Human behavioral and psychological phenomena

Sociology, Social Issues

While studying human behavioral and psychological phenomena, it is important to examine multiple levels of analysis. This is because various phenomena are influenced by mechanisms operating on different levels, such as the biological, psychological and social levels of analysis. Individuals have differential susceptibility to developing certain traits, influenced by an interactive process of genetic vulnerability and environmental experiences (Belsky et. al 2009). Thus, individual behavior is shaped by a relatively equally imperative interplay of internal and external factors, which function on different levels. In order to gain a thorough and holistic understanding of the phenomena, adopting an integrated, multi-level approach could provide comprehensive and deep insight into the mechanisms at play and their resulting functional outcomes. Including time considerations and analyzing the timespans across which the mechanisms operate further strengthens results.

In this essay, I will demonstrate these claims by examining 3 phenomena that have multi-level mechanisms – traumatic brain injury (TBI), memory consolidation and retrieval and stereotyping and prejudice. TBI can lead to the damage of the prefrontal cortex (PFC), which impairs cognitive and affective mechanisms at the psychological level over the ontogenic timespan. TBI also causes neural functional impairment, impairing a mechanism at the biological level over a momentary timespan. The process of memory consolidation and retrieval is influenced by the mechanisms of hippocampal activity and sleep at the biological level across a momentary timespan, and by cultural attitudes at the social level across an ontogenic timespan. The development of stereotypes and prejudices is influenced by

the mechanisms of amygdala activation and resource depletion, which operate on the biological level across the momentary timespan, and by the mechanism of cultural attitudes operating at the social level across the ontogenic and historical timespans.

TBI is generally a result of contact or inertial forces on the brain. One method of injury is a focal cortical contusion, which causes ventral frontal, anterior temporal and occipital cortical damage. Another method is diffuse axonal injury, which causes the stretching and tearing of axons. The PFC is especially susceptible to TBI. The PFC can be divided into two regions; dorsolateral (DLPFC), which is related to cognitive tasks, and ventral (VPFC), which is related to affective tasks. Thus, TBI impairs the performance of cognitive and affective tasks, which are mechanisms operating at the psychological level across the ontogenic timespan.

Subsequently, cognitive and affective functions are also affected. Bechara et. al (1997) modeled a gambling task to demonstrate the notion that, as compared to normal people, TBI patients did not generate skin conductance responses (SCRs), because orbitofrontal cortex (OFC) damage impaired emotional response development, which in turn compromised SCR formation. Normal individuals began to choose advantageously before they realized a dominant strategy that worked best, while patients with prefrontal damage continued to choose disadvantageously even after figuring out the dominant strategy. Cognitive deficits occurring in the momentary as well as ontogenic lifespan of TBI patients can present challenges to living independently, readapting socially and returning to work.

TBI causes changes in the emotional and behavioral regulation in patients. Some common characteristic changes include impulsivity and poor judgment as seen in the simulated poker game example, irritability leading to verbal outbursts, aggressive behavior, affective instability causing exaggerated displays of emotional expression and apathy due to deficits in motivated behavior. These alterations are permanent. (McAllister, 2011)

Further, an aspect left unexamined in the readings was that the forces from TBI cause the mechanical perturbation of neurons, leading to the significant release of a host of neurotransmitters. (McAllister, 2011) Thus, TBI also affects the working of neurons, which are mechanisms operating at the biological level. This influences the fate of the cell, as it may further distort and die, or recover itself and balance its membrane potential. The impact of TBI to the biological mechanism of cellular functioning is short-term, as neurotransmitter excesses tend to wane over the first several weeks of the recovery period. (McAllister, 2011) Thus, we see the consequence of TBI on mechanisms that affect biological, cognitive and social outcomes.

Another phenomenon that comprises mechanisms operating on multiple levels is memory consolidation. The chain of the transmittance of perceived information begins with sensory memory, which involves our senses momentarily registering certain details or items in a scene. This is followed by our short-term memory, involving the noticing and encoding of a few items that have been passed along. This is succeeded by long-term storage, during which some items are altered or lost. The final step is the retrieval

from long-term memory, which depends on interference, retrieval cues, moods and motives. (Srull, 1981)

Long-term memory retrieval is greatly influenced by aspects of our surroundings, both when the memory is being encoded and when it is being retrieved. Godden and Baddeley (1975) demonstrate the contextual dependency of memory through a free recall experiment, where divers learned lists of words in one of two natural environments – on dry land or underwater. Half of the people in each group swapped locations before recalling the words. The study found that lists learned underwater were better recalled underwater, and vice versa. This state-dependency of memory points to the specificity of the encoding process and the influence of the environmental context on cognitive processing.

Although this article cited evidence to show the context-dependency of memory consolidation and retrieval, it did not provide a concrete explanation for the underlying biological mechanism. Functional magnetic resonance imaging (fMRI) has been used to show elevated activation in the hippocampus when the conditions of retrieval are similar to the conditions of encoding. This biological mechanism operates across the momentary timespan and regulates the function of memory retrieval, as demonstrated by the study cited above. (Wagner et al 1985)

Sleep also plays a crucial role in memory consolidation. Ellenbogen et. al (2007) tested the role of offline processing in developing inferences based on premise-pair learning. By testing groups with varying offline delays, they found that individuals with 12 or 24-hour offline times displayed highly

significant relational memory development, which was further boosted if there was a sleeping period in the offline time. An interesting point not explored in the reading was that different types of memory appear to be consolidated during specific stages of sleep (Karni 1994). Slow-wave sleep appears to be critical in consolidating verbal tasks. Individual differences in slow-wave sleep could thus potentially impact consolidation functions. Age and gender also influence this process. Age is shown to be inversely proportional to the amount of slow-wave sleep. Additionally, females experience higher levels of slow-wave sleep until menopause as compared to males. The mechanism of sleep in the process of memory consolidation operates at the biological level across the momentary timespan and regulates the function of relational memory development.

Memory consolidation and retrieval also depends on the associative path items form. The connectionist network model suggests that individuals form mental links between concepts. Connecting concepts leads to a stronger association in memory. However, this may lead to memory being distorted when people try fit new information into existing schemas. (Srull, 1981) Further, memories can be altered due to an individual’s personal values and cultures. Bartlett (1932) told British participants in a study a Native-American legend called ‘ The War of the Ghosts’. When the participants retold the story, they made it more consistent with their own cultural expectations. The responses demonstrate the process of subjective memory reconstruction rather than an accurate, objective recall of events during the process of memory retrieval. The mechanism of linking memories operates at the social or cultural level across the ontogenic timespan, with memory distortion

serving as a potential functional outcome. Thus, we see that memory consolidation and retrieval is influenced by both internal and external factors and thus should be examined through a biological as well as a social lens of analysis.

Another important behavioral phenomenon is that of stereotyping and prejudice. Stereotypes are cognitions about groups. Prejudices are effective evaluations of groups.

Social perception is complex, with category processing occurring rapidly. A large network of regions and processes underlie race perception, racial stereotyping and racial prejudices. The biological mechanism involved in the process of stereotyping is the role of the amygdala. Phelps et. al (2000), using fMRI to study neural substrates in the amygdala, show that amygdala activation is stronger in response to unfamiliar Black faces than to unfamiliar White faces. This is correlated to two unconscious measures of racial evaluation – implicit association tests (IAT) and potentiated startle, but is uncorrelated to conscious measures. Further, differential amygdala activation is less stark in the case of familiar Black-versus-White faces. Viewing out-group faces activates the amygdala, which is involved with emotional processing, while viewing in-group faces activates the fusiform face area (FFA), which is involved in differentiating familiar objects. The mechanism of amygdala activation operates at a biological level across the momentary timespan.

Stereotyping and prejudices can also be measured through implicit association tests (IATs). These tests work to reveal biases that individuals

may not consciously be aware of and can predict real world discrimination (Greenwald et al 2009). Typical findings on IATs are that individuals are faster on White-good, Black-bad pairings, depicting the prevalence of negative implicit associations (Nosek et al 2007).

Exploring the influence of external factors on internal mechanisms, Richeson et al (2003) demonstrated that after interracial contact, there was more cognitive depletion, demonstrated by Stroop interference. Resource depletion is a potential mechanism through which interracial contact impairs executive function. The biological mechanism of resource depletion operates across the momentary timespan. However, these processes are malleable through counter-stereotypic exposure and childhood interracial contact. Lai et al (2014), tested the effects of implicit bias intervention. Participants read a story featuring a White assailant and Black rescuer. They then developed individual strategies for response control and perspective taking. The control group in the experiment read about the history of the toaster. The results were that intervention reduces implicit bias and that interracial childhood contact also decreases implicit bias. Thus, the mechanism of implicit bias operates on a social level across the ontogenic lifespan and can be influenced by intervention at the social level.

Additionally, certain stereotypes and prejudices are deeply rooted in society, which further contribute to individual attitudes and beliefs. Thus, the external influence mechanism operates on a social level across a historical timespan. Examining both the ontogenic and historical timespans helps us further classify the significance of the issue for the individual and for society.

Since stereotypes and prejudices have mechanisms operating at the individual and social level, to deal with the issue of implicit bias, we would need to target not only individual beliefs, but also societal attitudes.

Thus, through the examples of traumatic brain injury, memory consolidation and retrieval and the process of stereotyping and prejudice formation, we can see that each of these behavioral or psychological phenomena has mechanisms operating on multiple levels across different timespans. Further, there is also a feedback loop present between the mechanisms, where the environment or external influences alter internal states and mechanisms and vice versa. Subsequently, we also see functional outcomes at the biological, psychological and social levels of analysis. Thus, a multi-level analytical approach to studying these phenomena is crucial in achieving a comprehensive understanding of them.