

Journal Club

Editor's Note: These short, critical reviews of recent papers in the *Journal*, written exclusively by graduate students or postdoctoral fellows, are intended to summarize the important findings of the paper and provide additional insight and commentary. For more information on the format and purpose of the Journal Club, please see http://www.jneurosci.org/misc/ifa_features.shtml.

Emotional Appraisal of Moral Dilemmas: What Neuroimaging Can Tell about the Disgust–Morality Link

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Review of Hutcherson, Montaser-Kouhsari et al.

The debate about the origin of moral faculty—the psychological systems that make judgments about right and wrong, what's permissible and what is not (Jones, 2007)—has long been central among philosophers and scientists. In the contest of this debate, some experimental work (e.g., Eskine et al., 2011) has linked morality to distaste, according to the metaphor that moral transgressions “leave a bad taste in mouth” (Chapman et al., 2009).

A recent article published in *The Journal of Neuroscience* (Hutcherson, Montaser-Kouhsari et al., 2015) provides insights to this discussion. By acknowledging the popular accounts that moral judgment is ruled by two distinct (and conflicting) appraisals—one intuitive and emotional, the other rational and utilitarian—the authors attempt to clarify how they are represented in the brain and integrated into an overall moral judgment.

During fMRI scanning, participants were first asked to provide, using a four-point scale, in separate sessions, emotional (1 = “Extremely Appalling” to 4 = “Extremely Appealing”) and utilitarian (i.e., 1 = “Extremely Costly” to 4 = “Extremely Beneficial”) appraisals for differ-

ent potential actions (i.e., evil deeds vs greater goods actions). While performing the emotional and the utilitarian appraisals, participants were explicitly required to ignore the action's overall social utility and their emotional response, respectively. Following the appraisal tasks, subjects completed an overall moral judgment task of ethical dilemmas constructed from combinations of the above mentioned actions. They were asked to provide an overall moral value based on the appropriateness of performing the evil deed to achieve the greater good (1 = “Extremely Inappropriate” to 4 = “Extremely Appropriate”).

With this paradigm, Hutcherson, Montaser-Kouhsari et al. (2015) uncovered the existence of a neural dissociation between these two forms of appraisals in moral judgment. They showed that the activity of the anterior cingulate cortex (ACC), insula, and superior temporal gyrus (STG) correlated with emotional appraisals, whereas the activity of the temporoparietal junction and dorsomedial prefrontal cortex correlated with utilitarian appraisals.

These results are striking because they provide an elegant model that conciliates the (assumed) antagonism (Cushman, 2013) between these two forms of appraisal in moral judgment. Nevertheless, the authors admit some difficulty in explaining the involvement of the mid-insula and STG in the emotional appraisal of moral judgment, noting that these regions do not fall within canonical emotion circuits.

A possible explanation for the involvement of these two regions in the emotional appraisal of moral judgment might take into account the role of disgust processing, which has been suggested to be critical in mediating the experience of moral disapproval (Chapman and Anderson, 2013). Disgust might represent one of the “additional attributes” assumed by Hutcherson, Montaser-Kouhsari et al. (2015) (see Discussion, first paragraph, p. 12604). This suggestion is supported by the evidence that the effects of disgusting experiences are mapped into discrete subregions of insular cortex, including the mid-insula, that also predict the magnitude of disgust experienced by an observer (Harrison et al., 2012). Moreover, a study by Phillips et al. (2004) documented a great activation of the STG during the exposure to overt presentation of faces expressing disgust. According to this literature, the involvement of both mid-insula and STG in response to the emotional appraisal for moral dilemmas might be interpreted as evidence of a shared neural signature between moral disapproval and disgust processing. This suggestion is further corroborated by evidence of ACC involvement in response to the experience of sensory (i.e., smelling bad scents) and emotional (i.e., observing faces expressing dislike) disgust (Wicker et al., 2003), as well as for the emotional appraisal of moral judgment (Hutcherson, Montaser-Kouhsari et al., 2015). In contrast, no research has shown the involvement of the utilitarian appraisal circuit for moral

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judgment (i.e., the temporoparietal junction and the dorsomedial prefrontal cortex) in response to the experience of disgust. This suggests that the link between disgust and morality might be merely affective and that the amplification effect of disgust on moral judgment severity, as reported in several studies (for review, see Chapman and Anderson, 2013), might depend on the degree of emotional appraisal in response to ethical violations.

Overall, the results documented by Hutcherson, Montaser-Kouhsari et al. (2015) show that the neural circuit of the emotional appraisal of moral dilemmas overlaps with that of disgust processing. This provides an important contribution to the current debate on the nature of morality by suggesting that this human faculty might have origi-

nated, at least in part, from the feeling of repugnance.

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