

The domains of disgust and their origins: contrasting biological and cultural evolutionary accounts

Paul Rozin¹ and Jonathan Haidt²

¹ University of Pennsylvania, Department of Psychology, 3720 Walnut Street, Philadelphia, PA 19104-6241, USA

² New York University, Stern School of Business, 40 West 4th Street, New York, NY 10012, USA

A recent paper by Tybur and colleagues presents a theory of the evolved functions of disgust based on biological evolution. This work furthers our understanding of disgust and is the first to detail the computational mechanisms involved in detecting and evaluating disgust-related risks. However, because this approach ignores the powerful role of cultural evolution, its ability to encompass the wide and culturally variable range of disgust is limited.

How can one emotion – disgust – have elicitors as diverse as excrement, amputation, incest, and flag burning? Rozin, Haidt, and McCauley ([1]; hereafter RHM) proposed that disgust could be understood as a way of dealing with an expanding set of threats. They argued that disgust evolved – biologically and culturally – from the older distaste response by the process of preadaptation, a well-documented process, by which a structure or system that evolved for one purpose is re-used in a new context. On this account, the elicitors of disgust expanded by preadaptation, but the outputs – expressive, physiological, and behavioral – were generally conserved. These included contamination sensitivity and a motivation to cleanse, avoid, or expel the contaminant. The elicitors expanded from a food rejection system related to pathogen avoidance to avoidance of reminders of humans' animal nature, especially death, and then on to some aspects of the moral domain.

Tybur, Lieberman, Kurzban and Descioli ([2]; hereafter TLKD) recently published an alternative theory of disgust that accepts the general framework of an expansion from oral defense (pathogen avoidance) to other domains, but uses the term 'co-opted' instead of 'preadapted'. With a focus on problems faced by humans in their ancestral environment, they parse disgust into three fundamental domains: pathogen avoidance, sex/mating, and morality. They propose computational mechanisms for each domain, which detect and evaluate a particular risk, perform a cost-benefit analysis, and then program a response.

Unlike RHM, TLKD rely strictly on biological evolution to account for the historical expansion of disgust. Yet, the nature of disgust and its spread to social practices is quite variable in the West over the past thousand years [3] and across cultures right now [4]. Cultural evolution seems to be playing a major role. We highlight here two instances of the expansion of disgust where we think cultural matters are particularly important.

Animal reminder versus pathogen disgust

TLKD present and dismiss the proposal for an animal-reminder domain of disgust, which includes inappropriate sexual acts, poor hygiene, violations of the ideal body 'envelope' or exterior form, and most critically, death. RHM specifically noted that 'all four of these domains involve potential sources of biological contamination and infection [. . .] thus core disgust was preadapted and easily expanded to apply contamination sensitivity to these additional classes of threats' ([1], p. 761).

Disgust figures prominently in Norbert Elias' [3] account of the 'civilizing process', by which societies develop rules and practices of self-restraint – a 'second nature' – that distinguish them from primitive societies and animals. The civilizing process is a cultural rather than a biological process. By contrast, TLKD argue that pathogen threat is sufficient to explain disgust elicited not only by poor hygiene but also by body envelope violation and death.

TLKD present evidence that supports a link between pathogen avoidance and animal reminder disgust. (The most striking link, which they do not note, is that contamination sensitivity is present in both domains.) They weigh this evidence more heavily than RHM do, because, unlike TLKD, RHM see fear of death – the key feature of animal-reminder disgust – as a basic culture-derived human concern, potentially on a par with pathogen avoidance. Many scholars, including Ernest Becker [5] and terror management theorists, have placed mortality concerns at the center of understanding humans. Many religions seem to be motivated in part by providing a way to cope with mortality. It is true that pathogen risks arose millions of years prior to fear of mortality, but it is an open question whether animal-reminder disgust arose prior to humans realizing their own mortality.

Moral disgust

Both RHM and TLKD identify a distinct moral domain of disgust. For RHM, disgust maps to a particular subset of moral concerns – originally described by Richard Shweder [6] and elaborated by Haidt [7] – that involve sanctity, divinity, and the protection of what are perceived to be sacred values and objects. Examples include consumption of beef for religious Hindus, incest, blasphemy, treason, betrayal, and actions that are seen to be 'sleazy' or 'subhuman'. Violators are seen as 'polluted': people often do not want to touch them or touch things they have touched. RHM noted that many cultures conceive of a vertical dimension of social cognition, with gods at the top and demons and animals at the bottom. RHM argued that

moral disgust is felt when people judge others to have moved downward on that vertical dimension. Moral disgust is different from anger. People associate cheating, stealing, and most matters of harm and fairness more closely with anger (and angry faces) than with disgust (and disgust faces) [8]. Secular westerners have gradually lost touch with the ethics of divinity, shrinking the moral domain mostly to what Shweder called 'the ethics of autonomy' [6], but disgust and divinity concerns still play a powerful role in many political controversies, from abortion and euthanasia to gay marriage and flag burning [7].

TKLD study only harm-fairness actions that elicit primarily anger. Their 'three domains of disgust' scale [9] asks about actions such as cheating on an exam or stealing a candy bar. TKLD seem to ignore entirely the domain that Shweder called 'the ethics of divinity' [6]. It is true that people will sometimes use the word 'disgust' in response to actions that are harmful or unfair, and it is surely the case that people vary in their willingness to apply the word 'disgust' to violations of the ethics of autonomy. However, it is not clear whether this variation reveals anything deep about the emotion of disgust or whether it reveals only variations in linguistic usage.

After reducing the moral domain to issues of harm and fairness, TLKD proceed to propose a computational account of moral disgust that seems to miss most of what is distinctive about disgust. TLKD say that disgust intuitions 'serve as input to systems that judge the strategic value of endorsing a rule'. Disgust helps people to navigate the 'landscape of condemnation' and to avoid blame. Many of the moral rules and boundaries of daily life have nothing to do with disgust; they are guarded much more closely by anger. It is unclear why TLKD focus on disgust rather than anger (and the fear of other people's anger) as the emotion that was shaped by the need to navigate many of the complexities of everyday negotiations over fairness, rights, and harms.

TLKD have done the field a great service by pushing biological evolution further than anyone before them. They

are the first authors to seriously consider the computational mechanisms involved in the detection and evaluation of disgust-related risks. However, we can see no reason to ignore cultural evolution and symbolic processes. TLKD achieved greater parsimony, referring only to biological evolution, than RHM, but at the cost of surrendering much that is distinctive about disgust and about the culturally variable human experience of disgust. Cultural and biological evolution often work together and employ the same evolutionary principles (variation, transmission, natural selection). They should not be seen as providing mutually exclusive views. We urge an integration [10].

References

- 1 Rozin, P. *et al.* (2008) Disgust. In *Handbook of Emotions* (3rd edn) (Lewis, M. and Haviland, J., eds), pp. 757–776, Guilford
- 2 Tybur, J.M. *et al.* (2012) Disgust: evolved function and structure. *Psychol. Rev.* 120, 65–84
- 3 Elias, N. (1978) *The Civilizing Process, Vol. I: The History of Manners.* (Jephcott, E. trans.) Pantheon Books
- 4 Haidt, J. *et al.* (1997) Body, psyche, and culture: the relationship between disgust and morality. *Psychol. Dev. Soc.* 9, 107–131
- 5 Becker, E. (1973) *The Denial of Death.* The Free Press
- 6 Shweder, R.A. *et al.* (1997) The 'big three' of morality (autonomy, community, and divinity), and the 'big three' explanations of suffering. In *Morality and Health* (Brandt, A. and Rozin, P., eds), pp. 119–169, Routledge
- 7 Haidt, J. (2012) *The Righteous Mind: Why Good People are Divided by Politics and Religion.* Pantheon
- 8 Rozin, P. *et al.* (1999) The CAD triad hypothesis: a mapping between three moral emotions (contempt, anger, disgust) and three moral codes (community, autonomy, divinity). *J. Pers. Soc. Psychol.* 76, 574–586
- 9 Tybur, J.M. *et al.* (2009) Microbes, mating, and morality: Individual differences in three functional domains of disgust. *J. Pers. Soc. Psychol.* 97, 103–122
- 10 Rozin, P. (2010) Evolutionary and cultural psychology: complementing each other in the study of culture and cultural evolution. In *Evolution, Culture, and the Human Mind* (Schaller, M. *et al.*, eds), pp. 9–22, Psychology Press

1364-6613/\$ – see front matter © 2013 Elsevier Ltd. All rights reserved.
<http://dx.doi.org/10.1016/j.tics.2013.06.001> Trends in Cognitive
 Sciences, August 2013, Vol. 17, No. 8



Attention flexibly alters tuning for object categories

Jiye G. Kim¹ and Sabine Kastner^{1,2}

¹Princeton Neuroscience Institute, Princeton University, Princeton, NJ 08544, USA

²Department of Psychology, Princeton University, Princeton, NJ 08544, USA

Using functional MRI (fMRI) and a sophisticated forward encoding and decoding approach across the cortical surface, a new study examines how attention alternates tuning functions across a large set of semantic categories. The results suggest a dynamic attention mechanism that allocates greater resources to the attended and related semantic categories at the expense of unattended ones.

Natural environments contain many objects that cannot all be processed simultaneously due to capacity limitations of the visual system. Therefore, flexible mechanisms are

needed to selectively prioritize information that is relevant to ongoing behavior at the expense of irrelevant distracting information. This selection process is often referred to as 'attention'. A variety of attention-related modulatory effects on neural processing across the visual system have been demonstrated, such as increases in baseline activity [1], increases in response gain of neurons that selectively respond to an attended feature or location [2,3], as well as shifts of neuronal tuning curves, for example, changes in preferred feature selectivity [4]. Although these studies have shaped initial understanding of attention mechanisms, they have been limited to examining neural responses evoked predominantly by synthetic stimuli, such

Corresponding author: Kastner, S. (skastner@princeton.edu).