

Douglas F. Watt

Consciousness, Emotional Self-Regulation and the Brain

*Review Article*¹

Once deemed not respectable as a scientific domain, when behaviourist doctrine held sway, emotion is now an exploding subject of compelling attraction to a wide range of disciplines in psychology and neuroscience. Recent work suggests that the concept of ‘affective regulation’ has become a buzzword in these areas. Disciplines involved include not only affective neuroscience, but also cognitive neuroscience, developmental psychology, clinical psychiatric studies into syndromes of emotion dys-regulation (such as borderline personality, PTSD, mood disorders, and many other syndromes), various psychotherapy approaches, and several others, e.g. the increasingly popular fields of meditation and relaxation training. However, the overall conceptualization of emotion and its close ties to cognitive processes continues to befuddle many theorists and researchers, for various reasons.

I would suggest that these complex issues around emotion and cognition can be understood heuristically with a simple graphic:

HOMEOSTASIS ↔ EMOTION ↔ COGNITION

In essence, this framework emphasizes a basic propensity of evolution — keep what works and then tinker with it to make it work even better, under the pressure of adaptive selection. This argues that emotion is an evolutionary *extension* of homeostasis, and likewise that *cognition is an extension of emotion*, not something that sits fundamentally counterposed to it, in contrast to the simplistic ‘emotion vs. cognition’ debates that dominated psychology for decades. One could argue that the brain’s entire complex connectivity and functional operation is organized to achieve just such an adaptive and seamless integration of

Correspondence: Douglas F. Watt, Boston University School of Medicine, 715 Albany St., Boston, MA 02118, USA. Email: dfwatt@brahmacom.com

[1] **Mario Beauregard (ed.)**, *Consciousness, Emotional Self-Regulation and the Brain* (Amsterdam: John Benjamins, 2004. 294 pp. ISBN 1588114589)

homeostasis, emotion, and cognition, through a vertical integration of systems from top to bottom of the neuroaxis. This is biologically instantiated in rich neural connectivities between thalamocortical brain systems and many subcortical (basal forebrain, diencephalic, and midbrain-reticular) systems (see Watt and Pincus, 2004 for details).

From this perspective, emotion is an ‘evolved supervisor’ sitting over homeostatic routines, just as cognition performs a similar function for emotion, while still being fundamentally at the service of homeostatic and affective mandates. As perhaps the best studied prototype state, fear is an evolved ‘routine’ to lessen the likelihood of being killed or injured by predation or other physical dangers. It evolved to preserve our homeostasis, and to prevent us from becoming part of some other creature’s homeostatic solution (food). Emotion provides basic behavioural and body tuning paradigms to help maintain homeostasis in the context of adaptive challenges, such as dealing with predators, securing food/territory, structuring fundamental relationships with conspecifics, including the nurturing and protecting of young, selection of mates, and maintenance of intimate social connections and dominance hierarchies. Cognition can be understood as an evolutionary refinement of our ability to deal with prototypic adaptive challenges that are fundamentally affective. These cognitive tool-kits potentially allow increasingly subtle and adaptive fine-tuning of behaviour and subjective state consonant with basic emotional pushes and pulls. Much of the content of human consciousness once past early infancy consists of complex and highly variable even idiosyncratic emotion-and-cognition amalgams in which almost any version of a primary emotion (at almost any level of intensity) can be linked with almost any version of a perceptual or cognitive/conceptual attractor. Music and art are perhaps the most salient examples of how higher cognitive processes potentially recruit primary emotions, and the top-down activation of emotion by cognition leads directly to the enormous complexification of human emotional life.

With this framework in mind, one might outline territories within the overall topic of affective regulation as follows:

- (1) clinical disorders of affective regulation (mood disorders such as depression and bipolar disorder, and other clinical syndromes like borderline personality that show prominent failures of affective regulation, along with PTSD — indeed, many of the Axis I disorders in psychiatry could be thought of as failures of one kind or another in affective regulation);
- (2) various cognitive mechanisms that attenuate or modify affective activation, particularly that modify either attention to affective stimuli and/or attributions about their meaning that thereby can modulate affective arousal mechanisms;
- (3) attachment and its vicissitudes and losses, as central places for both affective regulation and *dys*-regulation;
- (4) play, laughter, and other strongly positive affective states in attachments that maintain euthymic states essential to affective regulation;

- (5) developmental aspects of affective regulation (how it changes and hopefully improves over the course of development).

The Beauregard volume shows some good scholarship and some excellent chapters (the best being an erudite chapter on emotive ‘set points’ and cingulate function by Luu and Tucker). But a core problem is that, of these five dimensions, the volume attends exclusively to #2. Many contributed pieces focus only on ‘top-down’ cognitive control mechanisms by which cortical creatures such as ourselves can inhibit and regulate emotion (such as attentional distraction away from affective stimuli, or appraisal ‘re-framing’ of those stimuli). Certainly there is solid evidence (summarized in a chapter titled ‘The Volitional Influence of The Mind on the Brain’) that both lateral and medial prefrontal system activation is associated with the ‘mindful’ or dispassionate self-observation and self-regulation of emotion (principles classically advocated in many ancient Buddhist texts). But to suggest that ‘mindful’ cognition-centered inhibition *‘is the core of all emotional self-regulation’* badly overstates the case, missing conceptual territories with a huge bearing on affective regulation sitting on the other side of the cognition-emotion border zone (*esp. domains #3 and #4*). To be fair, these are territories often neglected in cognitive neuroscience treatments of emotion. It is not so much that this cognition-centered view of emotional self-regulation is wrong, more that it is seriously incomplete.

Telling in this regard is that I don’t recall a single mention of the word ‘attachment’ or any substantive reference to play, laughter or intimacy in the entire volume. How one might purport to understand affective regulation with virtually no attention to the sources of our deepest joys and pleasures is baffling. Surely, if emotion is an ongoing commentary on the status of basic organismic value(s), affective regulation *must* be aiming us all towards a euthymic set-point (at least ideally). We are surely not content to be happy half the time and miserable the other half. Instead, much evidence argues that we have a quite limited tolerance for negative affective states, and we want them attenuated quickly. Euthymic states are maintained when negative emotion mobilizes corrective adaptive actions that quickly resolve or terminate sources of negative affect. However, euthymic states cannot be maintained simply by limiting negative affective activation, but must have a *critical if not primary* basis in the ongoing activation of positive states. While this may sound obvious, the volume pays almost no attention to these issues at all. Additionally, limiting the penetration of negative states often involves soliciting social comfort from another when distressed, which in turn requires empathy and related processes. Instead of considering the deeply social nature of positive affect *and therefore affective regulation*, the volume holds instead to an atomistic image of the solitary individual, cognitively regulating and suppressing negative affect by dint of disciplined, isolated effort. This stoic individualistic (one might say ‘counterdependent’) image of affective regulation subtly imprinted on much of this volume *cannot* be anything like the whole story of either emotion or, by implication, emotion regulation.

Perhaps the paradigmatic cogno-centric statement came in Lane and McRae's otherwise competent chapter on the neural substrates of conscious emotional experience (chapter 3), outlining key differences between neural substrates for 'background emotions', versus 'emotional feeling states', versus 'reflection on emotional feelings', each showing differential patterns of cingulate and prefrontal system activation. Lane and McRae argue that because of similarities between implicit emotional processing and implicit cognition that there is no point in assuming any fundamental separation between emotion and cognition at all. 'When considering the full array of elements that contribute to and constitute an emotional response, it is reasonable to conclude that there is nothing about emotion that is not cognitive' (p. 89). The only difference that these authors see between emotion and classically cognitive areas like memory and language is that emotion '*may* [italics added] involve judgments of value as the individual interacts with the environment' (p. 89). Even this sounds like a cognitive process (a 'judgment' of value). With this framing, the whole of affective neuroscience can be quickly annexed by cognitive neuroscience. Fortunately, our battles over conceptual territories are much less bloody than those fought over physical territories, albeit no less passionate!

But this framing is a conceptual Procrustean bed in which phenomena are stretched or shortened to fit one's favourite paradigm(s). A collapsing of emotion into cognitive processing conflates the cognitive top-down drivers for affective activation with the *whole* phenomenon of emotion proper. There is no disagreement here that much of the rich, highly varied precipitating triggers for activation of emotion are cognitive appraisals that are also highly variable in terms of their conscious vs. unconscious dimensions. But this leaves no explanation for intrinsic, fundamentally *non*-cognitive, elements of emotion identified for decades, if not millennia: prototypic facial expressions, closely related intrinsic patterns of motor activation (the priming and gating of motor space, such that certain behaviors are available when angry but virtually never when playful or sad and vice versa), characteristic autonomic/ neuroendocrine activations, and characteristic subjective valences. Stripped of these core attributes, one can argue that emotion no longer exists in the mind/brain. This cognitive 'reduction' of emotion has no explanation for subjective valence aspects of emotion: why is it that rage, fear and separation distress are intrinsically aversive and painful, while play, the gratifications of sex, or being soothed or comforted by a conspecific are intrinsically positive. Although we can change appraisals and thus limit (or increase) or even terminate the activation of a particular state, this is not the same as an explanation for valence.

Instead, one might argue that cognitive appraisals sit 'above' valence and prototype emotion. However, valence can only be meaningfully explained by creating a more action-centered theory of emotion (see Panksepp and Watt, 2004 for an extended discussion of this controversy). Any theory of emotional valence must take stock of how actions primed in prototype emotional states tell an unambiguous tale about whether something is organismically positive or negative. These action primes 'encode' how certain kinds of stimuli are

unconditionally positive or negative for an organism, telling the organism unambiguously whether stimuli are biologically desirable or not. This evolutionary ‘motor commentary’ ties subjective valence to unambiguous, characteristic motor activations, revealed in the classical motor states characterizing prototype emotion: running away in fear states, eager receptivity of infant mammals in receiving nurturance, joyful engagement of rough and tumble play in young mammals, and violent fighting in rage states. These action patterns constitute a ‘motor commentary’ on organismic value, evolutionarily conserved across many lines and through much of our phylogenesis, going back hundreds of millions of years. Nature tells us in these prototype states to ‘get the hell out of there,’ ‘terminate the source of the bad stuff with prejudice,’ or ‘stick around and get some more of the good stuff’. Emotion at its primitive core is just this primal *action-centered* signature of value in the brain/mind. Cognition allows that to be differentially activated, modulated, blended, and even inhibited. But those complex cognition- emotion amalgams shouldn’t be conflated with the primitive core of emotion, which is fundamentally about action to preserve organismic values.

More troubling still is the volume’s advocacy for quantum brain theories, a major editing failure on the part of Benjamins Publishing, as these theories really have no place in a literature review of cognitive or affective neuroscience issues in which empirical considerations should be and typically are the dominant currency. Quantum mechanics sits several levels of organization *underneath* biological phenomenon at even the cellular level, and therefore *many levels* of organization underneath any reasonable underpinning for conscious states within ultra-complex biological CNS organizations. Although there is no universal agreement, I would argue (in concert with most leading theorists) that consciousness must emerge from phenomena at much more nearly antecedent levels of organization; specifically, certain kinds of communication between large scale neuronal groups and populations (to cite a very partial list, Baars, 2003; Watt and Pincus, 2004; Engel *et al.*, 2001; Freeman, 1999; Tononi and Edelman, 1998). This is a general heuristic principle for emergent properties in nature, that their foundations rest in immediately preceding levels of organization, and not in processes many levels down the hierarchy. Seeking explanations in quantum mechanics for conscious operations of ultra-complex central nervous systems is, in the apt metaphor of Calvin (1998), ‘going from the basement to the penthouse’ without passing all levels in the middle. This seventh chapter argues that conscious regulation of emotion (seen in studies where medial and lateral prefrontal activations correlate with a suppression of emotion) shows us ‘the quantum action of mind on brain’. This is quite an interpretive leap from a group of data points with *much* less exotic and readily testable alternative explanations, such as the documented ability of prefrontal systems to gate activity in widespread regions, including subcortically and in various ‘limbic’ structures (Fuster, 1988). Clearly, many aspects of prefrontal system activity are probably essential to the overall process of affective regulation, but this ‘quantum-mind’ interpretation of the data, an argument never shown to be of any empirical value, and whose theoretical worth is doubtful at best, seems even more bizarre in the light

of the book's failure to cover several areas (i.e. those numbered 1, 3, 4 and 5 earlier in this review) that are *known* to be relevant to the study of affect and affective regulation. In view of all this, I would have to give this volume, overall, fairly mixed marks.

References

- Baars B.J. (2003), 'The conscious access hypothesis. Origins and recent evidence', *Trends in Cognitive Sciences*, **6** (1), pp. 47–51.
- Calvin, W.H. (1998), 'Competing for consciousness: A Darwinian mechanism at an appropriate level of explanation', *Journal of Consciousness Studies*, **5** (4), pp. 389–40.
- Engel, A.K., Fries P. & Singer, W. (2001), 'Dynamic predictions: Oscillations and synchrony in top-down processing', *Nat Rev Neurosci*, **2**, pp. 704–16.
- Freeman, W.J. (1999), *How Brains Make Up Their Minds* (London: Weidenfeld and Nicolson).
- Fuster, J.M. (1988), *The Prefrontal Cortex: Anatomy, Physiology and Connectivity* (New York: Ravens Press).
- Panksepp, J. and Watt, D. (2004), 'The ego is first and foremost a body ego', *Neuropsychanalysis*, **5** (2) pp. 201–18.
- Tononi, G. and Edelman, G.M. (1998), 'Consciousness and complexity', *Science*, **282**, pp. 1846–51.
- Watt, D.F. and Pincus D.I. (2004), 'The neural substrates of consciousness: implications for clinical psychiatry', in *Textbook of Biological Psychiatry*, ed. J. Panksepp (Hoboken, NJ: Wiley).

**The First International Conference
Post-Cognitivist Psychology**

**PostCog
2005**

will be held at the University of Strathclyde, Scotland

4–6th July 2005

Guest speakers will be

Mark Johnson (University of Oregon)
Annette Karmiloff-Smith (UCL)
Susan Hurley (University of Warwick)
Rob Ellis (University of Plymouth)

For further information and booking form:

*Dr Tony Anderson, Psychology Dept, Graham Hills Building,
University of Strathclyde, 40 George Street, Glasgow G1 1QE*

Tony.Anderson@strath.ac.uk

<http://www.strath.ac.uk/conferences/postcog2005/>