Explaining violence - towards a critical friendship with neuroscience?*

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ABSTRACT

The neurosciences challenge the 'standard social science' model of human behaviour particularly with reference to violence. Although explanations of violence are interdisciplinary it remains controversial to work across the division between the social and biological sciences. Neuroscience can be subject to familiar sociological critiques of scientism and reductionism but this paper considers whether this view should be reassessed. Concepts of brain plasticity and epigenetics could prompt reconsideration of the dichotomy of the social and natural while raising questions about the intersections of materiality, embodiment and social action. Although violence is intimately bound up with the body, sociologies of both violence and the body remain on the surface and rarely go under the skin or skulls of violent actors. This article argues for a non-reductionist realist explanation of violent behaviour that is also interdisciplinary and offers the potential to generate nuanced understandings of violent processes. It concludes that sociology should engage critically and creatively with the neuroscience of violence.

Key words: Social science, violence, critical neuroscience, biosocial intra-actions

Violence is about the body. It is enacted by bodies; it has instrumental and ritual manifestations, it creates boundaries and destroys them, as well as violating, polluting and destroying bodies. It stands at the intersection of many human sciences with differing conceptions of humanness and action yet the relationship between bodies and violent behaviour is contested. While in much of the post-War period the 'standard social science model' (SSSM) has had ascendency, over the last two decades neuroscience has challenged this and claimed jurisdiction over most facets of human behaviour, including crime, empathy, fear, impulsivity, kinship, obesity, racism, suicide, trust, love, violence, wisdom and many more (Vrecko, 2010)[1]. The SSSM is accused of ignoring non-social explanations and being closed to the possibility of interaction between genes, brains and social experience. In turn neuroscience is accused of reductionism along with individualizing and pathologizing social problems. There are fundamental issues at stake here over the nature of conscious life, intentionality and the determinants of the human. While this discussion

cannot resolve these it does suggest that the debate provides opportunities to reconsider sociological concepts of embodiment in relation to explanations of violence. There is often demand, especially from research councils, for greater interdisciplinary, transdisciplinary and multidisciplinary cooperation but in practice we are often inter, trans and multi with disciplines that are most cognate to our own and pose fewest challenges. Although bioscience is often accused of reductionism its recent emphasis on plasticity, and in particular epigenetics[2], suggest productive ground for rethinking the tortured history of relations between biology and sociology. One might not go quite so far as Rose (2013) in saying 'No longer are social theories thought progressive by virtue of their distance from the biological. Indeed, the reverse assumption is common – it seems that 'constructivism' is *passé*, the linguistic turn has reached a dead end and a rhetoric of materiality is almost obligatory'. However, the idea that 'we are our brains' is widely (if not universally) regarded in neuroscience as exaggerated and there are suggestions of possible rapprochement between the disciplines, such as Franks' (2010) 'neurosociology' although he leans more to the neuro than the social. Even so, a review of these formerly entrenched disciplinary divisions will pose challenges to both. This discussion focusses on these issues with reference to violence and addresses the question posed by Fitzgerald & Callard (2015) that is, 'what might happen if we set aside our usual disciplinary allegiances and identifications' in relation to social and neuroscience? It offers a different answer to theirs[3] but takes up Rose and Abi-Rached's (2013, p. 3) call for a 'critical friendship' with neuroscience.

Sociology, violence and the body

Violent behaviour is complex and multi-layered and is unlikely to have simple explanations. Some social conditions of crime and violence are well known, such as inequality, social exclusion, deprivation, cultures of masculinity, youth gang cultures, the drugs trade, consumerism and social strain. But these often over-predict its incidence while violent perpetrators might not fit these demographic profiles. Indeed, this leads some, such as Collins (2008, p.2-3) to dispute the relevance of social structural causes at all. However, paradoxically perhaps biosocial explanations might restate the significance of structural and demographic factors. Rudo-Hutt et al (2011) claim that hormones and neurotransmitters interact with social factors so that while deprivation might account for much violent crime, analysis of combinations of childhood abuse with deprivation and genetic risks point towards multi-layered explanations of violence. Social structure is relevant then in combination with other risk factors which might explain variance from typical demographic profiles. Further, reductionist versions of neuroscience (e.g. Rosenberg, 2006) are challenged by concepts of emergence – understanding how phenomena not apparent in parts appear in the whole – which allow multiple, genomic, neurological and social modes of explanation that overcome hypostasized categories of 'the body' and 'the social'. While recognising that the brain is the necessary condition for consciousness, since Cartesian dualism now seems untenable, we might rather think in realist terms of overdetermined bi-directional multiplicity. This might point a way out of the blind alleys of determinism and reductionism and view the brain and nervous system as nested in the body and environment such that their functions can be understood in relation to both.

Violence is intimately to do with the body and engages intense emotional arousal, in particular, aggression, anger, hate and as Randall Collins (2008, *passim*) argues confrontation/fear. Yet violence has received surprisingly little attention from the sociology of embodiment, with the exception of feminist theories such as Grosz (1994). Violence is mentioned only in passing in Shilling (2012), Turner (1984) and Featherstone *et al* (1991) and not at all by Leder (1990). Moreover, the previously absent body rediscovered in sociology is sometimes rather *dis*embodied. Cromby (2007) claims that 'in much of this work [on the body], the actual flesh and blood body, the body-brain system of neurones, hormones, glial cells, neuro-transmitters, muscles, bones and skin, is largely absent. In its place appear relatively undifferentiated notions of the body as … the carrier of symbolic meanings'. The body then is performed, adorned, objectified, commodified, technologized and disciplined, which indeed it is, although this does not tell us much about the body's physical recalcitrance, how it acts as a limit or interacts with social processes. Similarly, Williams (2006) asked 'where is the body in medical sociology?' which remains disembodied, disincarnated and dematerialized. Yet bodies 'surprise us, betray us' and render our constructions of them problematic. Williams calls for more delving into bodies rather than remaining on the outside and Newton (2003) argues similarly. Similarly Shilling counters the constructivist tendency with 'corporeal realism' which views the body as a multidimensional medium of perception, social activities and sensual visceral experience. Thus bodies possess a reality of which we are acutely aware through the experiences of pain, sexual arousal, strong emotions, menstruation, voice breaking and so on (Shilling 2012,

p.281). It is possible that contemporary neuroscience might open the way for a more constructive dialogue.

Neuroscience is a social practice

Before examining this dialogue various sociological objections should be considered. One strand of the sociological critique of neuroscience is to insist on its 'social construction' and to point out that what counts as important in the social sphere is likely to be invoked as important in neural processes. For example, Troy Duster (2006) rightly critiques the tendency to prioritize genetic and neurological research to explain complex social behaviour and health outcomes where this ignores the social, economic, and political aspects of health. So, for example in 2001-05 when the National Institute on Alcohol Abuse and Alcoholism commissioned research into exceptionally high rates of alcoholism among Native Americans they looked to Identify genes that are involved in alcohol-associated disorders, rather than social structural causes. In response to this trend he says that sociologists should more systematically demonstrate how the categories on which this apparently objective data is founded are really socially constructed. This is a valid though only partial critique.

It is true that diagnostic criteria and concepts are structured upon certain assumptions and understandings about social categories, which Hacking (1995) describes as 'looping effects'. 'Disorders' such as 'oppositional defiant disorder', 'conduct disorder' and 'antisocial behaviour disorder' could be strategies that locate social problems in individual pathology rather than in political issues of inequality and disadvantage (e.g. Eastman & Campbell, 2006). Further, data is generated in a social context and brain sciences are embedded in

historical cultural, political and economic formations and brain images have been produced in laboratories. As Rose and Abi-Rached (2013, p.76) point out, rather than being 'non-places', they are rather unusual arrangements of space, persons, machinery, sounds and sights. They are organized spaces in which multiple practices and disciplines including neuroscience, computational theory, physics, computer science, statistics, and nuclear medicine all intersect. There are resolution limitations in neuroimaging technology, limited participant selection and often inadequate distinction is made between different types of violence, notably impulsive and predatory (Bufkin & Luttrell, 2005). Moreover, there are problems of replication and controls in brain scan evidence and subjects' functioning during experimental tasks are rarely compared with a 'normal' template (Canli & Amin, 2002; Pridmore et al 2005). Functional magnetic resonance imaging (fMRI) measures the increased flow of oxygenated blood, which becomes a proxy for cerebral activity but brain regions may serve multiple functions and the process of imaging is 'messy, intimate' and not 'fact producing' but performative (Fitzgerald & Callard, 2015). Fine (2010) shows how cultural biases enter experimental fMRI evidence of gender differences that then are recycled as 'facts'. Rather than reject the method though she emphasises the importance of understanding brain interconnectivity rather than focus on particular cortical areas (2010, p.153). On the other hand, neuroimaging is just one component of a wider set of social and life history data and cumulative evidence points to a strong association between increased aggressiveness and reduced pre-frontal cortex (PFC) activity (Brower & Price 2001).

It is also true that caution should be exercised in the use of neurological explanations. First, even when present, brain damage may have an uncertain, or no relationship to the violent

behaviour. PFC disruption is only relevant in combination with social factors that may enhance or diminish it (Bufkin & Luttrell, 2005). Second, this data is exclusively based on known criminal populations while as Collins shows, the sociology of violence should understand the shared dynamics of both legitimate and nonlegitimate violence – so for example the bodily, affective and interactional dynamics of being an army sniper or hitman are similar in gaining 'dominance in attention space' (2008, p.431ff). Third, in group analysis high scoring individuals will compensate for low scoring – so not all 'psychopaths' will have reduced PFC activity (van Veelen, 2009). Fourth, individualized pathology cannot adequately account for collective violence and ethnonational conflict, which is often extreme and can arise rapidly among people who previously lived together relatively peacefully. The epigenetic effects of such conflicts though might have consequences for subsequent experience of trauma and responses to stress. Fifth, there are macrosocial 'facts' such as inequality and poverty, legislation on lethal weapons and cultural values that affect known rates of violence in populations[4]. Violence is not then a fixed trait but varies historically and between societies. If we are to properly understand violence in a global context, then the socioeconomic and organizational structures that foster or inhibit violence and how these become embodied need to be understood too.

Nonetheless, the interdependence of the self, emotions, actions and bodies means that just dismissing the data as a 'social construction' is not sufficient. There is a complex interdependence of social and neural processes which needs to be reiterated to both 'sides' of the debate. Fumagalli and Priori (2006) claim to have identified the brain locations necessary for moral reasoning in the frontal, temporal and cingulate cortices where

hormones moderate moral behaviour, which if dysfunctional give rise to 'abnormal morality'. However, there is debate over these claims. Abend (2011) argues that neurological experiments use 'thin' but not 'thick' concepts of morality. Experiments, he says, typically investigate subjects' judgments about 'thin concepts' of rightness, appropriateness, or permissibility rather than 'thick' ones of dignity, integrity, humanness, cruelty, exploitation or fanaticism that are dependent on institutional and cultural structures and less easily correlated with neural processes. One might note three further issues that will be pursued later in this paper. First, much work on 'neuromoral networks' is largely task-oriented (because brain responsiveness to these can be measured by scans) but practical moral judgements are often more often tacit, intuitive and subliminal (e.g. Haidt, 2001). Second, cognitive neuroscience claims to identify various brain locations involved in moral judgement but rejects the concept of a 'moral centre' in favour of a system linking multiple regions (e.g. Damasio 2012, p.77; Verplaetse et al 2009, p.9-10). Thus Pietrini and Bambini (2009) conclude 'No functional neuroimaging research to date has yielded normative data that can be used to distinguish between the neural correlates of normal and abnormal behaviour'. Third, and most important for this discussion, it is often asserted that human moral systems evolved to stabilize cooperation and supress aggression but they also evoke hostility, conflict, punitiveness, disgust and social aversion – so there is no simple polarity between social order and aggressiveness. Morality is heavily imbricated with affectivity and Antonio Damasio (2012, p.125) argues that social emotions, which will be considered later, incorporate moral principles and these are embedded in biosocial intra-actions[5]. Experiencing an emotion such as shame, jealousy, or empathy involve

mindreading, that is representing the mental states of others, and therefore positive or negative social judgements[6].

Neuroplasticity

Neurological research then is a social practice but, it will argued that a critical engagement with neuroscience within wider social theoretical debates is a challenge to reconsider the vague totalities of 'the body' and 'society'. Indeed, recent developments in neurology render simplistic causal analysis out-dated since theories of neuroplasticity suggest new modes of biosocial intra-actions. However, neuroscience, as opposed to some popular representations of it, models complexity, plasticity and malleability of neural structures. Whereas the brain was previously regarded as fixed, 'plasticity extends beyond the early phases of development … [to] later periods of the lifespan' (Champagne, 2010) demonstrating ongoing susceptibility to environmental influences. Lemke (2004) argues that the social power of genetic information 'lies less in the resurrection of genetic determinism and more in the construction of genetic risks'. Genetics, he says, seeks 'probabilities, possibilities and expectations, referring less to a model of determination than to the mode of dispositions'. Indeed, when earlier biological theories are described as 'dogma' (Champagne 2010) there are indications of a scientific revolution underway. While genes structure brain development, learning reinforces or suspends synaptic links leading Wexler (2006:8) to refer to 'remarkable neuroplasticity, and Catherine Malabou, with allusion to Marx, to claim that 'people make their own brain but they do not know it' (2011, 35). Plasticity is found in development, modulation and reparation as brains develop in

interaction with the environment through human action. Learning and memory reinforce or suspend synaptic connections. There is then a basis for reconfiguring the relations between nature, bodies and society, for which many sociologists have been calling for some time and which genetics and neuroscience are now obligingly enabling. Indeed, as Raymond Tallis (2012, p.152) comments the 'the increasing emphasis on post-genomics, epigenetics, integrative biology and the influence of the environment is an indirect criticism of the hype around DNA'. Certain brain regions appear to be continually modified by experience as new cells are generated in the hippocampus and olfactory bulb (Fulwiler, 2003). Maguire *et al* (2006) compared the posterior hippocampi (linked to spatial awareness) of London taxi drivers with a control group and found using structural MRIs that those of taxi drivers were significantly larger relative to those of controls and that the variance was greater the longer drivers had been doing the job. Damasio (1994, p.78) writes of a multi-layered self in which molecules, synapses, local circuits and systems, sociocultural factors, past and present, all intervene powerfully. Then there is the idea of the 'social brain' developed for and empathy and intersubjectivity resonating with Collins' (2008) understanding of humans as 'hard wired for solidarity'.

Cromby et al (2011) note that plasticity 'has its limits of course' but 'nevertheless provides both arguments and evidence for accounts of subjectivity that can neither be "read off" from the neural nor understood thoroughly in its absence. This trend is further exemplified in epigenetics, which attempts to identify the mechanisms of somatic plasticity whereby biology is modified by social experience while challenging much pervious biological orthodoxy and reopening the nineteenth century debate between Darwinians and

Lamarckians on the transmissibility of acquired characteristics, which was for a long time thought heretical[7]. This is particularly salient for understanding both the bodily effects of violence and the mechanism for the neural coding of social influences. The environmental consequences of socially generated effects such as poverty, stress, exposure to toxins and poor diet prompt epigenetic mutation. One example of this is the onset of cancer where tumour suppressor genes are silenced and bodies are at risk of cancerous growths (Carey 2012, p.215). Research on the 'Dutch Hunger Winter' (1944) found genetic effects transmitted across three generations (e.g. Walker & Cicchetti, 2003). Exposure to stressful events can produce long-term biological alterations for example in the hypothalamic-pituitary-adrenal (HPA) axis, which regulates cortisol levels[8] (Oitzl et al, 2010; Sharkey 2010; Yakyavi, 2014). Similarly studies with children of Holocaust survivors found increased susceptibility to stress across subsequent generations (Cicchetti et al, 2013) although this could also be transmitted environmentally. Nonetheless, it seems that persistent stress and fear have effects on brain development and can change neurocognitive functioning. Thus growing up in violent areas will have developmental effects since in neighbourhoods with high homicide rates children frequently experience fear, especially immediately following the discovery of a corpse, which in turn has effects on learning, memory and ability to deal with stress (Raine 2013, p.263). In this way epigenetics as Rose (2013) says creates a 'crucial role for the social and human sciences in accounting for the shaping of vitality at the molecular level'.

The biosocial feedbacks between exposure and vulnerability to trauma indicate that it is important to theorize cultural and material facets of the body. Violence is both expressed

and experienced through the body and large scale violence involves direct slaughter, affective assaults on whole populations and 'slow violence' of environmental and infrastructural degradations (McSorley, 2015). Post-traumatic stress disorder (PSTD) has transmissible bodily effects since trauma involves a fundamental rupture of a coherent sense of self and body. Exposure to stress and toxins in childhood may increase vulnerability to disease, including PTSD and other mood and anxiety disorders through the developmental intra-action of genetic variants with neural circuits that regulate emotion (Neigh et al, 2009). Ethnographies of soldiers who experienced PTSD describe how knowledge of their condition 'interpolates soldiers into the grammatical position of victims' and address the threats debilitating illness poses to self-concepts of masculinity and heteronormativity (Kilshaw, 2009). But Wool (2013) points out that valid as these cultural analyses are, 'reading PTSD as cultural text' draws away from phenomenological experiences. Robinson (2011) integrates neurophysiological concepts PTSD with soldiers' memoires, bringing veterans' accounts of the trauma of war into dialogue with the wider research literature on PTSD. The genetic, neurochemical and neuroimaging findings then suggest a complex role for gene-environment intra-action in pathogenesis of violence (Staniloiu & Markowitsch, 2011). However, these effects are differentiated since not everyone exposed to trauma will demonstrate altered HPA axis functioning (Neigh et al, 2009) suggesting that there are complex cumulative and intergenerational effects through which neural development is moulded historically.

Towards a biosocial theory

If these observations are now focussed more closely on violence there are a number of issues to consider in developing a realist theory on multiple levels. The following discussion addresses two related aspects of this. First, the control paradigm in neuroscience, which has a parallel in sociology, both of which understand violence as a result of damaged or inadequate controls. Second, a more specific theory of emotionality and violence which integrates neurological and social explanations into a hypothetical model of violence and emotional entrainment.

Violence, control and complexity

A considerable amount of violence literature focusses on failures of control systems. This approach addresses mainly impulsive rather than predatory violence and will require qualifying in the following section but it enables us to think in terms of socio-neural systems. Control theories implicitly or explicitly invoke a Hobbesian theory of innate violence that has gradually been moderated by complex socio-psychological bonds. Steven Pinker for example says 'most of us-including you, dear reader – are wired for violence' (2012, 483). Similarly, David Buss (2006) claims that violence features extensively in the imagination but is generally inhibited, so for example, 91 per cent of men and 84 per cent of women have had at least one vivid and intense fantasy of committing murder suggesting that 'all of us house in our large brain specific specialized psychological circuits that lead us to contemplate murder as a solution to specific adaptive problems' (2006, 30). These theories will be contrasted with more promising interactionist biosocial approaches.

For contemporary neuroscience the case of Phineas Gage in 1848 became an exemplar of the effects of traumatic frontal injury on affective behaviour, which is still regularly cited in neurological papers (e.g. O'Driscoll & Leach 1998; Van Horn et al 2012; Verplaetse *et al* 2009). Gage, aged 25, was the foreman of a crew cutting a railroad bed in Cavendish, Vermont. When using a tamping iron to pack explosive powder into a hole, the powder detonated and a tamping iron—43 inches long, 1.25 inches in diameter and weighing 13.25 pounds—shot upwards, penetrating Gage's left cheek, passing through his brain and skull, landing several feet away. Remarkably he survived the accident and recovered but, according to some accounts, with significant personality change, becoming unpredictable, volatile, irreverent, 'indulging at times in the grossest profanity, which was not previously his custom', and 'was no longer Gage' (O'Driscoll & Leach 1998). John Harlow, the physician who treated Gage with considerable skill, was influenced by phrenology and keen to demonstrate that the location of the brain damage had affected his self-control as a result of damage to the organs of Veneration and Benevolence (Macmillan, 2010). Whatever the facts of this case, the incident set the scene for subsequent neurological concepts of the frontal cortex control theories of violent behaviour and indeed for some simplification of the relationship between violence and control, which one might call the 'Gage effect'[9].

Biosocial theories claim that behaviour 'previously believed to be social is actually multifactoral' and those showing evidence of phenotypes associated with deficits in self-control have a high probability of violence (DeLisi, 2015). The orbital PFC is involved in many pacifying and controlling faculties of the mind, including planning, self-control, empathy and sensitivity to norms. It is claimed therefore that damage to or inadequate development of

the PFC predisposes actors to increased impulsiveness and low inhibition (e.g. Pietrini & Bambini, 2009). This is because the potential for violence, or at least aggressiveness, emotionality and impulsiveness arise from the core brain regions of oldest basal nuclei, the globus pallidus, the olfactory bulbs and amygdala, which in the functioning controlled brain are regulated by developed the PFC (Pallone & Hennessy, 1998; Brower & Price, 2001). The amygdala stores emotional memories, is central to learning to associate stimuli with consequences (Davidson *et al*, 2000) and reduces constraints on action when the actor perceives danger, so damage to neural circuits with the PFC can increase perception of and responses to threat (Fumagalli & Priori, 2012). Disruption of the neurotransmitters regulating cortisol, serotonin and testosterone, it is claimed, are often linked to aggressive behaviour – where levels of the former are low and of the latter high (e.g. Bernhardt, 1997; Kuepper *et al*, 2010; Mehta & Beer, 2010; Raine, 2013). Dissociation of moral emotions from reasoning, where the actor has no interest in the consequences of their actions is also explained with reference to damage to the PFC and reduced metabolic activity (Haidt, 2001). Neuropsychological defects, such as brain dysfunction, hormone and neurotransmitter abnormalities in the limbic system and PFC can be identified in murderers and habitually violent offenders. According to Pallone and Hennessy (1998) frontal lobe damage is found in homicide offenders to a rate of 32:1 with the general population.

This evidence does not preclude social causes and it is possible that identification the PFC as crucial for controlling emotions and impulsivity might provide understanding of the gaps in existing explanations. While violent crime correlates with well-known social variables, such as the relationship between homicide and poverty [r^2 =.68] and inequality [r^2=.59] (Ray

2011, pp.134-43), the pathways or mechanisms are not well understood and knowledge of neural processes develops explanations of the intra-action of the social and biological. Rain (2013, p.263) claims that 'the social has proved to be more important than imagined' (by whom he does not say). Similarly, Pietrini and Bambini (2009) call for a 'non-reductionistic conception of criminality' that addresses multiple explanatory levels. No longer is there a search for *the* 'violence gene' but complex post-genomic systems analysis suggest multiple biosocial influences (Buckholtz & Meyer-Lindenburg, 2008; Hacking, 2006; Ferguson & Beaver, 2009; Meloni, 2014). There has been extensive research on the relationship the gene variant of the MAOA gene (that regulates neurotransmitters such as dopamine and serotonin) and childhood abuse. High levels of MAOA expression seem to protect against aggression in later life while low levels increase the risk (Roach & Pease 2015, p.75). We might note though that Brunner, the psychiatrist initially involved in this research, has distanced himself from some of the claims made for it[10] and later findings are contradictory (Verhoeven *et al*, 2012).

In a sense sociological control theories that regard violence as an outcome of defects in socially regulating bonds are the mirror of neuro control theories. Social control theory suggests that 'antisocial behaviour' is reduced by regulatory social bonds such as attachment and sensitivity to others, commitment (investment in conventional society), involvement (keeping occupied which reduces opportunities) and beliefs (commitment to obeying the law). Weakness of these bonds results in low self-control, a 'semi-permanent enduring personality characteristic' that remains 'reasonably constant over the life-course' (Gottfredson & Hirschi 2000, p.151). This is also a theory of impulsivity that regards the

majority of crimes as involving no planning, little loss, less gain, are pursued for short-term gratification with little weighing up of costs (Burt 2015, p.143). Further, the regulatory systems inhibiting violence will change over time and the long-term decline in European homicide from the Middle Ages to the mid-twentieth century (Eisner, 2001) is attributed in part to the growth of psychical 'equipment of emotional control' (Spierenburg, 1994). This could be seen as a kind of social-neural feedback, which Damasio (2012:292) calls 'sociocultural homeostasis'.

Nonetheless, these are complex overdetermined systems of social and bodily intra-action and while anomalies found in the frontal limbic system are associated with loss of control they depend on their intra-action with social learning and environment (Brower & Price, 2001; Pietrine & Bambini, 2009). It is not always acknowledged that whereas evolutionary psychologists (such as Pinker) often regard aggression as an evolutionarily adapted means of inter-group competition, neuroscience emphasises differential learning and failures of PFC controls as conditions for violent behaviour (De Schrijver 2009, p.263). Further, the relationships between neural dysfunction and aggression are complex. For example, while 'lack of empathy' is often cited as a factor in increased aggressiveness, Decety *et al* (2008) found *increased* empathetic mimicry among youths predisposed to aggression, so that the injury or hurt of a friend or gang member could provoke exaggerated aggressive responses. What they do not note, however, is that this response in turn presupposes a social interactive process of group bonding and in-out group affective identifications and mindreading where they experience the emotional states of others. Mark Hamm's (1994) study of violent American racist gangs illustrates this. He describes them as having both 'a

profound sense of hopelessness mixed with rage that no one could prevent terrible things from happening' (1994, p.80) and close friendships since they 'appear to love and value one another' in a family-like mentality (1994, p.184).

In contrast to simple control theories, Collins argues that rather than view violence as innate we are rather 'hard-wired' for solidarity and 'interactional entrainment', which makes violence difficult because it 'directly contravenes the tendency for entrainment in each other's emotions when there is a common focus of attention' (Collins 2008, p.27). This explains why aggressive confrontations are far more common than violent ones (see also Felson *et al*, 2003) since the latter require overcoming inhibitions of confrontation tension/fear (*ct/f*) which occurs only in specific interaction sequences among 'the violent few' (2008, p.370ff)[11]. Even so, his concept of 'moral holiday' suggests that violence is, at least for some, an enjoyable release from constraints while his central concept of 'emotional entrainment', as noted above, implies neurological feedback loops, even if he does not pursue this dimension himself. The experience he describes of 'forward panic' involves intense emotional arousal – rage, frenzy, elation, 'roaring down a tunnel' and lack of control from which one might not emerge, as when rampage shooting ends in suicide of the assailant (2008, pp.91-4). Further, entrainment is dependent on unconscious (subliminal) mimicry involving mirror neurones and premotor links between perception and action (Decety & Batson 2009, p.115). Developing complex biosocial systems of violent behaviour will enable the development of multi-layered explanations such as that in Diagram 1, which is discussed in the next section.

For control theories violent emotions arise from below so to speak, from deep regions of the brain. However, violence is not only a control problem but on the contrary also involves overriding feelings of compassion and be directed by higher cognitive functions. Indeed, the implication of Collins' work is that violence is a 'skill' exhibited by relatively few people rather than decontrolled raging. In this context one can distinguish ferocious from callous violence (Collins, 1974) which have different sources. Regarding the latter Pinker (2012, p.506) says the 'most brutal serial killers minimize and even justify their crimes' and the cerebral parts of the cerebrum are neither 'inner demons nor better angels' but rather tools that can foster violence or inhibit it. Hannah Arendt referred to the 'Himmler trick' whereby mass murderers do not recognize their responsibility but rather say 'What horrible things I have had to watch in performance of my duties, how heavily the task weighed on my shoulders' (Arendt 2006, p.106) thereby congratulating themselves on their higher 'ethical' will to resist any temptation to give in to humanitarian feelings, exemplified by Himmler's 1943 speech to SS officers in Poznan[12]. This illustrates the complexity of ethical and moral judgements noted above, which are not simply 'controlling' but can also facilitate dehumanization and violence especially when combined with disgust. Damage/control theories address some violent situations but a theory of the emergence of violent action needs to elaborate the role of emotions and the meanings of violence for perpetrators.

The materiality of emotions

There are parallels between social and biosocial control theories although this approach to violence is limited, being a hydraulic model of impulse and control. An emergent theory of violent behaviour that is less focussed on brain malfunction but pays more attention to the

socio-neural responses might be developed through attention to emotionality. It has been seen that neuroscience is not necessarily 'hard' but rather is an embedded social practice that, like any other, requires social reflexivity on its methods and results. The 'neuromolecular gaze' risks 'flattening subjectivity' (Cromby *et al*, 2011) effecting a shift from social and psychological to biological systems, yet neuroscience has developed frames of reference that are open to social analysis. At the same time, while sociology has given attention to the embodied nature of sociality, and in particular to emotions, it has not grappled with deeper somatic embeddedness. This can be pursued with reference to the role of emotions in behaviour and concepts of the self. While social judgement is formed intersubjectively (and cannot therefore be purely individual) moral and normative judgements at the same time involve complex limbic processes. People have high emotional investment in mutually shared social expectations, which is Illustrated by the resultant outrage and moral anger when they are breached as for example in Garkinkel's breaching experiments (Barbalet 2001, p.143). Indeed, arguably, judgements about action involve moral emotions more than they do moral reasoning which is rarely the direct cause of actions and reasoning is often formulated ex post facto and orientated to social expectations (Haidt, 2001). As George Herbert Mead (1967, p.196) put it, 'It is only after we have acted that we know what we have done'.

Emotions are core to Thomas Scheff's theory that violence is always the outcome of spirals of unacknowledged shame and rage, a thesis he attempts to demonstrate across micro and macro levels of behaviour. Shame, he says, is a 'master emotion' in the sense that anticipation of the judgements of others (i.e. potential shaming) is core to sociality but at

the same time warps our understanding of ourselves and others in a way that makes sustainable relations extremely difficult. For Scheff shame is the motor of violence when repressed and operates in a similar way to unresolved grief as 'humiliated fury'. He identifies alternating pathways of silence/violence, especially among men who internalize dominant conceptions of masculinity:

> *Hypermasculine men are silent about their feelings to the point of repressing them altogether, even anger …. Repressing love and the vulnerable emotions … leads to either silence or withdrawal, on the one hand, or acting out anger (flagrant hostility), on the other. The composure and poise of hypermasculinity seems to be a recipe for silence and violence.* (Scheff 2006a)

Emotional responses then are structured by social relations (in this case gender) but manifest along pathways that are not easily available to verbal recognition and articulation. This is why both interpersonal and macro conflicts that are embedded in shame dynamics become interminable cycles of quarrels and impasses that will not be susceptible to easy resolution. Further these styles of communication are learned in childhood (Scheff 2006b, p.31) and structure adult relationships although they will be culturally variable arising from differential socialization patterns. In an 'honour culture' for example, violence might be a socially expected response among men to a perceived shaming (see for example Nisbett & Cohen, 1996).

This model has been applied in various ways. For example, Ray *et al* (2004) argued with reference to racist violence and Ray (2014) regarding the English August 2011 riots that the

combination of material disadvantage with the social shame of exclusion was violently externalised as ‘righteous anger’ on symbols of shame and exclusion: the police, local communities and consumer goods. James Gilligan notes that ‘the prison inmates I work with have told me repeatedly, when I asked them why they had assaulted someone, that it was because 'he disrespected me‘ (2000, p.106) and ‘I have yet to see a serious act of violence that was not provoked by the experience of feeling shamed and humiliated, disrespected and ridiculed, and that did not represent the attempt to prevent or undo this "loss of face" - no matter how severe the punishment, even if it includes death’ (2000, p.110). This resonates with Scheff’s claim that the cycle of repressed shame-alienation-lack of empathy-aggression can result in violent outbursts. The self is emotionally valenced, that is, structured by the intrinsic attractiveness (positive valence) or aversiveness (negative valence) of an event. However, according to this view, some emotions are a threat to the self and are placed ‘out of reach’, that is, repressed but nonetheless retain the power to affect interpersonal relationships. Shame further entails angry passivity since, as Jack Katz (1999, p.144) notes, it is resistant to ‘the active voice’ and denotes incapacity for action that ‘highlights ones being more than one’s doing’ (1999, p.146). He continues to suggest that shame involves mystery, something hidden, isolation from community, moral inferiority, vulnerability, and a sense of chaos.

These accounts though do not explore the embodidness of emotion or repression as a psychoneural process. While the *source* of humiliation will be social, as a feeling it is expressed in the brain and engages complex neural processes, being then an example of biosocial feedback that entails both non-linguistic feelings and linguistic communications. It

is true that repression is not a 'scientific' concept for neuroscience although some, such as Heather Berlin (2011) are working on possible neural process of repression to show that subliminal processes evoke activation of cortical areas so that people 'feel things without knowing they feel them'. This idea is also central to Damasio's concept of consciousness where emotions are biological-organic *and* symbolic gestures that appear as intense arousal but without being acknowledged as feelings. So someone can 'feel without knowing they feel' although these feelings manifest behaviourally and can be observed by third parties – such as someone unconsciously expressing aversion to a member of an ethnic minority (2011, p.40). He proposes a three-stage process whereby states of emotion once triggered in brain stem nuclei appear as unconscious feelings ('having a feeling') which can become known, that is, conscious but private, then publicly articulated feelings. These correspond the three levels of the self – the proto-self, which is unconscious and experiences primordial feelings but also the capacity to interact with others; the core self, which is the feeling 'I' of self-awareness and narrative sequences of images and feelings of emotion; and the autobiographical self or the 'what I am' of memories and temporality[13]. This is relevant for understanding the source of violent emotions in that unlike control theories it envisages a complex biofeedback process. The brain can stimulate but also *simulate* bodily states since as we witness the actions of another our body-brain adopts the feeling state (as-if) we *would* assume ourselves (2012, p.104). The recall of ideas and memories modifies the body in loops engaging cognitive reactions and normative principles along with feelings of emotion. From this point of view, the normative principles then engaged, say, indicating

that violence is a legitimate response to perceived humiliation, derive in part from neurally encoded learning and also from socially shared expectations.

While Damasio does not explicitly acknowledge the process of repression[14] he regards homeostasis as a core neurological process (e.g. 2012 *passim*). Since this maintains the stable equilibrium of the organism and shame is experienced as emotional pain and a threat to one's self-identity, homeostasis could be a neural process for the repression of shame and protection of self-identity. A similar analysis of the socio-neural bases of shame and violence is developed by Jonathan Turner (2007) who argues that 'most of the time the brain does not think in words'[15]. Rather emotions are gestalt patterns that are translated into sequential speech via Broca's area and information processing via Wernicke's area. Quick emotional processing (based in the amygdala and habituated responses) vies with specialized spatio-temporal other-directed thought (Haidt, 2001) and in situations of Collins' *ct/f* the former will exercise hegemony over the latter. Whereas positive emotions are attributed to the self and reinforced in interaction rituals, negative emotions will tend to be repressed and attributed to external objects. However, while Damasio describes how feeling perceptions are mapped onto the conscious self he does not deal with misattribution where the subject does not recognize the sources of shame or indeed why they are responding violently to certain stimuli. For example, street gangs whose members dropped out of schools often do not vent their anger at the schools but at other gangs (Turner 2007) or indeed on culturally available pariah groups.

Further, there is a developmental biosocial intra-action following the experience of injustice and abuse. Based on ethnographic work in economically depressed urban areas in northern England, Winlow (2014) found that experience of traumatic events and prolonged periods of insecurity during childhood, set against a cultural background which values violent response to perceived humiliation, can act to create a deep commitment to physical violence. He identifies 'a form of subjectivity that understands itself principally in relation to violence'. This could (though Winlow's Lacanian theoretical approach would not suggest enthusiasm for it) be further investigated with reference to research noted above on low MAOA expression, childhood trauma and aggression.

This line of thought might open a nexus for connecting social experience, self-concept, psychodynamics and the brain as overdetermined complex material processes. This might be particularly productive if one focusses less on the brain damage model (the Gage effect) but more on the intra-action between neurosocial processes and developmental trajectories. For example, for Honneth (2007, p.72) negative emotional states of shame, anger and frustration make us conscious of an injustice although these are not automatically experienced as such. Rather, disrespect in a set of relationships in which one seeks recognition can result in internalisation of the rejection, as shame. Experienced as conscious feeling (in Damasio's terms) this might manifest as diffuse anxiety and anger and pleasure in imagining or inflicting harm justified, as noted above, as 'righteous anger'. The latter might as Turner (2007) says be intensified by networks of like-minded individuals where repressed shame/anger takes on a performative and dramaturgical form (such as the example above

of racist skinheads) and social identities that seek scapegoats for experiences of rejection and anger.

These threads can be pulled together in a hypothetical model of biosocial intra-actions in Diagram 1 similar to the 'boxology' of Nichols and Stich (2003). The sources of social shame and injustice leave traces in damaged development and possibly increased susceptibility to stress with cycles of hyperarousal and hyperquiesence (Scheff's alienation/anger) both of which stimulate the limbic system because they involve intense feelings. Triggers of aggressive response might be endogenous as in self-entrainment, or exogenous, such as perceived humiliation or circumstances of a moral holiday. These are both affective and cognitive responses and might entail imagining pleasure in inflicting harm. This as Bollas (1995, p.209) suggests unconsciously seeks to induce in others the experience of traumatic breakdown in trust in the benignity of the world that they experienced. Violence breaks through to remaster trauma and convert anxiety into excitement (1995, 209). This model proposes multiple non-reducible levels of biography, self, neural process, socio-political contexts and the feedbacks between them. While these feelings arise in part endogenously they are also likely to find legitimation in networks of other individuals – thus achieving both solidarity and a coordinated arousal of the limbic system in a sense of unity. 'Nothing' as René Girard comments, is as 'socially cathartic as righteous violence especially when unanimous' (Girard, 1977, p.78) This feedback between feelings, body and group might be short-lived, as in the moral holiday afforded by a riot, or is encoded into habits of action and persist over longer periods and transmitted across generations. In the latter case it can be so to speak stored as a resource to be mobilized. In ethnonationalist 'memories' for

example the humiliation of defeat is often nurtured more caringly than the celebration of victories – one instance of this was the mobilization of 'memories' of the 1389 Serbian defeat at Kosovo Polje (Ray, 1999). In this way interpersonal and collective violence can be understood as outcomes of complex overdetermined neural, historical and social processes.

DIAGRAM 1 HERE

Conclusion

To the question then 'what might happen if we set aside our usual disciplinary allegiances and identifications in relation to social and neuroscience?' one answer is that we would approach the latter with critical and sceptical openness. A better understanding of both the sociological body and violence might be developed through engagement with neuroscience on the basis of a non-reductive epistemological pluralism that moves beyond a human subject divided along disciplinary lines into a bodily and social presence. Fulwiler (2003) claims that 'Whether we focus on trauma, poverty, or racism as causes, the final pathway to violent behavior is through the brain. Our understanding of these influences will not be complete without the biology'. An objection can be raised that this may be neorobiologically accurate but is sociologically anodyne for few would doubt that neural conditions correspond to actions and states of mind (Rose & Abi-Rached, 2013, 145). However, if research establishes mutually determining feedbacks it is contributing to a more comprehensive theory of action. This will generate constructive interdisciplinary engagement only if we acknowledge the tensions and challenges of the project. Some who are developing 'critical neuroscience' (e.g. Salby & Choudhry, 2012) emphasise the

sociological import of cultural biology, the social brain, the social context of neurological knowledge and so on, which of course is very interesting but risks bringing neuroscience safely within the social sciences and thereby neutralizing any challenge it might otherwise pose. Neuroscientists are already engaged in discussing issues such as contextual experimenter bias and the intra-action of social and neural processes. Constructive engagement will acknowledge the materiality of neural processes while resisting reductions of complex biosocial processes to the influence of tissue connectivity. Humans are biosocial and social action requires neural coding as a sufficient condition for action but in turn bodies are moulded by culture, perhaps to a more fundamental degree than previously thought. Like any other social practice, brain science itself is embedded in political, economic and social formations with which it interacts. Certainly, recent developments in neuroscience contain dangers of reductionism and of further medicalizing matters of normative interaction and deliberation. Yet they might also suggest new ways of thinking about the social and the embodied that offer thicker understandings of the processes of violence and embodiment. The purpose of suggesting, somewhat programmatically, such engagement with neurology is not to fix or to legitimate existing social relations. On the contrary, the conservative view of fixed 'human nature' is itself challenged by recent developments that historicize and socialize the body. Indeed, violence is often an outcome of the embodiment of the unruly forces of contemporary society itself, with its alienating methods of production, growing inequalities and techniques of power. The purpose of the critique of the conditions that generate violence is to seek ways in which the impersonal biosociosymbolic order might be reordered for the sanity of subjects.

NOTES

[1] Depending on what search terms are entered, there are around 70,000 papers on neurology and violence or aggression of which 60,000 have been published since 2000.

[2] An epigenetic effect is where the DNA nucleotide remains fixed but chromatin proteins that affect gene expression may become altered by the environment throughout life and transfer to next generation (Champagne, 2010).

[3] Theirs is to write novel genealogies of entanglement of social and natural informed by Actor Network Theory.

[4] Siegel *et al* (2013) found that in the US each percentage increase in gun ownership was accompanied by a 0.9 per cent increase in homicide.

[5] Following Barad (2007) 'intra-action' is preferred to 'interaction' to capture the entanglement of social and biological processes.

[6] Third-person mindreading though, as Nichols and Stich (2003) show, is a rather complicated process.

[7] Epigenetics, still at an early stage of development, appears overcome the Weismann Barrier – the principle that hereditary information moves only from genes to body cells, and never in reverse (Fuller, 2011, p.20).

[8] The HPA axis is a limbic feedback process that releases the hormone cortisol in response to stress while a poorly functioning HPA can increase vulnerability to stress (Smith *et al*, 2006).

[9] Damasio created a computer simulation of Gage's injuries and concludes that the accident caused a lesion in the frontal cortex, at the position assumed to be responsible for regulation of social behaviour (Pietrini & Bambini, 2009). Even so, some accounts suggest that his personality change was less pronounced and more temporary than often suggested (e.g. Macmillan, 2000; Macmillan & Lena, 2010), which would make the case even more neurologically interesting.

[10] He says 'genes are essentially simple and behaviour is by definition complex, a direct causal relationship between a single gene and a specific behaviour is highly unlikely. … the concept of a gene that directly encodes behaviour is unrealistic' (Brunner, 1996).

[11] The 'violent few' overcome ct/f – in various ways: attacking weak and vulnerable, audience-oriented (such as duels and 'riots'), remote violence (e.g. firing missiles), deception (hit men, snipers, suicide bombers) and 'forward panic', where emotional impulses are overwhelming', like 'roaring down a tunnel', which can result in calculated and extreme violence.

[12] 'Most of you know what it means to see a hundred corpses lying together, five hundred, or a thousand. To have gone through this and yet … to have remained decent fellows, this is what has made us hard. This is a glorious page in our history that has never been written and shall never be written' http://www.historyplace.com/worldwar2/holocaust/h-posen.htm

[13] Damasio (2012, p.202) does not claim that these levels of the self correspond to cerebral localities but rather emerge from systematic cooperation between the brain stem and cerebral cortex.

[14] His tripartite model is reminiscent of Freud's but his use of the 'unconscious' (proto-self) is essentially pre-Freudian and refers to autonomic neural processes rather than a site of repressed ideas.

[15] 'Within a few hundred milliseconds the emotional cascade manages to transform the state of several viscera, the striated musculature of face and posture… and themes our thoughts' (Damasio 2012, p.114)

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