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Evolutionary neurology, responsive equilibrium, and the moral brain

Grant Gillett *, Elizabeth Franz

University of Otago, Dunedin, New Zealand

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ABSTRACT

The relation between morality and the brain is a topic usefully examined through the evolutionary neurology of John Hughlings-Jackson, who considered higher mental function to be progressively inclusive integration of sensori-motor processes. His view, based on careful observations of patients with neurological disorders, implies that moral reasoning involves integration and coordination of behaviour through a process of representation and re-representation encompassing broader and broader types of information sensitive to environmental contingencies. The relevant information is processed in diverse brain areas: superior temporal sulcus (STS), inferior parietal lobule (IPL), inferior frontal gyrus (IFG), dorsolateral prefrontal (DLPF) areas, as well as anterior temporal (AT) structures. Moral function can be regarded as maximally integrating emotion, social cognition, and other-regarding sensibilities using propositionally organised cognitive structures that map a shared world of human activity and relationships so that they take account of what in social and personal life counts as something.

1. Introduction

The relation between morality and the brain is a fertile topic to examine through the evolutionary lens found in the work of John Hughlings Jackson (JHJ), a great English neurologist whose centenary was recently celebrated (Franz & Gillett, 2011). JHJ's views on neurology and his model of brain organisation, derived from clinical observations of patients with disorders such as epilepsy and aphasia, together with his understanding of higher-order mental processes and psychiatric disorders (1887), suggest that asking how JHJ would explain moral reasoning might illuminate current work on the moral brain.

Greene and Haidt (2002) champion "a growing consensus that moral judgements are based largely on intuition – gut feelings about what is right or wrong" (2003) i.e. that "the emotional dog" wags "the rational tail" (Haidt, 2001). But their developed thesis "fully integrates reasoning, emotion, intuition, and social influence" implying that "there is no specifically moral part of the brain" and that the relevant brain areas are also "implicated in non-moral processes" (Greene & Haidt, 2002, 522). They implicate Temporal, Parietal and Frontal cortices and sub-cortical centres (e.g. the amygdalae), an inclusive spread that is comprehensible within an evolutionary perspective on moral thought and action. We will argue that it also takes us beyond the idea of "reflective equilibrium" (Arras, 2001; Rawls, 1957) to a "responsive equilibrium" within a JHJ or "embodied cognition" view of higher mental functions where the latter concept links our capacity for moral cognition to interpersonal resonance and responsiveness.

* Corresponding author.
E-mail address: grant.gillett@otago.ac.nz (G. Gillett).

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Moral thinking draws on a number of subsidiary cognitive capabilities. First there are dynamic practical skills used in negotiating the domain in which we experience our being-in-the-world, implicating Occipital, Parietal, and Frontal lobes and associated subcortical circuits. These integrate perceptuo-motor schemata and the learning/memory functions required for tracking affordances (Chemero, 2003) that, in social animals, include interactions with others (Temporal & Limbic structures and Medial Pre-Frontal Cortex; Saxe, 2006), our self-related feelings about things (Limbic, insular, and midline structures; Northoff & Bermpohl, 2004), interpersonal relations (e.g. cingulate and orbito-frontal areas; Mitchell, 2009), and executive planning (pre-frontal areas). But how do these diverse brain areas give us the knowledge of "what in social and personal life means something" necessary for moral reasoning? (Williams, 1985, p. 201).

2. The Hughlings Jackson perspective

JHJ's evolutionary neurology was based on the views of Herbert Spencer a post-Darwinian free thinker: "Darwin's scheme was the first to incorporate biological evolution, associationist psychology, evolutionary geology, and cosmological developmentalism." (Elliot, 2003, 1). JHJ used Spencer's framework to outline the evolution and dissolution of nervous function, and a principle of concomitance whereby all higher mental processes are understood as integrated sensori-motor functions. Recent writings capture similar ideas including our human "propensity to process information in high-level meaningful units (unified wholes) where possible, and a built-in multi-layer hierarchy of information processing mechanisms" (Franz, 2010, p. 17). Such hierarchical networks enable adaptation in response to a complex and ever-changing environment where, in human ethology, the presence of other human beings and what they do is very significant. Moral thought re-represents organising representations related to the immediate survival needs of the individual so as to incorporate fitting and empathic responsiveness to others (Singer, 2006) and not just Machiavellian intelligence. It is plausible on an evolutionary basis that such high level re-representations factor in a regard for the most vulnerable members of a human group, perhaps on a "canary in the mine" principle (Gillett, 2004).

JHJ's framework converges with recent views of embodied cognition and the shared-circuit-model of behavioural control using mimicry, mirroring, and inhibition in a finely attuned socially adaptive mode of responding (Hurley, 2008). He also argues that higher mental functions make use of "propositionising" to articulate complex actions in the social and interpersonal sphere where such actions are attuned to "third thing" – the focus of shared attention – in triadic relations where communication occurs about what is being dealt with and how to respond (Saxe, 2006). At such higher re-re-representational levels it is likely that the Mirror Neurone System, discovered in monkeys as a key mechanism associating motor efferent patterns and observed movements, is linked to the development of a language based circuit of human intentionality. JHJ links speech and human mentation: 'words serve us during reasoning; they are necessarily required in all abstract thought' (Hughlings Jackson, 1884, p. 704). JHJ's thought here anticipates Luria's thesis that "higher mental processes take place on the basis of speech activity" (1973, 93–4) and his claim that 'an utterance is or is not a proposition according as it is used' (1879, p. 210) ties *use* to language related human activities through 'propositional functions' representing a shared world in which we coordinate our dealings with things both internally and inter-personally. Hurley's shared circuits model and the concept of interpersonal responsiveness implies that our extended activities are co-created by human beings and that words are used not only in communication of ideas but in cooperatively adapting to a context of interactive behaviour through human agreement and disagreement (Pinker, 2010; Fullinwinder, 1983, p. 153; Wittgenstein, 1953, ##224, 241). JHJ's complex evolutionary view also focuses on ongoing neural evolution in which the pre-frontal areas, drawing on "associationist psychology" and "developmentalism" (Elliot, 2003), make extensive gains in intelligent adaptation through the "service of words" (Hughlings Jackson, 1878, 320).

3. The cognitive neuroscience of morality

Our feelings about self and its emotional connections to significant others implicate Limbic and midline structures: Cingulate Gyrus, both posterior and anterior, (Northoff & Bermpohl, 2004 8: 102–7), and anterior and posterior areas in the insula (Singer, 2006). These affect not only our emotional reactions but are also activated during personalised moral tasks, especially those dealt with intuitively, a fact Greene uses to support the view that moral judgment is emotively driven (2003). Given the role of significant others in our social worlds, it is relevant that memory functions of the fusiform network (Kanwisher & McDermott and Chun, 1997; Ishai, 2008), used in person recognition, provide important inputs into human social cognition so that the fusiform face area in humans (Postero-inferior temporal lobe) connects closely to other areas selectively activated by individual, recognisable faces (Inferior Temporal Gyrus) and facial expressions (Superior Temporal Sulcus). That allows us to build "dossiers" on others which are also, it seems, informed by interpersonal emotional relatedness as a key variable in person-perception and typically linked to individual names that can serve as identifying elements in propositional functions and that seem to be disordered in Capgras Syndrome (Ellis & Lewis, 2001).

Saxe (2006) notes that uniquely human social cognition (in that it embeds triadic relations) implies understanding that others have their own subjective views of the world (in JHJ's terms that involves memory, emotion, reasoning and collaborative action). The triadic relations that she identifies between self, other and world are built on a basis of responding to humans as a distinctive kind of thing (lateral occipito-temporo-parietal cortex), understanding their actions (posterior Superior Temporal Sulcus), and inferring their states of mind, (served by the Temporo-Parietal Junction: TPJ). There is some

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