Psychology theories of motivation

ASSIGN BUSTER

The evolution of motivation

PART 1 – BRAIN PARTS IN EVOLUTION

Human motivation is a psychological construct that has its basis in the brain. The brain is an organ comprised of nervous cells and comprises the nervous system in most organisms, with the exception of certain invertebrates. One view suggests that different parts of the brain are specialized for different functions. Being the most complex organ in a vertebrate's body, the brain has been associated with several functions. Among these, the brain is responsible for perception, motor control, information processing, but it also has more complex functions for the human species, those of learning and memory. One particularly interesting function of the brain is that of motivation. Motivation is frequently associated with the limbic system. Often called the " reptilian brain", the limbic system also accounts for other functions, such as spatial memory, olfaction, learning and emotion. This brain structure is located on both sides of the thalamus, under the cerebrum and is comprised of the telencephalon, diencephalon and mesencephalon. The structures include other numerous areas, among which the hippocampus (memory and spatial navigation), the amygdala (emotions) [LeDoux, 2000]., the olfactory bulbs (processing social and environmental stimuli) and the basal ganglion are contained. The basal ganglion is being associated with motivation, due to its role in reward-punishment process. The basal ganglia are located at the base of the forebrain, representing a set of interconnected areas. Looking at motivation from an evolutionary perspective, it is argued that organisms' behavior is genetically programmed to ensure survival and reproductive fitness. It is argued that his motivational system of the brain is the basis for the motivational behaviors in which organisms' engage. Some scholars (Paul D. MacLean) argued that the limbic system is the oldest part of the fore-brain, developing to manage the flight or fight response.

When looking at the evolution of brain components, it is important to consider the fact that evolution is selecting on function. This process is mediated by the metabolic cost of the behavioral function. Developmental demands need to come to a certain compromise with developmental variation in order to ensure a positive outcome in terms of function and costs. The limbic system is thus seen as a " unit of development" due to its patterned change in the compromises taken. Some evidence supports the view that the limbic system is a unit of development [Reep, 1984; Squire, 1992; LeDoux, 2000].

The limbic system has a diversity of functions; however, it acts statistically as a single function. The components of the segmental structures of the forebrain are linked, offering the possibility of a pleiotropic effect on the evolution of behaviour. Thus, it would mean that selecting for one component would mean selecting for all of them. For instance, selecting for a visual component in humans would result for a certain election of structures utilised for different functions, such as motivation.

The authors looked at how the scale of the limbic system changed throughout time. They found similar patterns of scaling across all taxa. For primates, insectivores, ungulate and marine mammals, reduced limbic structures were associated with increased volumes of the isocortex. One possible cause explaining this was suggested. They argued that the" expansion and contraction of the domains of regulatory gene expression" which is associated with prosomeres could be a source of such structure. In primates in particularly, the arrangement of neural components by prosomeres suggest the possibility of the inverse relationships between limbic system and isocortex volumes.

Put how the limbic system actually decreased – Another way one could understand the evolution of the primate brain would be to consider the trade-offs between factors. There has been a reduction in the primate limbic system which could be attributed to a reduction of the olfactory system because of the dependence primates have on vision. Another explanation could be that this reduction is secondary to another adaptation; that of expansion of cortical systems specialised in memory. This unfortunate decrease in the limbic system could be only a minor side effect for the beneficial adaptation the increase of the cortex has brought- storage of long-term memory mediating increasingly social interactions.

An evolutionary look at how the structure and function of the basal ganglia changed with time passage shows that it underwent a big elaboration in the transition from amphibians to reptiles. This change consisted in the increase of cells in the basal ganglia, as well as receiving more dopaminergic and serotonergic inputs (hormones). Moreover, more neural circuitry (neuron rich) basal ganglia were found in modern mammals, birds and reptiles. The implications of this change are that amniotes might have had the ability to learn or execute more sophisticated behaviours and movements. This ability could be what allowed the amniotes to better adapt to a fully terrestrial habitat. As for the mammals, it appears that a divergence from this reptile lineage represented by the emergence of the cerebral cortex which became the target of the basal ganglia circuitry's function in the control of movement.

Thus, rudimentary basal ganglia are likely to have been present in the common ancestor of the jawed and jawless vertebrates that live today.

The implications of this increase in complexity of the brain can be seen in the behaviour repertoires of animals. The reptiles and mammals have a more complex behaviour than amniotes. This alongside the shift in habitat brought in the need to deal with more complex and variable situations, requiring more complex and adaptive behaviour in order to acquire food, avoid predators and survive. These changes were promoted by the increase in the visual and hearing apparatus -> allowed for more control over behaviour. *Conenct back to motivation* – how did the decrease in limbic system affect motivation?

Because there is a high interconnectedness between the limbic system and the cerebral cortex, cognitive processes can modify the effect of the limbic system on the functions of the hypothalamus (hormone production), which plays a role in the reward-punishment process – the basis for motivational behavior.

The basal ganglia receive information about the body position and motivational state from the cerebral cortex – integrates this information and facilitates for the appropriate (motor) behavior.

The role of the basal ganglia in motivated behavior has been explained by Cunha et. al (2012). It consists of the basal ganglia selecting for unconditioned/conditioned responses, goal-directed actions and stimulus-response habits. This is done by the activation of striatal neurons (input neurons of the basal ganglia) by cortical and subcortical neurons encoding those processes. Levels of extracellular dopamine influence the strength of the synapses which signal outcomes that are better or worse than " expected". Moreover, the dopamine release in response to the unconditioned/conditioned responses can " energize" the execution of selected actions. This is why the basal ganglia is thought to play a role in the selection of action processes that are needed to express unconscious and long-term memories, which play a role in motivation.

PART 2 – PERSPECTIVES ON MOTIVATION

The biological thus shows what the basis of motivation is. It does not, however, explain the cognitive aspect of it. Several attempts to model and explain motivation from an evolutionary psychological way have been proposed.

There are different perspectives taken in the study of motivation. Behavioral, cognitive and biological.

Art 9 -> Batali and Grundy (1996) tried to present a model of the evolution of motivation by referring to how they could become integrated into generational adaptive behavior, they tries to establish how the innate and learned components of the motivational mechanisms that generate behavior are connected. They used the concept of motivational system to investigate this process. A motivation system, for them, is the mechanism that allows an organism to feel pleasure and pain as responses to certain environmental conditions; pleasure in response to conditions that are beneficial for the organism's fitness and pain in adverse conditions. What they argue is that this motivational system evolves alongside the behaviors evaluated by it. They used James Mark Baldwin's idea through which he argued that an organism's ability to undergo ontogenetic adaptation, through which the congenital and phylogenetic adaptation that are kept in existence are those which favor adaptive modifications during the lifetime of organisms which have them. This is how various ontogenetic modes of action, such as learning, can work in synergy with evolution. Thus, organisms that have the ability to learn are more likely to improve their behavior, which in turn offers them an advantage over others. Possessing the improvements that learning offers can result in selection of organisms that carry those traits innately. This is how, he argues, species can evolve in directions endorsed by intelligence. This proposition is similar to Throndike's " law of effect", in which he suggested that animals will repeat the actions that have the most satisfying outcomes and avoid the ones that are displeasing. The mechanism that offers the possibility of feeling this pleasure and pain is the motivation system. This system can also be involved in the process of selecting actions which are expected to be favorably appraised. Evaluations depend on physiological and environmental factors. Subtle changes in any characteristics of the environment or animal physiology can have drastic impacts on fitness.

The authors of this article tried, thus, to model motivation using different complexity world simulations of the evolution of populations that contained designs that generated action and learning. Their findings showed that some organisms developed motivation systems that were accurate enough to direct learning in a direction that increases the fitness of actions performed by the agents. Moreover, their results showed that the motivation systems were attuned to the worlds they were a part of. The systematic distortions present in the worlds could be seen in the structure of the motivational system in such way that the distortions increased the adaptiveness of the generated behaviour.

These results show how simple designs can be used to model motivation, implying that the complicated perspective in motivation of the cognitive perspective is somewhat unnecessary.

Thus, members of population that incorporated learning tended to evolve more quickly and have higher performance than the organisms whose behaviour was innate. The adaptive behaviour that early generations must learn had the tendency to become more and more innate. This process occurs when there is an evolved motivational system that directs the learning of structures used to cause actions. All in all, this study showed that motivational systems can coevolve with the learning of the behaviours it assesses.

=> *cognition and motivation:* Evidence for the co-evolution of motivation and cognition was found by Ermer et al. (2008) when investigating whether status plays a role in regulating risky decision-making regarding resources in men. They discussed how access to relevant resources brings about intersexual competition in men, which also serves as a determinant for status. What they discovered was that motivation for risk-taking behaviour appeared in situations where men were of equal status and had resource loss problems. This suggests that the motivational systems that mediate status related problems in the social world also regulate cognitive operations which generate risky decision-making processes in men, implying that motivational and cognitive mechanisms co-evolved to function in synergetic, domain-specific ways. The motivation's role in this process is to determine what state or good an individual wants to attain – it refers to their aspirations. The controversial point of this finding is that instead of desires or other motivations serving as inputs for domain-general decision regulations, it proposes that responses are produced by a motivational system that is specialized in regulating competitive interactions, being equipped with its own decision rules. It also shows that motivational systems are activated by cues.

Another attempt to explain human social motivation from an evolutionary perspective has been done by Buss (1997) through discussing the Terror Management Theory (TMT). Being a theory anchored in evolutionary biology, TMT assumes that the major motive of any organism is survival. What the author argues is that this theory of social motivation should recognize that the engine that drives the evolutionary process is reproduction, and not survival. Thus, it is important to recognise the real causal process of evolution in order to establish what stands behind motivation.