



Review of Cacioppo & Berntson (Eds) *Essays in Social Neuroscience*

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This book is a celebration of the discipline of social neuroscience, and the striking combinations of words that appear in these collected essays provide impressive testimony to the ambitiousness of the endeavour. ‘Oxytocin’ and ‘love’ appear together in the title of C.S. Carter’s essay, while ‘self-enhancement’ and ‘hypothalamic-pituitary-adrenal axis’ make equally unlikely bedfellows in the text of S.E. Taylor’s essay on the effect of social and psychological factors on the course of illness. And to choose a third example from many possibilities, R.J. Davidson’s essay about the causes and consequences of affective style, presents ‘meditation’ and ‘baseline brain electrical asymmetry’ in the same paragraph.

This union of social and neuroscientific concepts is a relatively recent one. As editors Cacioppo and Berntson explain in their preface, until the end of the last century these two lines of research seemed destined never to meet. The neuroscience approach regarded its everyday fare of neurons and genes as “sculpted by the forces of evolution ... and encapsulated within living cells far from the reach of social influences” (p. vii). Even when social factors were acknowledged to be important, it was assumed that it was

inconsistent with scientific progress to attempt to incorporate them as factors in neuroscientific accounts. The social approach, in turn, regarded neuroscience with great suspicion, fearing that neuroscientists sought to replace the social level of analysis with their own, lower levels of representation (the construct of substitutionism, often confused with reductionism).

Since the end of the last century, however, multi-disciplinary approaches utilising both social and biological perspectives have become increasingly common. Social neuroscience is founded on the assumption that reductionism is to be embraced rather than feared. Reductionism, according to Cacioppo & Bernston, involves using different levels of analysis to “both constrain and inspire the interpretation of data derived from other levels of analysis” (p. viii). The hope of the social neuroscience endeavour is that collaborations between neuroscientists and cognitive scientists will yield fresh insights into such complex social mysteries as the mechanisms of aggression, stress, love, nurturance, and so on. Calling upon leaders in the social neuroscience field, the aim of this collection of essays is to demonstrate, “the breadth and potential of the social neuroscience perspective” (p. x) to readers from a range of scientific backgrounds.

In the first four essays, the emphasis tends towards courageously tackling the question of how social processes impact at the biological level. The first two essays both explore the interaction between genes and early rearing environment in creating a behavioural phenotype. In M.J. Meaney’s essay (*The nature of nurture: maternal effects and chromatin remodeling*), for example, we learn how mothering behaviour in rats (how much licking and grooming her offspring enjoy), alters the expression of the pups’ genetic material that codes for endocrine and behavioural responses to stress. For those, like myself, not at home with the language of chromosomes (as a quick test, do you know what an ‘exon 1₇ glucocorticoid receptor promotor sequence’ is?), many of the technical details of this chapter are rather demanding. Yet despite this, the significance of the scientific findings stand out. The postnatal environment provided by the mother programs the expression of particular genes in the brain. The essay ends with the intriguing suggestion that, in a sense, the offspring are ‘inheriting’ their mother’s environment. A mother in a highly stressful environment will nurture her offspring less and, in doing so, passes onto her pups an enhanced response to stress which helps to prepare them for the likely adversity ahead. The thought-provoking implication of this research is that “there is no single ideal form of parenting: various levels of environmental demand require different traits in the offspring.” (Meaney, p. 13).

S.J. Suomi (*Aggression, serotonin, and gene-environment interactions in rhesus monkeys*) also examines the interaction of genes and environment, this time in the production of serotonin levels, which are inversely associated with aggression in rhesus monkeys. While the understanding of the effects of the social environment on gene expression here is not so well advanced as in the areas covered in the previous essay, there are again hints that the early rearing experience of a monkey can affect the expression of genetic material coding for serotonergic functioning and aggression.

Social factors figure rather more tangentially in the next two essays, with the authors using broader strokes to paint a picture of the potential impact of social factors at

the biological level. In *A balance within: dissecting neural and neuroendocrine pathways that transduce signals from the outside world*, E.M. Sternberg discusses how animal models might be used to track, at the cellular level, the impact of environmental stressors on immune responses. (Again, the technical language of this chapter might be found challenging). B.S. McEwen's essay (*Protective and damaging effects of stress mediators*) explains how hormonal responses to acute stressors are protective, but have damaging effects when stress is chronic. He explores how stress arising from an individual's social environment can (unsurprisingly) have an impact on physical and mental health.

In *Oxytocin and the prairie vole: A love story*, C.S. Carter devotes equal attention to the hormone oxytocin (which is strongly implicated in social bonding and behaviour) and the concept of love, concluding that oxytocin may play a central role in the neurobiology of love. Noting the protective nature of love in all its many manifestations, she offers the intriguing possibility that, through the study of the effects of oxytocin on the brain, we may come to understand how love mediates its physical and emotional protective effects. In the next essay, (*On pheromones, vasanas, social odors, and the unconscious*), M.K. McClintock discusses the effects of social interactions on pheromones and other social chemosignals, and *vice versa*.

In the majority of the remaining essays, the emphasis shifts more towards how social processes are manifested in the brain, and the impact of biological factors on these processes. R.J. Davidson's contribution (*Affective style: causes and consequences*) explores the neural correlates of individual differences in affective style (crudely, to what extent the world elicits positive and negative emotions from an individual). Remarkably, the relative activity of right and left prefrontal cortex in a person can reliably predict affective style. As Davidson notes, affective style may play an important role in several mental disorders. A reliable neural correlate of emotion regulation provides a new window to understanding how the biological factors involved in individual differences in affective style might act to impact mental and physical health. Moreover, it provides a new means of assessing the effects of interventions (such as meditation) on affective style, and in individuals with emotional disorders.

D.L. Schacter's essay (*When memory sins*) mostly comprises an account of the contribution of cognitive neuroscience to our understanding of memory. However, he points towards a few avenues of research in which social issues relating to memory are beginning to be addressed. The achievements and potential of the social neuroscience approach are more directly addressed in Berntson & Cacioppo's essay, *Multilevel analyses and reductionism: why social psychologists should care about neuroscience and vice versa*. They offer both concrete examples of the social neuroscience approach, and a more abstract discussion of its potential power. In a demonstration of top-down influences of social factors, they explain how examining the effect of social stressors on autonomic responses has led to an important redefinition of physiological accounts of autonomic control. Conversely, autonomic states and other lower-level functions have important impacts on higher level cognitive functions, including memory, emotion and decision-making.

R. Adolph's essay (*Emotion, social cognition, and the human brain*) offers an impressive summary of the neural structures involved in processing social and emotional

processing—particularly from facial expressions—and yields important examples of how analysis at the neural level may indeed “constrain and inspire” psychological accounts. The final essay (S.E. Taylor’s *The Accidental neuroscientist: Positive resources, stress responses, and course of illness*) echoes earlier essays in its return to the interaction between social stress and biological systems. Taylor’s essay, however, includes in its analysis consideration of the roles of psychosocial resources, such as psychological outlook and social relationships, in mediating mental and physical health.

The aim of this collection—to showcase the breadth and potential of the discipline of social neuroscience—is unarguably fulfilled. In addition to the wide range of innovative research described in *Essays in Social Neuroscience*, many of the authors also convey to the reader their own excitement about the advances that future research will bring. The very breadth of social neuroscience—the range of research fields and methodologies that it encompasses—inevitably makes for demanding reading for the non-expert at some points. However, for those curious about this brave new discipline, the effort is well worthwhile.