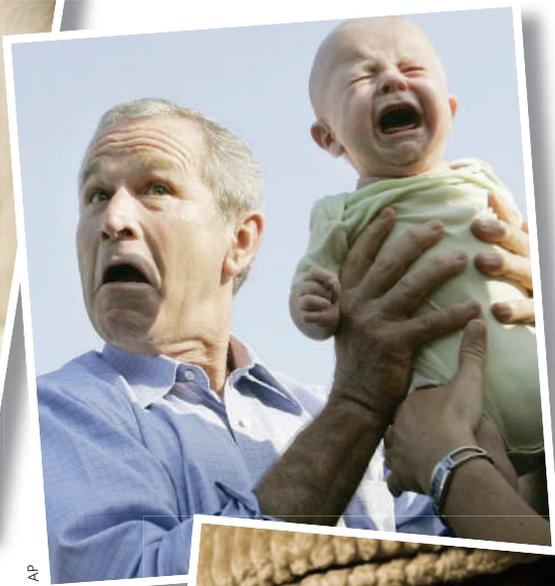


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The depths of disgust

Is there wisdom to be found in repugnance? Or is disgust 'the nastiest of all emotions', offering nothing but support to prejudice? **Dan Jones** looks at the repellent side of human nature.

In 1997, Dolly the sheep unleashed bioethical responses of every conceivable flavour, from the ruminatively utilitarian to the emotionally outraged. Leon Kass, a bioethicist at the University of Chicago, Illinois, who chaired President Bush's Council on Bioethics from 2002 to 2005, combined scholarly and visceral responses in a much cited essay entitled 'The Wisdom of Repugnance'. He did not go quite so far as to say that the revulsion reportedly evoked by the prospect of human cloning was in itself an argument against such endeavours. But he got fairly close:

"We are repelled by the prospect of cloning human beings not because of the strangeness or novelty of the undertaking, but because we intuit and feel, immediately and without argument, the violation of things that we rightfully hold dear... Shallow are the souls that have forgotten how to shudder."

Kass had aired the same worries at the advent of *in vitro* fertilization treatment in the 1970s, and similar reactions continue to bedevil biomedical developments today, such as in the debate over the creation of human-animal hybrids for stem-cell research. But in recent years, a loose band of interdisciplinary psychologists and neuroscientists has been putting together a new picture of the emotion that underlies such responses to biology: disgust.

Drawing on both evolutionary theory and moral philosophy, their work casts doubt on the idea that disgust embodies a deep-seated wisdom. Instead it provides an emerging portrait of an evolutionarily constrained emotion that is a poor guide to ethical action.

These scholars see disgust as a basic emotion that, like fear, anger, sadness and joy, is found across all cultures. All around the world pus, maggots, rotting food and scavenging animals such as rats produce the distinctive facial expression of disgust: nose wrinkled, mouth agape, lips raised. When severe, the feeling of revulsion can be accompanied by throat clenching, nausea and vomiting. In evolutionary terms, the adaptive value of such reactions seems to be to prevent people from eating contaminated foodstuffs and to get rid of any they have ingested. Disgust is related to bodily purity and integrity, with things that should be on the outside — such as faeces — kept out, and things that should be on the inside — such as blood — kept in.

Although the experience of disgust feels primal, the emotion does not seem to be widespread in other animals. Many species exhibit distaste in response to the sensory properties of food — such as sourness and bitterness — and a monkey, cat or human infant might spit out something disagreeable. But only humans beyond infancy will reject food on the basis of



where it might have been and what it might have touched (see 'Gut reactions'). "Disgust is a much more cognitive and emotional feeling than distaste," says Paul Rozin, a psychologist at the University of Pennsylvania, Philadelphia, who has pioneered research on the subject. "It involves understanding what a food is and where it comes from."

Part of its complexity is that disgust carries with it the notion of contamination; otherwise-edible food that has been touched even fleetingly or innocuously by something viewed as disgusting will be avoided. Most people, Rozin has found, won't drink juice that has been whisked with a sterilized cockroach or drink out of a meticulously cleaned bedpan. Rozin suggests that it is the cognitive sophistication of this idea that explains why the emotion is absent in other animals and infants.

Basic instinct

But what is the link between visceral or 'core' disgust — the feeling you get when you encounter an unflushed toilet — and a disgusted reaction to something much more abstract, such as the idea of animal chromosomes in a part-human embryo?

A clue is the language of moral indignation itself. "All cultures and languages that we have studied have at least one word that applies both to core disgust (cockroaches and faeces) and also to some kind of social offence, such as sleazy politicians or hypocrites," says Jonathan Haidt, a psychologist at the University of Virginia in Charlottesville and a former student of Rozin's. People labelled as disgusting in this way evoke fears of contamination just as rotting food does. When Rozin asked people about the prospect of wearing Hitler's carefully laundered sweater, most didn't feel at all comfortable with the idea. "The contami-

Gut reactions

Jonathan Haidt from the University of Virginia in Charlottesville and Paul Rozin from the University of Pennsylvania in Philadelphia, with various colleagues, have developed a questionnaire to discover how prone a person is to disgust by recording how strongly they agree or disagree with a series of statements. For example:

- I might be willing to try eating monkey meat, under some circumstances.
- It would bother me to be in a science class and to see a human hand preserved in a jar.
- I never let any part of my body touch the toilet seat in public restrooms.
- It would not upset me at all to watch a person with a glass eye take the eye out of the socket.
- Even if I was hungry, I would not drink a bowl of my favorite soup if it had been stirred by a used but thoroughly washed fly swatter.
- It would bother me to sleep in a nice hotel room if I knew that a man had died of a heart attack in that room the night before.

For an interactive version of the full test, and explanation of the results, see <http://yourmorals.org/>

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nation of disgust is generalized to moral issues, and that's a very deep feature of disgust," he says. "If it was just metaphorical then Hitler's sweater wouldn't be so offensive."

Paul Bloom, a psychologist at Yale University is sceptical. He agrees that disgust drives some moral judgements, but points out that they are mainly those relating to behaviour that involves bodily fluids or contact — gay sex, for instance — rather than more abstract issues. Just as people don't really lust for a car or genuinely thirst after knowledge, suggests Bloom, they don't really feel disgust at more abstract issues. "When we say something like 'This tax proposal is disgusting', we're using a metaphor," he says. "It's a very powerful metaphor, but it doesn't elicit the same disgust or nausea as primary disgust elicitors such as faeces and body fluids."

But Haidt thinks he has found clues pointing to a physiological reality for moral disgust. Whereas anger pushes the heart rate up, being viscerally disgusted makes it drop. With his student Gary Sherman, Haidt showed people hooked up to a heart monitor video footage of morally negative but not viscerally disgusting behaviour, such as an American neo-Nazi meeting. The participants said that the video triggered disgust and anger, and on average their heart rates fell, not rose. What's more, those who reported increased clenching in

their throat had a greater drop in heart rate, making the link with core disgust look stronger. "We think that this is the first physiological evidence that socio-moral disgust really is disgust and not just metaphor or anger," says Haidt of the as yet unpublished work.

Brain imaging studies might also point to an overlap between core and moral disgust. Jorge Moll, a cognitive neuroscientist at Rede Labs D'Or, Rio de Janeiro, Brazil, used magnetic resonance imaging (MRI) to monitor the flow of blood in the brains of 13 healthy adult volunteers as they mulled over situations evocative of core disgust and those that elicit self-reported moral disgust or indignation². He found that core and moral disgust recruit overlapping brain areas, particularly the lateral and medial orbitofrontal cortex, suggesting that the emotions are related. These regions of the brain are activated by unpleasant sensory stimuli, and they connect with other emotion-related areas, such as the amygdala.

As well as showing overlap, Moll's work suggests that core and moral disgust also activate some distinct areas. They produced similar activity in the posterior orbitofrontal cortex, but moral disgust produced greater activity than core disgust in the more evolutionarily recent anterior region, which some think is involved in more abstract emotional associations.

Moral foundations

Moll's original work can be criticized because some of the 'moral disgust' scenarios also featured elicitors of core disgust, such as rats. But in a paper to be published in *Social Neuroscience*³, Moll and his colleagues created 'cleaner' scenarios that describe pure moral violations without a visceral element, and arrived at much the same results. And last October, the team presented evidence suggesting that the lateral orbitofrontal cortex was also activated when volunteers made decisions on whether to oppose charitable organizations that had moral agendas different from their own — on abortion, gun control or the death penalty, for example⁴. It seems that just thinking about some sorts of moral conflict is enough to get parts of the brain implicated in disgust ticking over.

Even if moral and visceral disgust are not the same emotion, visceral disgust will sometimes affect ethical judgements. Susan Fiske and Lasana Harris, psychologists at Princeton University in New Jersey, have used MRI to probe the disgust evoked by images of people such as drug addicts or the unkempt poor and homeless⁵. Their findings seem to support an unsurprising but depressing conclusion. Not only did the amygdala and insula fire up (taken to indicate fear and disgust, respectively), the medial prefrontal cortex, which is usually active when

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thinking about people and social situations, as opposed to thinking about objects, was less active. This can be interpreted as evidence that disgust goes some way to trumping empathy and compassion. “When we respond to a homeless person with disgust, we avoid considering the person’s mind,” says Fiske. “We treat the person as equivalent to a pile of garbage.”

Also disturbing is the way in which disgust can play a similar role in interactions with people who offer none of the objective correlates of visceral disgust. Its role may be tied to the evolutionary process, though, in that disgust is broadened out from the original purely hygienic concerns to the more general moral role that Rozin, Haidt and their colleagues see it playing today. Visceral disgust is in essence an emotion of distancing — of avoiding or expelling the contaminant. Marc Hauser, a psychologist at Harvard University who has worked with primates, suggests that this aspect of disgust made it a suitable raw material for evolution to work with in building up instinctive distinctions between the in-group and the out-group. The force with which such distinctions are felt may promote survival, and thus have adaptive value in the face of natural selection.

Drawing distinctions between in-group and out-group — us and them — “is not something the human line invented”, says Hauser. It is seen in various social animals. But humans are peculiarly preoccupied with these distinctions. Some, such as the football team someone supports, are not widely accepted by outsiders as carrying moral weight. Others, including our political and religious affiliations, are value-laden to the core. “The moral faculty, which deals with moral problems, is going to have a deep connection

The basis of belief

Although disgust may be built into the human moral faculty, that faculty does not work the same way in everyone, and the moral weight given to repugnance may thus differ from person to person. Paul Bloom from Yale University, working with David Pizarro and Yoel Inbar at Cornell University, Ithaca, New York, has recently explored how reactions to disgust relate to political and ideological views of the world. Their results bring into focus the fault lines of the notorious ‘culture wars’ that divide liberals and conservatives on myriad social issues.

In an unpublished study,

Bloom and his colleagues asked self-identified political liberals and conservatives to take a well-established written test for measurement of sensitivity to disgust, and then recorded their attitudes on a range of moral and social issues. They found that, even when controlling for factors such as age, class and gender, the more prone to disgust a person was, the more he or she was likely to hold conservative views on social debates. The link was especially strong in attitudes to abortion and gay rights, both of which are potentially rich in the type of imagery that can prompt

visceral disgust. On the more abstract concepts, the link between sensitivity to disgust and conservatism was not statistically significant for any given issue, but when the issues were aggregated it became so, according to Inbar. Pizarro says he has preliminary data suggesting sensitivity to disgust is also related to attitudes to cloning and stem-cell research.

This finding fits with work by psychologist Jonathan Haidt and graduate student Jesse Graham from the University of Virginia in Charlottesville, on the foundations of the moral faculty. A psychological

with issues of ‘in’ versus ‘out,’” claims Hauser.

Evolution suggests that the human moral faculty — the psychological systems that make judgements about right and wrong, what’s permissible and what isn’t — was cobbled together from pre-existing brain systems over millions of years of biological and cultural evolution. Along the way, it latched onto disgust as a useful tool. “The experimental data point to the possibility that our disgust system might have been adapted by evolution to allow us to reject or disapprove of abstract concepts such as ideologies and political views that are deeply influenced by culture, as well social groups associated with

‘disgusting’ concepts,” says Moll.

Some theories of the evolution of human cooperation and altruism suggest that inter-group conflict was a potent force driving cooperation within groups, the most cooperative being the most successful at surviving. In making symbolic distinctions between us and them visceral, disgust could potentially foster greater cohesion within groups by bringing people together in defence against a common out-group. “Disgust works for the group as it does for the individual — what is in the group is ‘me’ and what is not is ‘not me,’” says Haidt. “Where core disgust is the guardian of the body, moral disgust acts as the guardian of social body — that’s when disgust shows its ugliest side.”

Out with the old: vomiting could have an adaptive role in evolution.

Repulsive alliances

Propagandists throughout history have been quick to pick up on the possibilities raised by the blurring of visceral disgust into a weapon for the in-group/out-group border patrol. Nazi propaganda depicted Jews as cockroaches and rats; Hutu instigators denigrated Tutsis as cockroaches during the Rwandan genocide. As with the sight and smell of a dispossessed street person, identifying the enemy with an object of disgust throws up strong emotional barriers to empathy. “That’s why I say that disgust is the nastiest of all emotions,” says Hauser.

“Our moral disgust/indignation brain network is the source of prejudice, stereotyping and sometimes outward aggression,” says Moll. Fiske agrees, saying the picture of disgust painted by data from psychology and neuroscience should make us think twice about drawing on revulsion as a basis for our personal moral judgements. History seems to





tradition that draws on the work of Lawrence Kohlberg — known for his work in moral development — portrays morality as consisting of two central issues: whether someone was treated unfairly

and whether someone was harmed. Then, in the late 1980s, anthropologist Richard Shweder developed the idea that ethical concepts around the world cluster into three overlapping but distinct

domains — the ethics of autonomy (individual rights and freedom from harm), community (respect for tradition, hierarchy and authority) and divinity (spiritual purity and sanctity). Haidt and Graham, drawing on both lines of work, have suggested five foundations to explain the ethical intuitions observed across cultures: a concern for harm to people; fairness; in-group loyalty; respect for authority; and spiritual purity and sanctity. Disgust, they think, is most closely tied to the last of these.

Haidt and Graham used a questionnaire to probe 1,613 self-identified liberals and conservatives about the weight they gave to these different concerns in their moral judgements⁵. Respondents were asked to rate the relevance

of 15 such concerns (three for each foundation) in making moral judgements, such as “Was anyone harmed?” “Did someone act unfairly?” or “Did someone betray the in-group?”. Whereas liberals typically draw on just the first two foundations — harm and fairness — conservatives tend to be concerned with all five. “Liberals see only a subset of the moral domain — there’s a lot more going on that they’re not aware of,” says Haidt. “We liberals often find it difficult to understand what the big deal is about homosexuality and even first-trimester abortion. But there’s more to morality than we used to think — the areas of sacredness and divinity, and group-loyalty have barely been touched.”

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bear this out. Women (especially menstruating ones), the mentally and physically disabled, and inter-racial sex have all been viewed with disgust, and are still viewed as such by some. But few people in liberal societies today would defend such attitudes and many have genuinely ceased to feel them. If disgust wasn’t a good moral indicator then, why should it be now?

Some defenders of disgust accept at least some of the implications of the current research. Kass emphasizes that he does not claim that repugnance is a sufficient guide in moral matters. “It is at most a pointer, and of course the objects of disgust are to a considerable extent and in many cases culturally malleable,” he says. At the same time, Kass is sceptical of throwing out the baby with the disgusting bathwater. Although he acknowledges that disgust has historically been used and abused to persecute ethnic and religious minorities and to promote the mistreatment of women, he doesn’t rule out a role for disgust in morality: “It does not follow from these examples that repugnance about, say, the eating of human flesh (or excrement) or father–daughter incest is unlinked to the moral/aesthetic truth about these practices.”

One way forward is to at least recognize the part played by disgust and to be vigilant in its surveillance. And in the special case of bioethics, it also means thinking carefully about what is actually being proposed, rather than concentrating on outrageous scenarios that elicit emotion even while straining credulity. “It is almost impossible to consult our moral intuitions on bioethical questions when we have so little experience of their outcomes,” says Haidt. “We can make up all sorts of sci-fi futures but



Beauty or beast: things that once disgusted can in new contexts be tolerated.

it’s not even worth thinking about them because our intuitions are just too unreliable.”

No one is arguing that emotion has no role in moral judgements. Indeed, the whole basis of this new approach is to argue that emotion is inseparable from morality, and that feelings matter deeply. But that does not mean all emotions are created equal. The distinctions that

disgust has evolved to police, those between the in-group and out-group, and to some extent the sacred and profane (see ‘The basis of belief’), are much more subjective than the aspects of life dealt with by the other emotions that Haidt and his colleagues see contributing to morality. “Disgust didn’t evolve to track things that we would normally consider morally important, unlike empathy, which is triggered by the real pain or suffering of others,” says David Pizarro of Cornell University in Ithaca, New York.

Still, disgust is an emotion we are stuck with. The challenge, suggests Hauser, is to make people more reflective about what they say and think. He cites the success that advocates of political correctness have had in lowering the prevalence of casually sexist and racist language. Moll suggests optimistically that cultivating cultural and personal values of tolerance and empathy could function as an antidote to the toxic effects of disgust. This may all sound a little wishy-washy; the implications of this research, as well as the research itself, deserve critical examination from well beyond the confines of the small group of scientists currently involved. But it is hard not to conclude that, by thinking less with our guts, and more with our heads and hearts, we might be able push back the boundaries of our moral world. ■

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See Editorial, page 753.

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