

The place of inner language in feeling: a commentary on “Revisiting the Left Convexity Hypothesis: Changes in the Mental Apparatus after Left Dorso-medial Prefrontal Damage” by Salas & Yuen

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Abstract

This paper provides a commentary on the target article by Salas and Yuen, who propose a revision to the ‘left convexity hypothesis’ of Kaplan-Solms and Solms that there is no evidence for involvement of left hemisphere regions in the mental apparatus. Salas and Yuen provide a theoretical review and detailed clinical description that forms the basis for their argument that left dorso-medial frontal regions may be involved in ego regulation of emotion. In this commentary, the theoretical basis for Salas and Yuen’s argument is considered in light of cognitive and affective neuroscience models of emotion regulation. Whilst this commentary is supportive of Salas’ and Yuen’s position, the models discussed distinguish different roles of inner language associated with labeling and reappraisal, or with distancing or shifting of inner perspective. This clinical, theoretical and empirical extension of Salas and Yuen’s position points the way to further investigation regarding the role and nature of inner language with regard to the experience and regulation of emotion.

Background

The target paper of Salas and Yuen is concerned with the role of the left prefrontal cortical region in the mental apparatus described by Freud. The authors argue that an update on Kaplan-Solms and Solms’ (2000) position that damage to left frontal areas does not impede the function of the mental apparatus, which was based on a case with a lesion in Broca’s area, is required. Salas and Yuen review this position conceptually and then clinically through the report of a case of psychoanalytic therapy with Professor F, who sustained predominantly left dorso-medial prefrontal damage. The authors propose a basis for understanding the impact of left dorso-medial damage on

ego regulation of emotion via preconscious inner language, and the conscious voices of the super ego.

In this commentary I will set out parallel theoretical frameworks and related research that speak to the issue of the role of left frontal regions in regulation of emotion.

Whilst Salas and Yuen's proposed update of the left convexity hypothesis can be defended by reference to the broader affective neuroscience literature on emotion regulation and cognition, some additional points can be considered alongside their conclusions and this commentary seeks to extend rather than refute their position.

First I will consider the revised position alongside the literature on emotion regulation, specifically the model of Ochsner & Gross (2008). Second I will review alternative neuroanatomical accounts, drawing on the distinction between dorso-medial and dorso-lateral networks associated with cognitive and emotional regulation. Specifically I will briefly summarise relevant literature concerning the functional and anatomical distinctions between the default mode network and stimulus driven attention networks. I will argue that whilst consistent with Salas and Yuen's revised position, reference to contemporary network models of self-regulation could cast additional light on our understanding of the nature of the mental apparatus, and indeed the processes described in Salas and Yuen's case.

Cognitive self-regulation of affect

Salas and Yuen emphasise the relationships between language, inner speech and regulation of emotion, drawing on a Lurian-Vygotskian approach, suggesting a specific subset of executive processes that are reliant on inner speech or language,

associated with the left frontal region. They further develop their ideas in reference to Stuss' (2011) model of frontal-executive processes, which provides a more recent description of processes localized to left frontal regions and pertaining to inner speech. 'Task setting', associated with left ventro-lateral cortex, involves orientation of attention and aligning of a behavioral response to a stimulus. 'Energization', associated with medial frontal areas bilaterally, is concerned with initiation of a response, and in terms of inner speech might be associated with spontaneous occurrence of mental phenomena in the absence of a salient external stimulus. Although these processes are largely described in the literature in relation to 'cold' (cognitive) regulation, Salas and Yuen propose that the left dorso-medial PFC damage evident in Professor F could underpin a change in the id-ego balance, further described in terms of balance between bottom-up emotion generation and top-down regulation. Later they note evidence for a link between labeling of emotions and down-regulation of emotional response, that is also consistent with this proposal.

Drawing together their position with the clinical case of Professor F, Salas and Yuen seem to propose that the dorso-medial damage reduces energisation of spontaneous mental phenomena, limiting the availability of inner dialogue to 'down-regulate' emotional responses. This results in altering of id-ego balance such that basic emotions (both positive and negative) are poorly regulated. In addition, the absence of spontaneous inner dialogue is suggested to impact upon super-ego functions, resulting in vulnerability to becoming stuck at the receiving end of a harsh inner voice.

Salas and Yuen's position could be further explored by consideration of research regarding this link between inner speech and spontaneous regulation and experiencing of affect.

Ochsner & Gross (2008) present a review of regulatory processes focusing largely on (verbal) reappraisal as a specific form of self-regulation, and its regulatory action at different points within the elicitation of an emotion and emotional response. The review describes neuroimaging findings, allowing comparison and integration of literature concerning ‘cold’ cognitive processes (such as working memory) and lesion studies. A number of components involved in the successful regulation of emotion from verbal reappraisal are identified and related to specific brain areas. Ochsner and Gross argue that reappraisal processes (involving dorsal PFC implicated in working memory, anterior cingulate cortex involved in attention control, and medial PFC involved in reflection on affective states of self or others) reduces activation in lower-level emotion processing systems (involving the amygdala and insula). They suggest this appraisal and regulation route occurs relatively early, rapidly following emotional elicitation, and therefore may not be fully conscious, compared with later and slower deliberate attempts to suppress emotions or thoughts. Ochsner and Gross also note that types of reappraisal may be distinguished, for example noting the dissociation of distancing (medial systems involved in reflection on mental states of self and others) from verbal reappraisal (dorsal and left-lateralized attention and working memory processes) and slower alterations of emotional associations over time (ventral frontal systems; Ochsner, Ray, Cooper, Robertson, Chopra, Gabrieli & Gross, 2004).

Salas and Yuen’s more nuanced description of the relation of inner speech to superego functions and inner dialogue focuses solely on ventro-medial and dorso-lateral functions. Although the putative role of dorso-medial structures in possible ‘energization’ of spontaneous mental phenomena is referenced, the role of these structures in the self-reflective and distancing aspects of inner regulation implied from

Ochsner and Gross' review are also worthy of consideration here, especially given Professor F's experiences.

This raises a question as to whether the 'core deficit' in the case of Professor F is best considered in terms of inner *language* or thought within the ego and super-ego functions, or inner *perspective*, such that distancing or reflective inner language that binds within it the capacity to distinguish internal from external and self from other is at the heart of the issue here. A potentially fruitful avenue for further exploration of the issues of balance between the internal and external and the role of inner perspective alongside inner language might be gleaned from neuroimaging work concerning the dissociable roles of the default mode network (DMN) and stimulus or goal driven attentional networks.

The default mode network in affect regulation and inner experience

The picture painted by Salas and Yuen of Professor F's feelings and inner life is rich and compelling. The authors weave a psychological tapestry linking past experiences with internalized processes and basic emotional responses within a neuroanatomical architecture distinguishing limbic system emotion activation, ventro-medial behavioral regulation, lateral PFC verbal self-regulation and inner thought. However, I have here argued that the literature on the role of medial cortical structures in inner language and self-regulation provides additional details that enrich or extend the Salas and Yuen position, specifically whether the focus here goes beyond inner language and concerns a particular type or perspective of inner life, or the flexibility to adopt a third-person perspective as a component of verbal self-regulation.

Professor F describes not only enhanced experiences of all emotions (reduced regulation), but also an array of changes to his inner life. These include at times an absence of inner thought, not bland as one might think if describing pure ‘absence’ but rather contemplative and rich with non-linguistic experience: ‘They are moments of pure sensation’. There is reflexive space but an absence of reflexive content. However, Professor F’s mind is not always blank. He experiences inner dialogue involving critical inner voices associated with his past experiences, yet he is unable to step out of these dialogues. He has the potential to ‘think’ his fears of being unable to speak, express himself, albeit in a somewhat faltering way.

One way of accounting for this varied presentation of types of, and changes to, inner language and inner life could be drawn from the literature describing the distinct but related operations of default mode (DMN) and stimulus driven (SDN) networks. The concept of the DMN was initially proposed by Raichle, MacLeod, Snyder, Powers, Gusnard & Shulman (2001) to account for observation of areas of deactivation in the brain that appeared anti-correlated with corresponding areas of activation across various functional imaging tasks. In a helpful review of neuroscientific studies concerning the nature and functions of the DMN, Andrews-Hanna (2012) identifies two dissociable but related DMN subsystems. These subsystems appear to each have a central neuroanatomical ‘hub’, activation of which is correlated with a specific subset of regions. First, the medial temporal lobe (MTL) hub is most strongly connected with hippocampal and posterior parietal areas. This subsystem is activated in the context of tasks requiring reconstruction of autobiographical memories, and internally related goals such as, for example, judging the motivational or personal value or significance of a stimulus. The second subsystem has as its most

interconnected hub the dorso-medial PFC (DMPFC) hub, which is connected with the temporo-parietal junction, lateral temporal cortex and temporal pole. The core function here appears to be introspection about mental states of self or others. Andrews-Hanna concludes that this subsystem is engaged when we ‘reflect upon, evaluate or appraise social information ...[and] ... can be directed to our own or others thoughts, feelings or desires’ (p. 10).

The description of the architecture and proposed function of the DMPFC subsystem of the DMN resonates with Salas and Yuen’s position and their description of Professor F, but does not fully address the questions regarding the distinction between inner perspective and content of inner language. Implicit in Andrews-Hanna’s description of this system is the ability to distinguish own from others’ mental states, as well as inferring the nature of those inner states. Evident in the case of Professor F is the absence of inner thought in the absence of any stimulus, and enhanced capacity for accessing his emotional inner life with an absence of spontaneous (verbal) reappraisal, which might temper emotional reactions. This would be consistent with an impairment of the DMPFC hub, resulting in reduced spontaneous mentation, and a related deficit in generation of a reflective inner dialogue. In addition is the *presence* of inner voices that hark from his past and carry the harsh criticism and standards that he internalized in childhood. One must assume that this form of spontaneous inner mentation can be dissociated from that which might take a distancing or reflective *perspective* on inner life, or from an alternative *content or function* of inner speech that is itself directly regulating of affect. Given the bilaterality of the DMPFC hub, it is possible that Professor F has some spared ability in his capacity to reflect upon mental states and distinguish his own experiences, but a deficit in a more specific

representational aspect of these processes: for example, the spontaneous representational (linguistic) labeling of inner experiences required to scaffold sufficient perspective or distance to disengage from emotionally driven harsh inner voices, or verbally reappraise and down-regulate basic emotional responses. One wonders the extent to which the careful and ongoing therapy provided a neuropsychotherapeutic compensatory social ‘milieu’ within which Professor F could ‘hear’ himself, a shared, cognitive space within which he could glimpse a distanced perspective, articulated in linguistic representational forms, if only momentarily.

Summary

In summary, Salas and Yuen have provided a coherent and compelling clinical account that successfully argues for reconsideration of Kaplan-Solms and Solms’ (2000) left convexity hypothesis. Drawing on cognitive affective neuroscience, detailed clinical observation and reflection, and psychoanalytic theory, they propose a specific role of inner language processes localized to left PFC, particularly left DMPFC within id-ego balance and super-ego functions of the mental apparatus.

In providing a commentary on their paper, I have here drawn out additional considerations arising from Stuss’s model of executive functioning (Stuss, 2011), Ochsner and Gross’s review of the role of verbal reappraisal in affect regulation (Ochsner & Gross, 2008), and on the emerging study of the DMN and its role in inner mentation (Andrews-Hanna, 2012). Whilst it is clear from a consideration of these differing strands of literature that Professor F’s altered inner experiences, including changes in his capacity to respond to and manage emotional responses, can be attributed to his left DMPFC damage, the paper raises more questions than it answers

regarding the specific nature of this deficit in regulation and perspective taking. Is Professor F's deficit one of loss of inner language required for regulation, or a deficit in perspective taking? Are representational aspects of inner language required in order to generate the perspective required for regulation of affect and switching of attention between inner voices? How is Professor F so able to generate coherent verbal narrative reflections of his memory of experiences marked by absence of reflexive language? What role does the shared mentation of psychotherapy play in either temporary or enduring changes in these functions for patients with impairments impinging upon the mental apparatus?

Clearly, whilst Salas and Yuen's position should be taken as a further step in the development of the neuropsychanalysis project, and a robust development of Kaplan-Solms and Solms initial position regarding the left convexity, further analysis of these concepts and experiences through experimental, clinical and conceptual work is required.

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