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An Evolutionary and Anthropological Examination of Brain/Mind and Novelty

Arthur Saniotis, Maciej Henneberg,
and Jaliya Kumaratilake

Abstract

The human brain functions evolved to support the survival of our ancestors as omnivores in natural environments that were of complex and varied nature. This evolution, of necessity, had to support the development of extensive memory systems and of an ability to imitate behaviors of others. Novelty as an expression of creative thought probably evolved along with the increasingly complex social processes of earlier human ancestors. Novel thought was especially expedited by the evolution of complex societies, which allowed for increasing individual specialisation. This article provides an overview on how the brain/mind works in relation to novelty from evolutionary and anthropological perspectives. The paper locates brain/mind novelty in terms of evolution, pattern and evolutionary learning. The authors conclude that novelty is contingent on social systems, and that current human societies need to challenge ordinary ways of thinking in order to reduce social and ecological problems.

Keywords: *neuro-hormonal organization, metapattern, evolutionary learning, liminality, symbolism.*

Introduction: The Evolutionary Considerations of Novelty

This article examines how the brain/mind works in relation to novelty, and how this relationship is constituted. The first section will provide an overview of brain/mind and novelty from an evolutionary point of view. The second section will locate brain/mind and novelty in relation to patterns. These patterns provide cognitive variations which in turn re-organize and re-invigorate older conceptual patterns. The third section will discuss Gregory Bateson's notion of 'evolutionary learning' and relate it to Victor Turner's concept of *liminality* as a generator of novelty in human societies.

In this analysis, Novelty can be described as:

1. A combination of units of mind that produces phenomena which were previously unknown.

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2. Something which is new and useful.

Novelty in human beings consists of several levels:

1. neuro-hormonal level;
2. language= symbolic communication;
3. embodiment into material or conceptual entities.

The human brain functions evolved to support the survival of our ancestors as omnivores in natural environments that were of complex and varied nature. This evolution, of necessity, had to support the development of extensive memory systems and of an ability to imitate behaviors of others, especially of the more experienced members of successful populations. In the short-term of the life of a generation or two, imitation and conformity ensured survival. On a larger scale of a number of generations, however, moving through a number of different environments that changed in response to global cycles and trends of climate, it was necessary that new ways of perceiving and manipulating the world would appear and be selectively supported if humanity were to survive. Since it did this, the appearance of novelties and their incorporation in human behavioral repertoire had to occur naturally. The human brain, with its multi-dimensional, uncertain processing of multiple neural signals in a tangle of criss-crossing neuronal networks bathed by hormonal secretions (Henneberg 1988) is incapable of sustained logical thought without artificial extraneous support of drawing maps, writing and figurative art. Therefore novelty, an important element of hominin evolution, was not a result of conscious logical thought, but a product of natural phenomena of interactions of brain functions with external environmental stimuli. It follows that the occurrence of novelty, though important, is a rare evolutionary event in the situation of multitudes of human brains processing routine impulses in repetitive ways based primarily on imitation and repetition of memorized patterns.

Novelty can result from the combination of units of mind that could produce phenomena, which were previously unknown. Putting together the units of mind capable of generating a novel idea could be regulated by the neuro-hormonal functioning of the cerebral cortex and the idea could be expressed using a language (orally or in writing) or symbolic communication (*i.e.*, drawings, body movements).

Buddhist philosophy that originated over 2500 years ago, introduced to the world the novel concept of 'self-enlightenment', which resulted from the creative logical functioning/thinking of the human mind. Subsequently, both Plato and Aristotle incorporated novel thought into the appreciation of philosophy, aesthetics and morals. While novelty has been mainly the domain of philosophical inquiry, science has recently come on board to examine the roots, generation, and implications of novelty in human beings.

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thought was especially expedited by the evolution of complex societies, which allowed for increasing individual specialization (Simonton 2000). Rogers (quoted in Ochse 1990) views novelty in terms of producing something, that is, as a produced creation. Alternately, according to Wertheimer (1945), novel problem solving is based on reorganizing the existing knowledge into *gestalts* (wholes) and perception is based on categorizing the world into good and bad *gestalts*. In addition, human perception is organized ‘to perceive sets of stimuli as wholes’, which express symmetrical and harmonious patterns (Bowers *et al.* 1995). Similarly, the brain tends to reorganize and transform knowledge during novel thoughts and problem solving (Gruber 1974; Feldman 1988).

Novelty is dynamic, has the quality of underlying directionality, that is a ‘conceptual momentum’ (Freyd and Pantzer 1995). Furthermore, creativity consists of two stages, the generative and exploratory phases (Finke *et al.* 1992). Edelman (1992) argues that the evolution of the human brain was expedited due to neuronal group selection and the brain’s higher order consciousness. The speed of the brain’s development is also due, according to Edelman (1987), to ‘somatic selection’ in which evolution occurs within the organism via competition between cells.

Novelty probably evolved as an adaptive mechanism that increased individual and collective fitness. The Acheulian axes ascribed to Lower Pleistocene hominins (*H. erectus sensu lato*) depict novel symmetrical objects which served probably both for utilitarian and aesthetic purposes. Moreover, the advent of religious/spiritual ideas in early Homo was truly novel and became integrated in early shamanism. For Boyer (2000: 93), the characteristic of the human mind is that it has a capacity for culture – it is a ‘cultured mind’, thereby enhancing the transmission of knowledge inter-generationally. This is an idea proposed by many social scientists and behaviourists. However, Boyer is cautious about whether hominization led to ‘liberated’ cognition, and therefore, making Homo more capable of novelty. However, since novelty is intrinsic to evolutionary processes, it should not be viewed as the special province of *Homo sapiens*. While evolutionary psychology posits brain/mind to be based on multiple modularity, as characterised by the ‘Swiss army knife’ analogy, this model has some shortcomings.

Firstly, the brain has evolved for different kinds of transmission and learning, such as cultural learning which seems to have been selected by natural selection to be most suited for *Homo sapiens*. In Darwinian terms, novelty can be thought of as an ideational mutation, which can inject otherwise stagnant ideational systems with new kinds of knowledge (*e.g.*, Buddhist philosophy) (Sternberg 2000).

Sternberg (2000) points out that novelty is significant for the evolution of societies. Thus, novelty would have acted as a selection pressure on humans in the evolution of parts of culture. In other words, novelty may have played

an important role in 'gene-culture co-evolution'. Novel thought is often generated by peripheral individuals in primate and human societies, thus, such individuals often do not come from the dominant echelons of their society (Laland *et al.* 2000).

However, the evolved capacities of human societies towards novel thought, albeit important, may not be as significant as humans have claimed. For example, while human cultures show a considerable variation, there are also considerable similarities in relation to technology and mytho-religious ideas. Following Boyer (2000: 97), what we observe is a recurrence of templates rather than limited variation. Moreover, human ability for accuracy in beliefs may also be overestimated (Papineau 2000: 170), meaning that novelty may also be constrained in most humans. There is no doubt that novelty yielded advantages to ancestral hominins which in turn increased human social complexity and human morphology. For example, the novel use of fire for food processing (possibly beginning with *H. habilis*) led to the reduction of human gut size and dental and mandibular structures (Henneberg 1998). Moreover, the early hominins would have created various types of novel parenting structures such as alloparenting which meant that parental roles would have been shared within a community of female/males thereby increasing a child's fitness. Alloparenting extended human sociality, enabling a child to receive care and information from multiple inputs, as well as optimizing cooperative breeding (Hrdy 1999).

The social organization of early hominins had to have been adapted to the fluctuations of multiple environments, thereby stimulating various adaptation strategies, which further triggered new ways of thinking about the world (Ehrlich 2000: 113). This feedback system may have endowed hominin ancestors with cognitive capacities such as creating 'internal representations or models of reality' (Bradshaw 1997: 146). These models of reality may have further led to more complex symbolic behaviours such as ritual genre which contoured human development and neural synaptic wiring (Laughlin *et al.* 1979). According to Turner (1969, 1974), rituals provide novel ways for thinking and experiencing the lifeworld. Thus, rituals through their symbolic elements, redress existential themes with a view of reclaiming psychic equilibrium. This is what Jackson (1998) refers to as the 'existential imperative'. Moreover, for Teske (2006) the narrative forms such as myth and ritual, construct virtual realities through which human actions commune with the sacred entities.

Following this theme, Winkelman highlights the neurological elements of Upper Paleolithic cave art which may have represented internal models for meditating mytho-religious experience (Winkelman 2004: 204). It could be suggested that ancestral cave art was an analogic device for eliciting and meditating altered states of consciousness (ASC) via sympathetic and parasympathetic arousal (Saniotis and Henneberg 2011). A feature of some Cro-Magnon cave art is their actual physical inaccessibility; some art can only be reached by

traversing long, narrow tunnels in total darkness, requiring a degree of effort and experiencing sensory deprivation. The remoteness of some cave art combined with physical effort and sensory deprivation may have been a novel device for eliciting altered states of consciousness, thereby heightening the extraordinary quality of the individual's experience (Leroi-Gourhan 1967; Saniotis and Henneberg 2011). According to Winkelman (2000, 2002, 2004) and Krippner (2000), the ancestral shamanism was able to exploit the human propensity towards ASC via the manipulation of symbols in order to generate affective states. Moreover, McClenon (1997) notes that the majority of human beings are genetically predisposed towards hypnotic states – an ancestral legacy that probably improved fitness in the ancestral environment (by alleviating stress response, improving fertility, strengthening group ties). The shamanic manipulation of ASC for mytho-religious purposes was probably an exaptation (a by-product of another selected trait). In any case, the ancestral shamanism was an ingeniously novel complex whose techniques informed religious practices during the Holocene Era.

Novelty as a Pattern

Being an organic system, the brain consists of a dynamic flow of interactions at many levels and parts. The brain/mind is organized to create patterns. These patterns 'both envelop and are enveloped by other patterns'. The brain/mind is in a constant process of exchanging information and transformation. As a feedback structure, the brain's mechanism is circular in which input and output interact. 'This complex interaction between perception and action evident in explaining and learning behaviors, is the means by which a system...' has the capacity to adapt and increase its complexity (Bale 1995). The brain/mind creates the dynamic patterns because that is the only way it meets the condition of transmissibility. Brain/mind is an open system. Brain is posited on an exchange of nerve signals between body and environment. Therefore, the patterns of signals in this system are largely repetitive.

The metapatterns in the brain/mind have been considered as a basis for the generation of novelty in humans. Bateson has described metapatterns as patterns which describe other patterns. Another definition of metapatterns is common patterns which occur across biological and mental systems. Levi-Strauss (1962) believed that cultural binary systems reflected the dualistic structure of the human brain. The notion of cultural opposites was considered by structural anthropologists as being universal, a belief that was refuted by Turner (1967), who claimed that Ndembu sociality was based on a tri-partite categorical system.

Novelty is not a random act but is often deliberated and directed by cognition using different states of consciousness. This means that non-ordinary states such as ASC may also participate in generating novelty. What is not known is

how different modes of awareness interact to produce novelty. That is, how and to what extent do the sub-liminal modes direct normal consciousness? Jung (1964) pre-eminently discussed this interaction in relation to his archetypal theory, in which natural metapatterns are inscribed in the subconscious substrate, which in turn influence conscious awareness. In other words, the mind uses certain ideas which may be combined and recombined over a process of elimination, and controlled in order to generate new kinds of variations of these combinations. These new cognitive variations are more complex since they often demand a new kind of thinking from conventional thinking patterns. Consequently, these patterns may provide the emergence of new conceptual paradigms, leading to new kinds of relationship structures (*i.e.*, eusociality). Novelty can reorganize conceptual patterns in individuals and groups, leading to a re-organization of old conceptual patterns.

$N \rightarrow N' = \sum [N1 + N2 + N3]$, where N is novelty and N' is various ideas generated by the brain/mind.

Evolutionary Learning, Liminality and Novelty

Evolutionary learning has been informed primarily by the noted cybernetician and anthropologist Gregory Bateson (1972, 2002). Bateson contends that many modern social systems are entrenched in negative cognitive maps that he refers to as 'internal incoherence'. This process is not only habitual but distorts human capacity for correct relation with each other and between the human and non-human worlds. Bateson insists that 'true' learning should be dynamic and flexible in order to foster new and positive social systems. Additionally, the evolutionary learning privileges the inter-dependencies between individuals and embraces new levels of connectedness and syncretism.

Several authors have shown that habituated cognitive maps throughout history have been social and ecologically deleterious. For example, Diamond (2005), argues that maladaptive cognitive maps of several previous cultures precipitated their extinction. These included Sumeria, Mohanjo Daro, Maya, Norse Greenland and Easter Island. In the case of Easter Island, its environment was totally devoid of trees. In each of the afore-mentioned societies, the exploitative socio-economic practices led to the environmental collapse. Diamond also claims that in the cases of Easter Island and Norse Greenland, unfavorable religious interpretations reduced their inhabitants' fitness.

The current rate of ecological degradation characterizes the deficient nature of human cognitive maps. Human global practices are at the heart of this problem and necessitate the new cognitive maps. Since a great deal has been written on this issue, we will mention here the heuristic provided by Bateson who argues that the creative process may enable *Homo sapiens* to re-connect with the non-human world. Bateson's view on aesthetics is intrinsically related to current social and individual pathologies. For Bateson, aesthetic behavior is a form

of evolutionary learning, in that it foregrounds the total human, and not simply cognition (Charlton 2008: 121). The art continually acknowledges the complexity of the life-world; as a pattern it may assist *Homo sapiens* to re-integrate with nature. One reason for this is that aesthetic processes are based on metaphor – they lead towards an ‘ecology of ideas’, of the interwoven patterning of life processes (*Ibid.*: 119). In this way, religion, art, dreams and other forms of ASC transcend the limitations of ‘language-mediated consciousness’, and privilege patterns of connectedness (*Ibid.*: 112). In this sense, art is corrective, enabling a way out of the current human malaise. As Bateson (1972: 132) points out: ‘[the artistic pattern] is *both* itself internally patterned *and* itself a part of a larger patterned universe which provides an integral experience’.

Bateson's notion of aesthetics as a novel form of evolutionary learning is reflected in Victor Turner's analysis of religious based rituals throughout the world. According to Turner, *liminality* is a state during rituals in which participants are segregated from society, and when their former social status is temporarily annulled. In this ‘statusless’ condition Turner believed that: ‘Liminal figures are neither here nor there; they are between and betwixt and between the positions assigned and arrayed by law, custom, convention, and ceremonial’ (Turner 1969: 95). Turner's concept of *liminality* is relevant here, since he argues that it has the capacity for questioning and violating social reality; in other words for challenging established cognitive maps and for fostering new ways of thinking. For Turnbull, ‘liminality is integrative of all experience, both on the conscious and subconscious levels of being’ (Turnbull 1990: 80). Turner as well as other scholars provides multiple ethnographic accounts of *liminality* which are beyond the scope of the present paper. That being said, Turner's symbolic approach emphasizes the creative and ludic elements of *liminality* within indigenous and secular rituals (Turner 1979, 1982, 1988). Indeed, *liminality* offers a theatre of creative possibilities for participants which would otherwise be hidden from them in their ordinary lives. For example, Turner notes that during pilgrimages, the participants symbolically move from a structural to an anti-structural condition involving a partial elimination of former social status (Eade and Sallnow 1991: 4). Turner also asserts that the relations between pilgrims during pilgrimage are characterized by *communitas* type bonds – a relationship fostering equality, egalitarianism and brotherhood (Turner 1974: 307). For Turner, the achievement of *communitas* is a significant reason to participate in rituals.

In other words, liminality embodies the principles of evolutionary learning, that is, creativity, flexibility, and temporal suspension or inversion of social values and behaviours. I contend that liminality in the human species is a novel behavioural intervention for dissipating social entropy (in this case, habitual cognitive maps that maintain structural forms of violence; that is inequality, social in-

justice, discrimination, overt competitiveness), by challenging the participants' worldviews. Participants then re-enter the secular world being revitalized.

Conclusion

This brief survey on brain/mind and novelty has argued for a heuristic towards understanding this relationship as being non-linear, non-reductionistic and dynamic. While the brain's architecture is genetic, the brain's synaptic flexibility is influenced by the environment. In this way, there is a constant interaction between neural models and the environment which is referred to as the 'cognitive imperative' – the need for *Homo sapiens* to examine and comprehend their environments, from which the causative understanding emerges (d'Aquili 1972). The implication here for brain novelty is that ideas should be accommodated in a social system in order to perpetuate. In other words, the environment influences the kinds of novelty which exist or not through a process of cultural selection, which in contrast to natural selection is not random but has a level of intentionality. The authors have contended that novelty has a phylogenetic history which in *Homo* was expanded via the evolution of complex societies.

Both Bateson and Turner offer ways of challenging old cognitive maps via evolutionary learning in which *Homo aestheticus* is introduced to our attention. The aesthetic modes of thinking and experiencing the world provide a way of ecological re-connection (Charlton 2008: 162), and for dissipating social entropy.

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