to universal aesthetics wove a common mental heuristic around a natural logic system that integrated values and traditions derived from local biophysical environments. As the effective complexity of coupled human-natural

ecosystems increases, we advocate a shift in human behavior towards maximizing biosphere fitness to mitigate anthropogenic impact. Such praxis of harmonious coexistence is reminiscent of many indigenous cultural belief systems.

Mimi E. Lam, Fisheries Centre, University of British Columbia, and Department of Biology, University of New Mexico, m.lam@fisheries.ubc.ca.

Roberto Gonzalez-Plaza, Northwest Indian College.

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