Advancing toward a neural architecture of motivational balance Schutter DJLG, Van Honk J Psychology Laboratory, Helmholtz Institute, Utrecht University, Utrecht

The triune brain concept of Paul Maclean has proven to be a valuable theoretical framework for understanding the neural correlates of human motivation and emotion. Apart from the reptilian complex, which primarily serves as the organism's life-supporting system, especially the limbic and neocortical systems are involved in synthesis and regulation of affect. Indeed, with the cortical expansion (i.e., encephalization) of the human brain two millions years ago, an additional system evolved which was capable of taming the subcortical beast. In particular the left prefrontal cortex (PFC) has been implicated in approach-related behavior, reward dependency and anger, whereas the right PFC is concerned with withdrawal-related behavior, punishment sensitivity and anxiety. It has furthermore been argued that the homeostasis between the left and right PFC activity is important for adaptive behavior and well-being (i.e., horizontal cortical balance). For example, extreme activity asymmetries favoring the right PFC are often accompanied by anxiety, whereas extreme left dominant PFC asymmetry has been associated with antisocial behavior. On the subcortical level the steroid hormones, testosterone and cortisol are argued to reflect the primordial instantiation of approach and withdrawal in terms of behavioral activation and inhibition systems respectively (i.e., horizontal limbic balance). For instance, phobias can be assumed to reflect a subcortical imbalance towards withdrawal and prepared forms of extreme fear. Although the cortical and limbic systems to some extend function autonomously, in affective processing there is also a cortico-limbic interplay. Thus the functional connectivity between the higher and lower brain levels plays is of importance (i.e., vertical brain balance). In sum, the affective brain is comprised of highly interactive systems, in which affective states are determined by a global homeostasis comprised of the three outlined balances and in which disruption will inevitably result in psychopathology.

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