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Polyvagal Theory Highlights

The power of play, in the development stages, to bridge the gap between activation of SNS, and socially adaptive and PNS based responses

Polyvagal theory describes the three stages of development of a mammal's ANS:

1. immobilisation
    a. feigning death, behavioural shutdown
    b. the most primitive component, shared with most vertebrates
    c. dependent on the oldest part of the vagus nerve (an umyelinated portion originating in the brainstem)
2. mobilisation
    a. fight or flight behaviours
    b. dependent on the functioning of the SNS, a system associated with increasing metabolic activity and increasing cardiac output
3. social communication or social engagement
    a. facial expressions, vocalisation, listening
    b. dependent on the myelinated vagus, originating from the brainstem
    c. the myelinated vagus fosters calm behavioural states by inhibiting the influence of the SNS on the heart

Linking social engagement to attachment and the formation of social bonds through the following steps:

1. three well-defined neural circuits support social engagement behaviours, mobilisation and immobilisation
2. independent of conscious awareness, the nervous system evaluates risk in the environment and regulates the expression of adaptive behaviour to match the neuroception of an environment that is safe, dangerous or life threatening
3. a neuroception of safety is necessary before social engagement behaviours can occur. These behaviours are accompanied with the benefits of the physiological states, associated with social support.
4. Social behaviours associated with nursing, reproduction, and the formation of strong pair bonds require immobilisation without fear
5. Oxytocin, a neuropeptide involved in the formation of social bonds, makes immobilisation without fear possible by blocking defensive freezing behaviour

neuroception

an ability to detect whether the environment is safe or whether another person is trustworthy

describes how neural circuits distinguish whether situations are safe, dangerous or life-threatening

takes part in primitive parts of the brain, without our conscious awareness. The detection of safety or danger triggers neurobiologically determined prosocial or defensive behaviours. Even though we may not be aware of danger on a cognitive level, on a neurophysiological level, our body has already started a

sequence of neural processes that would facilitate adaptive defense behaviours such as flight, fight or freeze

faulty neuroception might lie at the root of several psychiatric disorders:

- areas in the temporal cortex that are assumed to inhibit fight, flight or freeze reactions are not activated in people with autism or schizophrenia, who have difficulty with social engagement
- individuals with anxiety and depression disorders have compromised social behaviour difficulties in regulating heart rate, as reflected in measures of vagal control of the heart and reduced facial expressiveness
- maltreated and institutionalised children with reactive attachment disorders tend to be either inhibited (emotionally withdrawn and unresponsive) or uninhibited (indiscriminate in the attachment behaviour). Both types of behaviour suggest faulty neuroception of the risk in the environment.

Summary of the polyvagal theory

According to the polyvagal theory, our range of social behaviour is limited by our human physiology. When we are frightened or feel unsafe, we are dependent on neural circuits that evolved to provide adaptive defensive behaviours. These provide physiological mechanisms that reflexively organise mobilisation or immobilisation behaviours before we are consciously aware of what is happening. When on the other hand neuroception tells us that an environment is safe and that people in this environment can be trusted, our mechanisms of defense are disabled. We can then behave in ways that encourage social engagement and positive attachment.

The primary emotions, considered universal, include anger, fear, panic, sadness, surprise, interest, happiness (ecstasy) and disgust.
The PVT predicts shifts in the affective state to parallel RSA. Studies reveal decreases in RSA when person moves to negative emotional state while increases above the neutral base level when moving to positive state.

The PVT proposes that the evolution of the mammalian autonomic nervous system provides the neurophysiological substrates for adaptive behaviour, further proposing that physiological state limits the range of behaviour and psychological experience. The theory links the evolution of the ANS to affective experience, emotional expression, facial gestures, vocal communication and contingent social behaviour.

Stress Vulnerability

The concepts of stress and homeostasis are interdependent and manifested in the activity of the parasympathetic nervous system. In contrast to traditional models of stress, the PNS is proposed as the modulator of stress vulnerability and reactivity. The model proposed suggests that accurate monitoring of the PNS state will provide a window allowing the assessment of stress.

Cardiac vagal tone, measured by quantifying the amplitude of the RSA, is proposed as a novel index of stress vulnerability and reactivity with applications in all branches of medicine, and with particular value in paediatrics (is not dependent on stages of motor or cognitive development).

The Early Development of the ANS Provides a Neural Platform for Social Behaviour

Social behaviour and the capacity to manage challenges are dependent on the neural regulation of physiological state. If these circuits are easily available and efficiently functioning, then the laws of learning and the impact of experience can shape behaviour. However, if these circuits are not available, either as a function of phase of development or during periods of increased environmental risk, then state regulation is compromised, social skills are not easily learned, and social bonds become difficult to establish. During most of the life span, the vagal brake and the other features of the social engagement system are readily available and provide opportunities for social learning to occur. Without the efficient vagal brake turning off defensive systems and blunting their disruptive manifestations (eg. fight or flight behaviours), prosocial behaviour is limited, and opportunities for social learning and social bonding are minimised.

Vagal Tone and the Physiological Regulation of Emotion

Most research on the autonomic correlates of emotion has focused on sympathetic activation, yet here, there is a focus on how individual differences in parasympathetic tone are related to the regulation of emotion by focusing on a construct call vagal tone, which reflects the vagal control of the heart.

Information has been provided here regarding the relationship between vagal tone and emotion regulation. A review of research indicates that the baseline levels of RSA and RSA reactivity are associated with behavioural measures of reactivity, the expression of emotion, and elf regulation skills. Thus, we propose that cardiac vagal tone (i.e. RSA) can serve as an index of emotion regulation.

The polyvagal theory of emotion focuses on the evolution of the neural and neurochemical regulation of structures involved in the expression and experience of emotion as a theme to organise emotional experience and to understand the role of emotion in social behaviour. Over 100 years ago Jackson, intrigued by Darwin's model of evolution, elaborated on how evolution in reverse, termed 'dissolution", might be related to disease. According to Jackson, higher nervous system structures inhibit or control lower structures or systems and thus "when the higher are suddenly rendered functionless, the lower rise in activity". The polyvagal theory of emotion follows this Jacksonian principle. (p. 166)

BPD

The correlation between RSA and heart period provide additional support for the hypothesis that an individual without psychiatric disturbances, there is a strong link between vagal regulation and the control of the heart period. In previous research, we have reported that this covariation is compromised in other psychiatric disorders that have difficulties in regulating behaviour. The lack of correlation between RSA and heart period for the BPD group is consistent with these studies. (p. 236)

Abuse History is Related to Autonomic Regulation

Trauma not only may retune perception of others, making it more difficult to feel safe with others, but may also retune the neural circuits by lowering the threshold to react defensively. These changes affect our ability to socially engage, which may lead to dysfunctional coping strategies, lower self concept, and greater mood disturbance symptoms. (p. 244)

For PTSD... treatments might apply clinical strategies that would enable the client to move from flight or fight state to a physiological state associated with safety and social engagement. If treatments are unable

to shift the client to a calmer physiological state, then access to the physiological mechanisms and processes that have been the basis of psychotherapy may not be efficiently available. (p.245)

Questions

What comes first, thoughts or language?

Can you have language without thinking?

Can you have emotion without thought?

Can you have feelings without emotion?