

What Makes Moral Disgust Special? An Integrative Functional Review

Roger Giner-Sorolla
Tom Kupfer
John Sabo

University of Kent

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Contact author: Roger Giner-Sorolla, School of Psychology, University of Kent, Keynes College, Canterbury, Kent, CT2 7NP, United Kingdom.

Email: rsg@kent.ac.uk

Tel: 44 1227 823085

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Abstract

The role of disgust in moral psychology has been a matter of much controversy and experimentation over the past 20 or so years. We present here an integrative look at the literature, organized according to the four functions of emotion proposed by integrative functional theory (IFT): appraisal, associative, self-regulation and communicative. Regarding appraisals, we review experimental, personality, and neuroscientific work that has shown differences between elicitors of disgust and anger in moral contexts, with disgust responding more to bodily-moral violations such as incest, and anger responding more to socio-moral violations such as theft. We also present new evidence for interpreting the phenomenon of socio-moral disgust as an appraisal of bad character in a person. The associative nature of disgust is shown by evidence for “unreasoning disgust,” in which associations to bodily-moral violations are not accompanied by elaborated reasons, and not modified by appraisals such as harm or intent. We also critically examine the literature about the ability of incidental disgust to intensify moral judgments associatively. For disgust’s self-regulation function, we consider the possibility that disgust serves as an existential defense, regulating avoidance of thoughts that might threaten our basic self-image as living humans. Finally, we discuss new evidence from our lab that moral disgust serves a communicative function, implying that expressions of disgust serve to signal one’s own moral intentions even when a different emotion is felt internally on the basis of appraisal. Within the scope of the literature, there is evidence that all four functions of Giner-Sorolla’s (2012) integrative functional theory of emotion (IFT) may be operating, and that their variety can help explain some of the paradoxes of disgust.

What Makes Moral Disgust Special? An Integrative Functional Review

The phrase “moral disgust” at first seems to be an oxymoron. Morality, after all, stands among the highest and most refined attributes of humanity; disgust wallows in the low and gross. Morality helps groups and cultures to function (Giner-Sorolla, 2012; Ellemers, 2017), whereas disgust in its most basic form serves to keep the individual safe from harmful microbes or parasites (Curtis, de Barra, & Aunger, 2011; Oaten, Stevenson, & Case, 2009). Questions of morality often lead to thoughtful deliberation, the balancing of multiple standards against each other. But disgust is a reaction that seems intuitive, impenetrable to conscious explanation, to the point where some have classified it as a mere reflexive drive rather than an emotion (Panksepp, 2007; Royzman & Sabini, 2001). I might convince someone by argument that foie gras is a morally awful food because of the way the goose is treated, but my arguments will never convince lovers of foie gras that it tastes disgusting. Should human morality really depend on such an opaque feeling?

And yet psychological research has started to bridge the gap between disgust and morality. An influential line of argument, with both roots (Hume, 1748) and branches (Prinz, 2007) in moral philosophy, holds that morality is intrinsically emotional. The best-known statement of this kind is Haidt’s social intuitionist theory (2001), in which emotionally-based evaluations of moral and immoral acts arise spontaneously upon observation, whereas reasoning occurs largely after the fact. Likewise, the dual-process model advanced by Greene (2008; Cushman, Young, & Greene, 2010), largely in the context of life-or-death dilemmas, proposes a fast, emotional and intuitive tendency to follow simple moral rules, modified by a more deliberative tendency to maximize ultimate moral outcomes.

Disgust has played a key role in demonstrations of moral intuitionism. The “moral dumbfounding” experiments taken as evidence for intuitionism rely on participants’ inability to

articulate the reasons for disapproving of violations described as lacking harmful consequences, such as consensual incest or eating flesh from a human corpse (Bjorklund, Haidt, & Murphy, 2000). These violation types also elicit strong disgust as a primary emotional response (e.g., incest: Fessler & Navarrete, 2004; cannibalism: Gutierrez & Giner-Sorolla, 2007). In a life-or-death dilemma, aversion to harmful action, which is the dual-process “intuitive” response, also seems to be related to disgust sensitivity, as well as to the strength of anticipating disgust and other negative feelings if one were to carry out the harmful action (Baron, Gürçay, & Luce, 2017; Choe & Min, 2011; Pletti, Lotto, Tasso, & Sarlo, 2016). Notably, the related emotion of anger pushes in the other, less intuitive direction, toward taking harmful action to reduce overall harm (Choe & Min, 2011; Pletti et al., 2016).

But if moral decisions can be intuitive, disgust itself also shows a more complex face than its primal and reactive reputation suggests. Although animals show states of food aversion, such as distaste, and have many means to avoid contact with infectious substances, humans seem to uniquely combine hygiene and food concerns, such that disease-related things also evoke nausea (Kelly, 2011). Even among lay people, disgust is seen as a more uniquely human emotion than others such as fear or rage, above the midpoint on ratings of human uniqueness and closer to such elevated sentiments as sympathy or admiration (Demoulin et al., 2004). Disgust develops relatively late in childhood, compared to other “basic” emotions. The great variety among cultures in the things that they find disgusting shows that, like language, we have a prepared ability to learn what’s disgusting (Oaten, Stevenson, & Case, 2009). Even apparently universal elicitors like bodily waste may become disgusting because a functioning culture teaches its children to avoid filth and treat it as contaminating, and food that may simply be distasteful to an animal or young child can acquire strong aversive and even contaminating properties as disgust develops. Disgust can also be extended to cues not directly associated with infection avoidance, including violations of cultural bodily norms such as hairiness, odor, or forbidden third-party sexual activity. True, the body is common to these elicitors, and some

mechanisms such as self-relevant simulation of third-party acts may increase disgust (Lieberman & Smith, 2012). But disgust is not such an innate and reflexive emotion that it cannot take on higher functions. As we will see, disgust can end up defending society at large against threatening or immoral persons, groups, and actions.

To understand moral disgust, it may be useful to apply *integrative functional theory* (IFT; Giner-Sorolla, 2012). In the face of an overwhelming number of definitions and accounts of emotion in the literature, we reject the idea that any emotion can completely be explained by a single function, a single appraisal, or a single outcome. Rather, emotions are complex states that have taken on many functions over a process of biological and cultural evolution. Each separate function involves a set of cognitive, physiological, and expressive features typically seen in emotion, which benefit the individual in certain circumstances. Each of these functions has been described and championed separately by various theorists of emotion. The contribution of IFT has been to bring together these functions, and to consider how their coexistence might conflict, so that interference from one function might impede the others.

The four functions, illustrated in the context of disgust, are as follows:

1. In **appraisal**, an emotion responds to contextually sensitive assessments of the environment that motivate appropriate behavior and thought. For example, on seeing a dead pigeon on the street, the appraisal of it as contaminating would reasonably elicit disgust, which itself motivates avoidance in the short-term, or a desire to remove it in the long-term (if it is in your path as you exit your house).
2. The **associative** function of emotion is a simple link between a stimulus and emotion, with relative insensitivity to context. Disgust often seems to behave associatively. For example, plastic dog-doo is still treated as a disgusting and contaminating object (Rozin, Millman, & Nemeroff, 1986; Vogt, Lozo, Koster, & De Houwer, 2011), and in many other ways a disgusting appearance can overcome appraised information about the actual substance of an object.

Associative links, like other automatic responses, have the advantage of speed over more nuanced appraisals. Speculatively, inflexible associations may serve other purposes, such as helping to maintain social cohesion.

3. The **self-regulatory** function of emotion is about emotion's role after behavior has a chance to be enacted. Specifically, emotion intensifies if goal progress is not made, and dissipates if the goal is reached. Disgust's immediate goals tend to be simple: to avoid disgusting things. However, disgust may serve more complex self-regulatory goals as well, keeping thoughts and attention away from things that can threaten the self-concept, and preventing more primary self-regulatory emotions such as anxiety from taking root.
4. Finally, the **communicative** function explains why emotions are often expressive and uncontrollably so. The other functions give no reason why you should not optimally maintain a poker face at all times. But through facial expression, tone of voice, bodily signals, and direct verbal assertions, emotions let us show other people our intentions with a modicum of sincerity (Frank, 1988). People can communicate disgust through a characteristic expression of the face and tone of voice, as well as verbally. Even new modes of communication such as the Internet are used for the swift and eager communication of disgust-based images and arguments (Heath, Bell, & Sternberg, 2011; Brady et al., 2017).

In looking at the current state of the moral disgust literature, IFT helps make clear that any given manifestation of disgust can serve one or more distinct purposes. Disgust could be a reasonably rational response to a fairly high-level, contextually sensitive, and articulable appraisal of bad character. It could also be an inexplicable, irrational associative response triggered by merely incidental features: there's a bad smell in the air, and Jane is wearing a disgusting color of green, so there must be something disgusting about her behavior too. Disgust can be a defensive, self-regulating emotion, reacting to threats to the self rather than to

threats appraised in the environment. Most provocatively, expressions of disgust -- including the verbal expressions most often studied in psychological research -- may not correspond to the actual emotions, but can be deployed to demonstrate group solidarity or personal sincerity.

In this chapter, we start by reviewing necessary questions of measurement, in light of existing questions about the separate nature of anger and disgust in moral and social contexts, and about whether disgust in all its manifestations is a cohesive emotion. We argue that anger and disgust are related but separate reactions to social violations, and discuss methods of measurement that may prove effective in separating the two conceptually and empirically. We also caution that a componential view of emotion opens the possibility for disgust to vary in its “profile” of expressions and feelings, depending on whether it is felt toward a moral situation, and even possibly depending on what kind of moral situation is being considered.

The next part of the chapter reviews experimental work from our lab and others that is relevant to the appraisal function of moral disgust – the notion that disgust responds to elicitors in the environment that have certain abstract properties. This work has sought to establish exactly which eliciting appraisals most characteristically distinguish moral disgust from moral anger. Other findings, involving individual differences in disgust sensitivity and neurophysiological measures of reactions to moral situations, are reviewed as well. Overall, there have been grounds to see disgust as a reaction to abnormal acts involving violations of norms about the body (i.e., “bodily-moral” acts) as opposed to acts merely involving social harm (“socio-moral” acts). But subsequently, our research has also produced a challenge to that view. We find that moral disgust can also be appraised from evidence of bad character, even when wrongs do not involve bodily norms.

Having established these basics of the measurement and appraisal of moral anger and disgust, we look at these emotions through the remaining functions of our theoretical framework, IFT. We review evidence for the “unreasoning disgust” hypothesis: that compared to anger, disgust in moral situations has more features of an associative process than an appraisal

process, including cognitive automaticity and inaccessibility of elaborated reasons. We also review the controversial literature about the ability of disgust to intensify moral judgment, examining the implications for IFT's associative and self-regulation functions. We consider the possibility that disgust serves an existential self-regulation function, keeping at bay disturbing thoughts about death or animal kinship. And finally, we review emerging evidence for the uses of disgust as a communication signal of moral virtue, which compels a new look at the self-report literature on moral disgust elicitors, asking hard questions about whether moral disgust expressions are reflections of innermost feelings, or exist mostly for show.

Questions of measurement and definition

Disgust as a distinct emotion. Findings relating moral judgment to disgust feelings suffer from ambiguity. How can we be sure that the active ingredient in this relation is not just one of the features of disgust that it shares with other emotions: for instance, its negativity, its high level of arousal, its other-focused nature, its withdrawal tendencies? To clarify the special status of disgust, it is necessary to compare it to another negative emotion.

Sometimes the comparison emotion is sadness (e.g., Horberg, Oveis, Keltner, & Cohen, 2009; Moretti & Di Pellegrino, 2010; Schnall, Haidt, Clore, & Jordan, 2008). However, sadness is distinct from disgust on more general dimensions; it shows low- rather than high-arousal core affect (Barrett & J. A. Russell, 1998), for one, and is not generally classified as a morally relevant emotion (Haidt, 2003). Sadness also has cognitive consequences that are unlike those of other emotions, such as leading to increased use of heuristics and less detailed processing, which may impede hostile rumination on moral transgressions (Bless & Fiedler, 2006).

On the other hand, contempt as a comparison emotion may not be distinct enough from disgust. Argued by some to involve disgust intrinsically (Prinz, 2007), contempt is difficult to pry apart from disgust in studies of socio-moral situations (e.g., indistinguishable from disgust in Gutierrez, Giner-Sorolla, & Vasiljevic, 2012, Study 1; for a review see Fischer & Giner-Sorolla,

2016). It is perhaps due to this difficulty that little effort has gone into investigating the different antecedents of contempt and disgust.

Anger, at least in our research, has been the most apt comparison emotion for disgust. The two are classed separately as basic emotions in Ekman's well-known scheme. However, anger shares the high-arousal, other-focused properties of disgust, and is also recognized as a morally-relevant emotion (Haidt, 2003). These similarities are enough, empirically, to sometimes cause doubt about the distinctiveness of the individual terms "anger" and "disgust." "Disgusted" is semantically close to anger (Shaver, Schwartz, Kirson, & O'Connor, 1987), and sometimes achieves the status of a synonym for "angry" (J. A. Russell & Fehr, 1994). Nabi (2002) proposed that the term "disgust" is used by lay people as a synonym of "anger," and other words that more successfully convey the separate emotion of disgust, such as "grossed out," may be necessary to discriminate emotions. In facial expression identification, too, anger and disgust expressions are the most commonly confused pair (J. A. Russell, 1994). This has been especially shown in cross-cultural studies, where a data-driven model of basic expressions has been proposed that merges anger and disgust into one expression (Jack, Sun et al., 2016).

In studies we have run using moral judgment scenarios and targets, measures of anger and disgust tend to correlate moderately, with r seldom close to zero and more often in the .4-.7 range. This fits with the findings of more general emotional experience studies, when they measure anger and disgust separately. For example, Zelenski and Larsen (2000) used single-word measures and found $r = .43$; Izard, Libero, Putnam, and Hayes (1993) with multi-item measures found $r = .49$. On occasion, correlations are higher, as with an anger-disgust $r = .86$ in Sabo & Giner-Sorolla (2017), Experiment 2. Because the two scales in that one study shared 74% of variance, we declined to treat them as separate items¹.

¹ Given that the proportion of variance explained in one variable by another equals r^2 , a reasonable guideline might be to tread with caution when one variable explains most of the variance in another, i.e., when $r^2 > .50$ and hence $r > .70$.

Correlation between anger and disgust items presents both measurement and interpretive problems. We will deal with the less difficult measurement problem first. If we are to treat these emotions as worthy of separate consideration, maximizing statistical power means choosing measures that discriminate them, empirically, as much as possible. In line with Nabi's (2002) argument that including synonyms such as "grossed out" improves the discriminability of disgust in verbal self-reports, multiple synonym items are preferable to single terms. For instance, we often use "angry / infuriated / outraged" and "disgusted / sickened / repulsed".

An additional possibility for measurement is to have participants rate their feelings against prototypical photos of anger and disgust facial expressions, as in Rozin et al. (1999). These photos can be labeled further with emotion terms, or stand on their own. Facial ratings in particular seem to correlate at a more moderate level than verbal ratings, as shown by an analysis of the data from Gutierrez et al. (2012) that was not reported in that article. Across a selection of moral violations involving, or not involving, bodily norms, facial picture scales of anger and disgust correlated at $r = .26$, whereas multi-item verbal scales correlated at $r = .67$.

Salerno and Peter-Hagene (2013) reported evidence that anger and disgust have interactive effects on judgment (labeled as "moral outrage"). But their article also introduces a visual method to differentiate anger and disgust. Figure 1 shows their "grid" with ratings of one emotion on the x axis and ratings of the other on the y axis. Participants have to simultaneously consider their anger and disgust rating, and check one box in the two-dimensional grid that expresses both. The visual language of the grid encourages consideration of the emotions as orthogonal rather than parallel responses. Although anger-disgust correlations in these studies were still in the moderate range ($r = .54$ and $.38$), perhaps the study's gruesome crimes and hateful acts were subject to higher anger-disgust correlations than usual, seen as both harmful and disgusting. Scenarios that separate elements of harm and bodily abnormality, as used in Gutierrez et al. (2012), might be a better testing ground for a direct comparison of methods.

Insert Figure 1 around here

To test directly the power of the “grid,” we (Giner-Sorolla, Crispim, & Salerno, 2017, unpublished data) conducted a study recruiting 121 workers from Amazon Mechanical Turk. Between participants, we varied which measurement method for anger and disgust was used, the orthogonal “grid” or two parallel scales with order counterbalanced. Each participant read and rated 40 short scenarios, 20 of which were moral, of which 10 involved harm to others without bodily transgression and 10 involved bodily-moral transgression without harm to others. The other half were non-moral, 10 involving personal frustration and 10 involving spoiled or infectious things.

Using disgust as a predictor of anger (with similar results if the other direction of prediction was used), we conducted multilevel analyses controlling for participant-level variance, separately for each combination of measurement condition and scenario type. The results (Table 1) show that the orthogonal grid as compared to the parallel scales reduced anger-disgust relations, especially for the two types of moral scenarios, where the correlations were highest. Infection disgust situations produced weak or no relations between anger and disgust at all, whereas personal frustration situations showed a moderate relation not strongly affected by the method used.

It is also possible that measuring the bodily or expressive output from anger and disgust might focus the difference between the two emotions. One idea, which we tried in Experiment 5 of Sabo and Giner-Sorolla (2017), was to add more vivid and subjective three-item self-report measures of anger (e.g., “This makes my blood boil”) and disgust (e.g., “This makes me want to gag”). Although each set of physical metaphors was strongly correlated with the corresponding emotion terms ($r > .80$) and less so with the other emotion terms ($r < .45$), the correlation between anger and disgust metaphors ($r = .47$) was not appreciably less than the correlation between anger and disgust terms ($r = .50$).

The disgust-anger overlap may not be entirely semantic, either. Research has used electromyography (EMG) to measure facial muscle movements associated with disgust (levator labii) and anger (corrugator) while reading about various moral violations (Cannon, Schnall, & White, 2011). Here, “purity” violations involving bodily norms evoked relatively more levator than corrugator action, and harm violations more corrugator than levator (just as purity violations tend to evoke more disgust, and harm violations more anger; P. S. Russell & Giner-Sorolla, 2013). But both purity and harm violations increased both of these negative EMG components significantly above baseline (whereas fairness and authority violations seemed to activate only the levator). Similarly, in an EMG study, Whitton, Henry, Rendell, and Grisham (2014) also found that corrugator and levator activity seemed to rise and fall in tandem in response to manipulations of incidental disgust and anger and when reading moral and nonmoral negative stories.

Even if some of the methods above seem effective in decreasing overlap between anger and disgust ratings, none of them could reliably achieve complete independence, especially when using moral or social scenarios. A “disgust elicitor” in social situations usually elicits some anger as well, just not as much, and vice versa. Cameron, Lindquist, and Gray (2015) argue that the common finding of anger-disgust relations speaks against a view of anger and disgust as discrete, modular emotions. However, the kind of “modularity” in which one component must be entirely switched off for the other to function is not, in our view, a realistic standard for psychological functioning. To expand J. A. Russell’s (2009) analysis of how components of emotion can be related, two discriminable emotional states can draw on correlated common features in the environment, as well as involving cross-talk between their components.

Chewing and swallowing, for example, are seen as two distinct processes that are both involved in ingestion. An experience sampling study would show a high correlation, no doubt, between chewing and swallowing. Even if experiments were set up focusing on situations that elicit primarily chewing (bubble gum), there still might be a lesser amount of action in the gullet,

whereas experiments involving primarily swallowing activity (vanilla pudding) still might involve some chomping of teeth. Likewise, situations that evoke social anger and disgust both involve negative focus on another person, so persons who are not seen negatively or blamed for a negative outcome will simply not draw out either emotion. As we go forward to examine what kinds of situations preferentially elicit anger or disgust, it is worth keeping in mind the common elements in these situations, to continue engaging with the challenge in Cameron et al. (2015) over the modularity of emotions. Just because anger and disgust tend to go together in ways that extend beyond semantic confusion or methodological overlap does not mean that we cannot analyze their separate contributions.

Disgust as a coherent or diverse emotion. The hardest and most necessary tasks in the study of emotions are deciding what an emotion is, and how to draw the boundaries around specific emotions. The evidence to date does not support the idea of a fixed repertoire of emotions with invariant inputs and outputs, which are always either off or on all the way. Rather, a componential view of the structure and taxonomy of emotions has become more plausible (e.g., Scherer, 2009; Smith & Scott, 1997), shading into more radical constructionist views (e.g. J. A. Russell, 2003, 2009) that question whether the concept of specific emotions has any value. Componential views state that the relations among an emotion's linguistic label, input, mental content, feelings, communications, and motivation are only statistical; that less prototypical examples of emotions can have fewer of these elements, or import elements characteristic of other emotions; that no one of these elements is the "master" determining the others; and that it may be worthwhile to examine the causal relations between smaller subsets of an emotion's components (e.g., between the wrinkling of the eyebrows in anger and the feeling of dominance it entails) without necessarily invoking the entire emotion construct.

Under this kind of analysis, the great diversity of things that can get people to say "I'm disgusted!" might not all refer to the same, monolithic set of components that psychologists are willing to label DISGUST. For example, Cameron et al. (2015) offer the position that differences

between elicitors of disgust and other emotions may not be due to basic affect, but to cognitive concepts such as contamination. A componential view, however, would see contamination-related thoughts and behaviors as a component of the overall emotion package, which may or may not vary with core affective feelings such as arousal, pleasantness, and approach/avoidance motivation.

One way in which verbally reported “disgust” can fall apart when other indicators are looked at is illustrated by an area of research one of us has been involved with: non-moral “injury disgust” (Kupfer, in press). People report feeling disgust toward images of injury such as a limb with a distended broken bone, even when the image lacks any cues to infection (i.e., the skin is unbroken). However, correlational evidence and behavioral experiments showed that disgust reported toward injury stimuli did not entail avoidance of contact with related bandages, unlike disgust toward contaminating (infection) stimuli. Furthermore, analysis of participants' open ended feeling descriptions revealed that when looking at injuries, their feelings were based more on empathy and vicarious pain, rather than prototypical disgust feelings like nausea (Study 3). Another study showed that the degree of disgust reported towards images of injuries was better predicted by ratings of how painful and horrific the injuries looked than by how infectious and contaminating they looked.

A related study by Shenhav and Mendes (2014) used different measures to discriminate infection and injury disgust. They found that contagion-free injuries elicited both verbal labels and facial expressions of disgust, but differences were found in physiological measures, where infection disgust slowed down the gut while injury disgust slowed down the heart. Across both lines of research, the subjective experience and physiological findings suggest that empathy more than disgust is behind the bad feelings. Going forward into our examination of moral disgust, these examples show that it is often necessary to train multiple types of measurement upon an emotional phenomenon in order to see how coherent it is across and within situations. Whether and how moral disgust is different from other kinds of disgust, and whether different

moral elicitors involve different feelings, reactions, and expressions, are questions that will recur throughout our exploration.

The appraisal function

The moral element in appraisals of disgust and anger

In line with the appraisal function of emotion, disgust and anger in moral situations ought to respond to different kinds of perceived social challenge, and prepare action tendencies to deal with these challenges. In making this appraisal-based distinction, it is helpful to discriminate two kinds of moral violation from each other (see also P. S. Russell & Giner-Sorolla, 2013). In a socio-moral violation, a person does something that can be judged according to rules about helping or hurting someone. These rules can be simple and concrete (“Thou shalt not kill”) or complex and subject to interpretation (“Be fair when handing out candy”). A study of multiple languages and cultures as distinct as English, Hebrew, and Hopi has found that, when people are asked to explain the elicitors of disgust terms, they consistently mention socio-moral together with core disgust examples (Haidt, Rozin, McCauley, & Imada, 1997).

In a bodily-moral violation, a person does something that directly violates a moralized rule about how the body is used. In cultures, these rules are mainly about how and with whom you may have sex, what you may eat and how you may eat it, how you may (or should) groom and modify your body, and about damaging one’s own body, up to and including suicide (Chakroff, Dungan, & Young, 2013; Rottman, Kelemen, & Young, 2014). A violation can at the same time be bodily-moral and socio-moral, but not every socio-moral abuse of the body breaks a rule that is specifically about the body. For example, to sexually abuse a child counts as both violation types, because it harms someone in an improper sexual way; but to punch someone in the nose is only socio-moral, because there is no general taboo against using one’s fists.

The distinction between these two kinds of violations has been noted in a stream of research beginning with Richard Shweder's distinction between Autonomy (socio-moral) and Divinity (including bodily-moral) codes of morality (Shweder, Much, Mahapatra, & Park, 1997; Guerra & Giner-Sorolla, 2010). The influential moral foundations theory (MFT; Graham, Haidt, & Nosek, 2009) has built on this distinction. MFT keeps a close correspondence between its Purity foundation and Shweder's Divinity, while splitting Shweder's Autonomy foundation into two socio-moral concepts, Harm/Care and Fairness, which are conceptually and empirically related (that is, fairness can be seen as the application of rules for distributing harm or care as deserved).²

We prefer to define our "Divinity/Purity" analogue in terms of the body. The terms Divinity and Purity imply some involvement of metaphysical, non-bodily essence in these moral realms, but the strongest and most frequently used examples still have to do with sexual violations such as incest, moral food violations such as eating the body of a family pet, or Haidt, Koller, and Dias's (1993) trifecta of bestiality, necrophilia, and culinary impropriety: a man who has sex with a chicken carcass before cooking and eating it. It is also questionable whether violations of the soul or the sacred are good examples of this class of wrongs, looking at the emotions they elicit. Bodily Purity violations primarily evoke disgusted feelings. But Royzman, Atanasov, et al. (2014) found that Purity violations not involving the body, such as desecration of a believer's religious objects, attracted anger much more than disgust. The concept of purity itself, when explicitly rated, also does not seem to discriminate well between bodily-moral and socio-moral situations (Gray & Keeney, 2015, Study 1). Although a few exceptions might emerge, such as damage to natural sites held sacred (Frimer, Tell, & Haidt, 2015), most examples of the "purity" realm that work as disgust elicitors involve bodily-moral violations.

² Both theories also have posited additional moral categories based on duty, loyalty, and obedience, but the theoretical and empirical capacity of these to distinguish between disgust and anger is unclear, let alone their proposed special relations with contempt; see Gutierrez et al., 2012, and Fischer and Giner-Sorolla, 2016.

The distinction between kinds of moral violation has also been challenged by an empirically backed argument that harm in some way underpins all moral judgment, even of apparently victimless, bodily-moral offenses like consensual incest or, where it's frowned upon, masturbation (the "harm hypothesis": Gray, Young, & Waytz, 2012; Gray, Schein, & Ward, 2015; Schein & Gray, 2017). However, the most recent elaboration of that theory (Schein & Gray, 2017) dispenses with the earlier stipulation (in Gray et al., 2012) that moral harm must involve another, suffering mind. Instead, any victim of harm will do, including the self, distant entities like the weeping Madonna, or even abstract "victims" like society or nature. Indeed, the presumption of harm on the basis of ostensibly harmless activity is well-established; Kahan and Braman (2005) give numerous examples in the public sphere, and Haidt and Hersh (2001) have documented that conservatives tend to presume harm even from private and solitary taboo sexual activities.

Work from our lab, too, shows that bodily-moral violations can be seen as harming larger entities than a single person. Gutierrez and Giner-Sorolla (2011) ran a study in which, among other things, people read about a bodily-moral violation described without immediate harm (eating a cloned, hence cruelty-free, piece of human meat created from one's own muscle tissue). They were then asked whether this act harmed specific other persons, "nature," and "the community." Compared to a more innocuous act (taking a memory drug), the taboo steak-eating especially increased presumptions of harm to nature (by 2.4 points on a seven-point scale), but also (by less than 1 scale point) increased presumed harm to others and to the community. Likewise, when Sabo and Giner-Sorolla (in press, Experiment 4) asked who was harmed when people indulged sexually perverse fantasies in imagination or fiction, harm was presumed for the self and for the nonspecific "community," but not for specific other people.

Evidence varies whether harm presumption comes into play early (Gray, Schein, & Ward, 2015) or late (Gutierrez & Giner-Sorolla, 2007) in the moral decision making process. We should keep in mind, when considering this evidence, that investigations into the accessibility of

moral material in Western culture would be skewed by that culture's greater valorization of direct-harm morality (Haidt et al., 1993; Guerra & Giner-Sorolla, 2010). Fortunately, Schein and Gray (2017) have both bases covered, as they specify that norms and harm perception are two parts of a schema of immorality, which tends toward completing itself. Thus, harm can be presumed after the assessment of a norm violation, or harm can be perceived first, and the norm violation filled in. Even if the category of bodily-moral violations is not completely free of harm, the "harm hypothesis" still leaves them with ample grounds to distinguish them from socio-moral violations. The harm that bodily-moral wrongs are presumed to cause is usually suffered by distant and abstract entities (possibly even harm to the rule itself, or harm to morality!), and possibly even suffered by the agents themselves, but not necessarily by specific other people. Bodily-moral wrongs are also tied to specific rules about the use of the body. Some socio-moral wrongs like murder or lying may also relate to rules, but semantically, these taboos intrinsically involve negative consequences for others.

A number of studies, using various measures, have assessed how the appraised situations that evoke moral disgust may or may not differ from appraisals involved in other forms of disgust. We will start with the limitations of one attempt that went straight to the point. Hutcherson and Gross (2011) attempted to measure "moral disgust" directly, with that two-word phrase. Literal "moral disgust" was evoked more strongly by all kinds of socio-moral situations than plain old "grossed out," which only responded to Divinity violations (i.e., bodily-moral violations). However, it was not clear why the word "moral" was only appended to "disgust" and not the other emotions studied. Nor was it clear whether participants felt "moral disgust" as a separate feeling-state, or whether they responded to that phrase by combining their judgments of the act's overall immorality with their feelings of disgust.

The latter possibility was explored in our lab (P. S. Russell, Piazza, & Giner-Sorolla, 2013) with a study that presented the same moral violations but varied whether or not the word "moral" preceded the other emotions "anger," "contempt" and "fear/anxiety." Adding "moral" to

“anger” restored its preeminent position among socio-moral violations, such that it was endorsed more strongly than “moral disgust” was (although so was non-moral anger, a different result than Hatcher and Gross found). Indeed, adding “moral” to any emotion, even the not usually moralized emotion of fear, increased its intensity in response to moral violations. It may be tempting to rely on lay persons’ direct reports of “moral disgust,” but in our judgment, this method is too likely to force the question, combining moral and emotional evaluations into an indistinguishable portmanteau.

Moral anger and disgust appraisals in individual difference studies

People differ in squeamishness. Researchers have developed a number of individual difference measures that, for the most part, present descriptions of various gross things and ask people to rate how disgusted each one makes them feel. This approach can give some insight into the structure of emotion elicitors. Although sensitivity to disgust usually forms a common factor, there are also subscales in various measures that hang together statistically. In this way, it is possible to address questions such as whether disgust relates to morality independently of anger, whether people can be said to have different sensitivities to moral and physical disgust, and whether different elicitors of moral disgust hang together reliably as separate factors.

The earliest disgust scale still in general use is the Disgust Scale (DS; Haidt, McCauley, & Rozin, 1994), which measures six classes of non-moral disgust elicitors as well as a “sexual disgust” subscale that loads separately (under Varimax rotation) from the others and consists of third-party bodily-moral violations (e.g., homosexuality, bestiality); socio-moral violations are not included. The sex subscale also shows the lowest correlation with the total scale ($r = .27$). However, in refining and improving the reliability of a new version called the DS-R, Olatunji, Williams, et al. (2007) jettisoned the sex items, so that the most recent version lacks bodily-moral content. Drawing a link between non-moral disgust and socio-moral judgments, shortened versions of this scale (with or without the sex items) predicted harsher moral judgments in

criminal cases (Jones & Fitness, 2008), even controlling for individual differences in anger (Study 2) or anxiety (Study 3). Also, both the DS and DS-R have been associated in correlational studies with the tendency to moralize ambiguous judgments and to express harsher moral judgments (Chapman & Anderson, 2014). The result for the DS-R, which was mostly due to core disgust, survived covariation of trait anger. In those studies, “none of the items referred to physical disgust stimuli, bodily norms, or violations of sexual purity” (p. 347).

The relevance of disgust sensitivity measures to bodily-moral judgments is even more clear. Many studies have implicated trait disgust (mostly, DS-R) in anti-gay attitudes (e.g., Inbar, Pizarro, Knobe, & Bloom, 2009; Olatunji, 2008) and more generally in “culture war” attitudes towards groups implicated in sexual morality, such as Planned Parenthood (Crawford, Inbar, & Maloney, 2014). Trait disgust also is implicated more generally in intergroup prejudice (Hodson & Dhont, 2015), and there is some initial evidence that novel group descriptions manipulated to evoke bodily-moral disgust are particularly prone to elicit prejudice among the disgust-prone (Hodson, Choma, et al., 2013). And contrary to Chapman and Anderson’s (2014) findings, Oveis et al. (2009) found that trait disgust, controlling for trait anger, only predicted judgments of purity (mostly, bodily-moral) violations and not socio-moral violations.

Tybur et al. (2009) have further developed measurement with a Three Domain Disgust Scale, its elicitor categories derived from evolutionary theories: non-moral pathogen disgust, sexual disgust, and moral disgust. The moral disgust items are all socio-moral in nature (e.g., lying, stealing, violating social conventions), whereas the sexual disgust items, unlike those from the DS, measure disgust at unwanted sexual interest and intrusive sexual reminders, not third-party bodily-moral disapproval of sex acts. The pathogen and sexual scales have shown discriminable relations with such constructs as political ideology, genetic variation, and personality (e.g., Kupfer & Tybur, 2017; Sherlock, Zietch, Tybur, & Jern, 2016; Tybur & de Vries, 2013; Tybur, Inbar, Güler, & Molho, 2015). However, the moral disgust scale items, unlike the

other two, have been shown to elicit stronger anger than disgust reactions, and did not converge with other measures of trait or state disgust (Olatunji, Adams, et al., 2012).

Disgust propensity and sensitivity have also been measured with questions about one's general tendency to experience disgust, rather than the disgust felt toward specific elicitors (DPSS and DPSS-R scales; Cavanagh & Davey, 2000; van Overveld, de Jong, et al., 2006). This "pure" self-report of disgusted feelings, interestingly, has shown relations only to core disgust in behavioral situations (van Overveld, de Jong, & Peters, 2010). Reactions to moral stimuli, which included both bodily-moral (masturbation, eating horse meat) and socio-moral (racist violence), were not related to disgust sensitivity or to the core and animal-reminder components of the Haidt et al. (1994) scale.

Among all these investigations of individual differences and morality, no one study has clearly tested between bodily-moral and socio-moral violations, either as determinants of disgust sensitivity, as factors within disgust sensitivity, or as criterion judgments compared for their relation to disgust sensitivity. Nonetheless, multiple sources do confirm a link between sensitivity to core disgust elicitors and the intensity of socio-moral judgments, even when accounting for sensitivity to anger; and the same is true for core disgust as a predictor of bodily-moral reactions. It is still mysterious, though, why disgust sensitivity holds its own in correlation with socio-moral judgments, for which -- as we will shortly see -- anger tends to outshine disgust as an integral, state response.

Overall, there is evidence that the trait disgust-morality relation is something different than mere overlap from the relation between anger and morality. However, whether this relation reflects a separate category of socio-moral disgust, or just an application of general disgust to moral targets, remains unclear. The factor evidence for a separate socio-moral disgust factor, as we have seen, is vulnerable to being explained away by anger; whereas bodily-moral disgust assessment has been left out of the literature with the adoption of the DS-R. The answer will

have to await more comprehensive research that systematically assesses multiple factors of core and moral disgust sensitivity, as well as multiple moral judgment outcomes.

Individual difference measures, of course, are limited in the conclusions we can draw from them. No matter how assiduously third variables are controlled for, a devil's advocate can imagine another hidden variable lurking around the corner. Most troubling from our IFT point of view is the lack of a correspondence between general disgust sensitivity and functional perspectives. Individual variation may serve adaptive purposes by making possible a variety of reactions to appraised events (Curtis et al., 2011). A squeamish person, for example, may be best suited to keeping children away from things that might make them fall ill, whereas a more hardy soul can take on the job of gutting fish or scavenging for still-edible carrion. However, the same variation can also be useful when one is automatically learning disgust reactions, using disgust in self-regulation, or using it to communicate with others. The functionality of individual variation, in short, need not have anything to do with the structure or function of what disgust does in any given situation--our next topic of consideration.

Appraisals of moral anger and disgust: the bodily-moral hypothesis

The nature of the moral appraisals that situationally elicit disgust, in preference to other emotions, has been a primary focus of work in our lab. We were inspired by a pioneering set of studies by Rozin, Lowery, Imada, and Haidt (1999) that tested the CAD tripartite division of morality against the correspondent trio of emotions, contempt, anger and disgust, measured by endorsement of facial and word stimuli among US and Japanese participants. These findings, though suggestive, have been questioned on a number of grounds (see Cameron, Lindquist, & Gray, 2015; Hutcherson & Gross, 2011; P. S. Russell & Giner-Sorolla, 2013; Royzman et al., 2014): the loose construct validity of the moral codes, including some items that were non-moral (like "eating rotten meat"); the forced-choice methodology that may have obscured overlap among emotions and moral codes; and the failure, even so, of some of the results to conform to

CAD predictions. Oveis et al. (2009) framed similar questions in terms of anger and disgust corresponding to purity and harm, but those studies that experimentally manipulated elicitors also compared very different violation types to one another, some of which also were questionably moral in nature (e.g., purposefully wearing mismatched clothes.)

In a number of studies beginning with Gutierrez and Giner-Sorolla (2007), we took another approach, holding constant the framing details of single scenarios while varying only key appraisal elements. These studies tested the bodily-moral hypothesis: that disgust, controlling for anger, would increase primarily in response to violations of “taboo” norms about use of the body, rather than to violations of socio-moral “harm” norms about causing direct or symbolic harm to identifiable individuals. As already mentioned, a scenario we devised to frame these predictions is the human steak story, here reprinted in a version that violated bodily-moral norms (cannibalism) but not socio-moral symbolic harm norms (deceiving other people).

A scientist studying recent advances in cell cloning technology takes a group of muscle cells from her arm and clones them in a vat. The cells grow into a strip of human muscle tissue about the size of a steak. When the process is finished, she is curious about the meat's taste, so she takes the strip of tissue, grills it, and eats it alone for dinner. She knows it is free of any communicable diseases.

The scientist does not develop a taste for human flesh, and she is never tempted to harm people. Her curiosity is satisfied and she goes on with her research. She has no regrets or worries about what she has done, as it was all in the name of science.

The comparable version of the story that did not violate bodily norms, while still involving ingestion of an artificial substance, had the scientist concocting a memory drug which she mixes in water. To also violate harm norms, the scientist “serves it (the steak/drug) to her friends for dinner without their knowledge.” In Gutierrez and Giner-Sorolla (Study 1), a third condition of the

taboo steak story involving psychological harm to self was devised. Here, the scientist “develops deep regrets about what she has done, and worries about whether it was worth doing in the name of science.” That study also created versions of the consensual-incest story from Björklund et al. (2000) featuring no (direct) harm, harm to others, and harm to self, and gave similar treatment to an original scenario in which subscribers to a consensual necrophilia club give pre-arranged consent for their cadavers to be used for sexual purposes³.

These manipulations consistently showed that anger, relative to disgust, was highest when a scenario harmed others, whereas disgust prevailed by a larger margin when it harmed nobody specific or harmed only the person who committed the act (prefiguring Chakroff et al., 2013, and Rottman et al., 2014, who linked self-harm to purity violation). Our measures combined parallel ratings of one’s own anger and disgust feelings according to both verbal emotion terms and emotion face photographs. As a representative result, we present our Study 2, which crossed the bodily-moral (“taboo”) and socio-moral (“harm”) manipulations within the single scenario of the human steak. Across 182 participants in this 2 x 2 design, and collapsing over a load manipulation that did not moderate effects on emotion, we found a significant main effect of taboo, but not harm, increasing disgust. Conversely, anger increased as a main effect of harm, but not generally as a main effect of taboo, with an interaction effect showing that taboo acts increased anger only when no harm was described (Figure 2). However, a reanalysis of the data conducted for this paper showed that the taboo effect on disgust was still very strong (partial eta-squared = .47, $p < .001$) when anger was included as a covariate. In the original article, similar effects were obtained in a partial replication focusing on refining the measurement of perceived harm (Study 3). And, across both these experiments, in experiment-wide regression analyses, perceptions of symbolic harm to other individuals (rights violations) predicted anger, but not disgust.

³ As recently brought to our attention over a conference dinner, this arrangement would fall foul of recent legislation in some jurisdictions requiring sexual consent to be continuous throughout the act, e.g. California’s Education Code (Student Safety: Sexual Assault, 2014).

Insert Figure 2 around here

The initial foray into this method was somewhat limited by our failure to assess appraisals of the disgusting events. “Taboo” was our term referring to bodily-moral violations, but in Gutierrez & Giner-Sorolla (2007), there were as yet no items measuring disgust-related appraisals; namely, perceptions that the violation was abnormal, contaminating, impure, and other cognitive attributes associated with disgusting behavior. We later approached this question as part of a study reported in P. S. Russell & Giner-Sorolla (2011a). In addition to varying the actor’s intent, to examine moral emotions’ flexibility (see next section), we included a Harm (self/others) x Taboo design using the human steak scenario. This study measured appraisals of harm to others, but also theoretically disgust-related appraisals: the abnormality, impurity, and character flaws revealed by the act, which hung together as a reliable unit and loaded separately from the harm appraisals in factor analysis. Disgust and anger were measured by similar means as the previous studies. As before, disgust was intensified primarily by manipulated taboo, whereas anger was intensified primarily by manipulated harm (Figure 3). In fact, harm to self tended to increase disgust rather than anger, in line with Chakroff et al. (2013) and Rottman et al. (2014). Also, appraisals of harm followed the harm manipulation, and disgust-related appraisals followed the taboo manipulation.

Insert Figure 3 around here

Converging evidence was found in the previously mentioned Gutierrez and Giner-Sorolla (2011) study of presumed harm, in which the taboo “human steak” version of the study increased disgust more than anger. In that study, increased anger (not disgust) mediated the taboo’s effect on presumptions of harm to other people, whereas increased disgust (not anger) mediated its effect on presumptions of harm to nature. Even though harm to others was never mentioned in the design, anger retained its association with moral concerns about the rights of individuals, similar to the regression results obtained in the preceding studies.

Although the human steak example is memorable, it is also bizarre, in the tradition of philosophical thought experiments from Plato's cave to the ubiquitous trolley problems of today's moral psychology. Some might see this as a limitation, so Giner-Sorolla, Caswell, Bosson, and Hettinger (2012, Study 2) extended the study of bodily-moral and socio-moral violations to a more everyday kind of event: interpersonal transactions, sexual or otherwise. In our design, we presented participants with scenarios that crossed three levels of bodily abnormality expected to attract increasing levels of disapproval (1: no sexual content, i.e., a business deal; 2: heterosexual activity outside of marriage; 3: homosexual activity outside of marriage) with three levels of harm based on the betrayal plus deception involved in the deal or the sex (1: no betrayal/no harm; 2: covert betrayal of a business/romantic partner, "indirect harm"; 3: overt betrayal of the partner, "direct harm"). We measured anger and disgust through similar means as the previous studies, and additionally developed multiple items for harm and for three candidate appraisals related to disgust: bad character of the actor; contamination seen to emanate from the act; and the abnormality of the act.

The results for the two emotions (here, each controlling for the other) showed that anger was mostly influenced overall by the existence of betrayal, not the extent of bodily abnormality. Conversely, disgust was markedly higher for homosexual than heterosexual relations, although there was some increased disgust when the encounter was heterosexual versus non-sexual (see Figure 4). Using all disgust-related appraisals in a simultaneous mediation analysis between our manipulations and the emotion outcomes, only abnormality was a successful mediator between the bodily-moral manipulations and the disgust outcome. This held true when explaining both the leap in disgust from non-sexual to both sexual scenarios and the leap in disgust from heterosexual to homosexual scenarios. The combination of abnormality as a mediator, with its importance in explaining increased disgust as a result of bodily-moral elements, could be taken as support for the bodily-moral hypothesis of disgust.

Insert Figure 4 around here

In another test of elicitation that broadened the scope of scenarios used, Gutierrez, Giner-Sorolla, and Vasiljevic (2012) added three more taboo scenarios to the human steak (one about eating vulture meat at a dinner party, one about getting a body scarification, and one about a sexual relation across a wide age gap.) These were contrasted against versions that involved socio-moral but not bodily-moral violations in closely comparable settings (e.g., the voluntary scarification was replaced by a coerced tattooing while drunk, tattoos having become quite normal among our university population). Also, the socio-moral steak example was improved by having vat-grown lamb (rather than a drug) served to friends under false pretenses, increasing comparability with the taboo version. We were particularly interested in broadening the evidence base for different moral disgusts by seeing whether verbal labels (sets of emotion word synonyms, as before) corresponded more closely to endorsement of facial expressions for one type of violation versus another.

As with the other studies presented, socio-moral violations elicited relatively more anger, and less disgust, than bodily-moral ones did, no matter whether face or word measures were used. Taking disgust word use as the outcome, a regression analysis (see Figure 5) showed that much more variance in socio-moral “disgust” claims could be accounted for by relations with the use of the word “anger,” compared to bodily moral “disgust.” But at the same time, socio-moral disgust was not entirely an anger synonym-- there was some significant amount of verbal disgust in those violations that was accounted for by disgust face endorsement, even controlling for two distinct measures of anger. This implications of this small amount of independent socio-moral disgust will be further explored in the next section.

Insert Figure 5 around here

Although the previous studies have shown that abnormality, in the context of the body, is a key appraisal of disgust, what evidence is there that the body, in the context of abnormality, also plays a critical part? A recent unpublished study in our lab (Giner-Sorolla, 2017) pre-tested photographs either of unusual, unattractive fashions, or of extreme body modifications such as

scarification and hand piercings, matching the two photo types on general negativity and unusualness. We then asked 104 undergraduate participants to report their anger, fear, and disgust toward each photo. The interaction of Photo Type (fashion/body) with Emotion Type was significant. It was further qualified by a three-way interaction with the dichotomized variable of whether the participant reported themselves having any “unusual” body modifications (as defined by the participant; 46 yes, 57 no, one did not reply). Means with 95% confidence intervals are shown in Figure 6. Disgust, unlike the other two emotions, was much higher toward body modifications than toward the equally unpleasant and unusual fashions. This effect was especially strong for people who did not classify themselves as having any unusual body modifications. This study showed that it is not enough to break convention in an aesthetically unpleasant way to evoke disgust; the surface or openings of the body must be involved in some way for disgust to take hold.

Insert Figure 6 around here

The usefulness of “bodily-moral disgust” or similar concepts (e.g. purity, divinity) as a category has been challenged with the observation that the bodily-moral acts in these studies usually involve contagion exposure. This more parsimonious account explains disgust at incest and other such wrongs as a byproduct of core-disgust concerns that these bodily acts would spread disease. In IFT terms, it upholds a single-appraisal account of disgust. Such was the position of Royzman et al. (2014), who reported a series of studies showing that disgust was the predominant response only for violations of the “divinity” or “purity” codes that involved sexual contact, whereas crimes against the sacred itself that did not involve the body (e.g., burning holy texts in disrespect) evoked primarily anger. However, although these studies effectively force a second look at the validity of labels such as “divinity” and “purity,” they also reinforce the association of disgust with bodily-moral violations, asking us to consider that bodily-moral violations might be intrinsically bound up with health concerns.

Kayyal, Pochedly, McCarthy, and J. A. Russell (2015, Study 2) created a number of scenarios involving moral violations with and without pathogen transmission. Some of the pathogen scenarios involved sexual violations and gory violence, and these were the ones that were more likely to elicit a categorical choice of disgust over other negative emotions. Others involved only hitting (with fists, or a car), and these were low in disgust. Oddly, given J. A. Russell's (1993) prior critique of the facial recognition literature for using forced-choice methods, participants rated only the intensity of the predominant emotion chosen. This may have excluded genuine secondary disgust responses and exaggerated the conclusion that disgust-morality relations were weak or nonexistent outside of the sex-and-gore pathogen scenarios. Thus, the low disgust ratings reported for non-pathogen scenarios have to be taken with a grain of salt. However, the conclusion is similar to Royzman et al. (2014), in that manifest disgust at sexual morality violations is explained away as a product of pathogen concerns.

One problem for this account arises with a closer look at evidence from the preceding work. If disgust is just a byproduct of disease concerns, it should not contribute to moral judgments of the act, especially when other negative evaluations or emotions (in particular anger) would be partialled out in multivariate analyses. However, disgust made a significant contribution to moral judgments in experiment-wide regression analyses reported in several of the above-cited papers, including P. S. Russell and Giner-Sorolla (2011a) and Giner-Sorolla et al. (2012, both studies). A new analysis of data from Gutierrez and Giner-Sorolla (2007) also showed contributions of both emotions to the "right/wrong" evaluation item, which out of the four evaluation items was most clearly related to moral judgment (Experiment 1, multilevel analysis with participant as random factor: anger $\gamma = .68$, disgust $\gamma = .43$, both $p < .001$; Experiment 2, regression: anger $\beta = .39$, $p < .001$, disgust $\beta = .17$, $p = .016$; Experiment 3, regression: anger $\beta = .26$, $p = .044$, disgust $\beta = .29$, $p = .024$). Disgust also held its own in a similar reanalysis of data from Gutierrez and Giner-Sorolla (2011) (anger $\beta = .23$, $p = .059$, disgust $\beta = .35$, $p = .004$).

Although disgust is thus clearly moralized, another possibility is that the moralization is about disease and contamination. Scholars of health have often remarked that disease-spreading behavior is a moral issue in many societies (e.g., Brandt & Rozin, 1997). Behaviors are not strictly personal if they spread disease to a community, and when healthcare costs are shared by all, the unwell become a public burden. Curtis et al. (2011) also note that hygiene norms, adaptive in preserving the health of communities, are sometimes explicitly tied up with moralized group norms in societies like India. Even in Britain, data from a condition tested only in Study 1 of Sabo and Giner-Sorolla (2017) revealed some moral disgust toward individual hygiene violations such as intentionally eating moldy pizza. Of course, these pathogen-risky violations were rated as disgusting; but participants also rated them as morally wrong, closer to the midpoint of 4 than to the “not wrong” anchor of 1 on the seven-point scale ($M = 3.14$). Ratings of bad moral character were even higher, close to the midpoint at 4.10.

But speaking completely literally, disgust has been found toward moral violations even when it is made clear (as with the human steak) that any bodily involvement is disease-free. Fully protected consensual sex across a huge age gap, to use another example, is still repulsive to many -- more so than bareback sex between two attractive young people. Masturbating with the aid of a teddy bear is another less-than-fully contagious example that caused revulsion in Haidt and Hersh (2001). So the trigger cannot be our literal, modern idea of disease contagion, backed up by our medical knowledge, and with an escape clause for prophylaxis. Some examples even defy the superficial appearance of disease cues, as when sexual prejudice manifests itself as disgust toward a same-sex couple holding hands. To make sense as a reaction that biologically or culturally arose in the pre-Pasteurian past, pathogen disgust would have to react to a somewhat distant proxy stimulus--the contact of bodies, or the crossing of their skin boundary via an existing or custom-made orifice.

Another caveat would have to be layered on when we compare the leap in disgust from equally contagious different- to same-sex activity⁴, or from young love to young incestuous love. This may well be due to an additional appraisal function of disgust, Tybur et al.'s (2009) sexual disgust at unwanted pairings. But this function would seem to respond also to the elements of bodily contact and penetration, with additional specifications provided by culturally normative ideas of fitness and appropriateness. Somehow, sexual acts that are seen as normal in society, or at least as desirable by the individual, have to overcome a disease-based wariness about intimate contact. This dynamic has been studied in some detail by scholars of sexual function and dysfunction (e.g. de Jong, van Overveld, & Borg, 2013; Fleischman, 2014).

Third-party moral reactions have also been explained in terms of personal protective functions of disgust such as pathogen or sexual disgust via empathetic mental imagery (Fessler & Navarrete, 2003). That is, seeing someone else's behavior leads one to imagine how disgusting doing it yourself would be, leading to discomfort at mental imagery and the moralized desire to condemn the offending behavior. For example, imagining another person eating meat might be disgusting for a vegetarian, which might contribute to their opposition to the behavior (Fessler, Arguello, Mekdara, & Macias, 2003; Rozin, Markwith, & Stoess, 1997). Or, imagining incest would lead to thoughts of doing it with one's own relatives, which is personally sexually disgusting (Fessler & Navarrete, 2004). But ultimately, although this kind of dynamic can maintain and intensify a moral response, the disgust response has to come from somewhere, and leaves us with the puzzle of why some kinds of contact are disgusting and others are not. For example, actually having a sibling contributed significantly among women ($p < .01$), and marginally among men ($p < .05$, one tailed), to disgust at brother-sister incest descriptions in Fessler and Navarrete (2004), but a general tendency to judge moral transgressions harshly contributed more strongly and reliably in both regression equations ($p < .001$ for both men and

⁴ Bearing in mind that revulsion at sex between men was a feature of heteronormativity long before HIV became associated with that sexual activity.

women). Even in this research, social norms overwhelm the ability to personally imagine an act as a determinant of disgust.

In these thought experiments, we are left with a disgust very similar in its outline to the bodily-moral hypothesis. To be sure, the previous label of “abnormal use of the body” may be too broad, covering as it does punches to the face, wearing an ugly hat, and (to use one of Royzman et al.’s, 2014, examples) walking on one’s hands, none of which seem particularly disgusting either in thought or lab experimentation. What exactly about the body-abnormal is morally disgusting may elude neat and tidy definitions (as Royzman & Sabini, 2001, suggest). However, the elicitors most reliably found to be morally disgusting involve, somehow, the inside of the body and its interface with the exterior, whether through sex, eating, or modifications that break the skin. But just as important, to become truly moralized, disgust at such activities must be positioned against some kind of social norm about the use of the body; personal preferences can be idiosyncratic or socially perverse, but moral judgments refer to larger norms.

Appraisals in elicitation studies: Evidence from the neurology and physiology of disgust

As we previously mentioned, different elicitors of non-moral disgust (or, at least, different uses of the word “disgust”) have shown distinct signatures of psychophysiology, especially in heart rate (Shenhav & Mendes 2014; see also Olatunji, Haidt, McKay, & David, 2008). This raises the possibility that moral disgust might also show distinct responses as compared to non-moral disgust, or even that different moral elicitors might behave differently.

Self-reports of physiological reactions, which we have mentioned under measurement, were the focus of Royzman, Leeman, and Sabini’s (2008) investigation. They found evidence for an “oral inhibition” response, involving reports of nausea, gagging, and loss of appetite, toward bodily-moral scenarios involving sibling incest. Unfortunately, the only comparison of these measures to socio-moral disgust was in a briefly reported pretest, in which Hitler (perhaps also a prime example of the character hypothesis) elicited strong verbal disgust but little oral

inhibition. Our previously mentioned physiological self-report measures in Sabo and Giner-Sorolla (2017) were also activated more strongly by bodily-moral than socio-moral wrongs.

Ottaviani, Mancini, et al. (2013) measured actual physiological responses, via electrocardiogram, to core and moral disgust scenarios. Whereas non-moral disgust (an old man vomiting) reduced heart rate, moral disgust (toward parent-child incest) increased it, and in general showed a pattern more typical of anger than disgust. However, the scenario of incest would reasonably also be interpreted as abusive, so in our scheme would be counted both as a socio-moral and bodily-moral wrong. To date, research is lacking that could disambiguate the two types of moral disgust, or that uses additional measures such as gastric response that have been used to differentiate among elicitors of non-moral disgust (e.g., van Overveld, de Jong, & Peters, 2008.)

A number of attempts to discern the brain's responses to moral and non-moral disgust stimuli have also been published, mostly using functional magnetic resonance imaging (fMRI). A foremost concern for our purposes is whether the most basic form of disgust has a distinctive neural signature, which would allow a comparison with the signature of self-reported moral disgust. Some imaging and impairment studies have implicated the insula in disgust, especially as a structure activated by contaminating but not injury-related "disgust" images (Harrison, Gray, Gianaros, & Critchley, 2010; Heys, Stevenson, & Coltheart, 2007; Wicker, Keysers, et al. 2003; Wright, He, et al., 2004). Other studies give reason to doubt that the insula takes part in any distinctive or characteristic signature of disgust, including a meta-analysis of emotion-brain region correspondences (Lindquist, Wager, et al., 2012) and a study also associating the insula with fear (Scheinle, Stark, et al., 2002).

Moll, de Oliveira-Souza, et al. (2005), in an fMRI study, compared a set of verbal non-moral disgust elicitors, such as descriptions of bodily products and animals, which evoked strong disgust, to a set of socio-moral violations, which evoked a less strong mix of anger and disgust. Although there was some common activation of orbitofrontal cortex regions, the two

stimulus sets also activated many different regions, and it is not clear whether this was due to moral content, emotional content, or simply differences in the nature of the imagery evoked (e.g., social versus nonsocial).

Since then, there have been other studies which took more care to observe stimulus equivalence and greater distinction between socio-moral and bodily-moral cues. Schaich Borg, Lieberman, and Kiehl (2008) distinguished between “infection” (non-moral), “incest” (bodily-moral), and “iniquity” (socio-moral) violations by having participants in the fMRI scanner memorize self-relevant statements about carrying out pathogen-spreading contact, incest, harm, or neutral actions with an opposite-sex sibling. In self-reports, incest and pathogen acts were more disgusting than socio-moral acts. The functional activation contrasts showed different, but overlapping patterns supporting a distinction between neural responses to all three categories. Parkinson, Sinnott-Armstrong, et al. (2011) also found distinct fMRI responses to “disgusting” moral scenarios (on inspection, bodily-moral offenses without specific harm) and socio-moral scenarios, divided into harm and dishonesty violations. However, it is hard to find comparable brain region activations among the comparable elicitors across any of these studies, either in what is common to these disgusting scenarios or in what is specific to the different kinds of elicitors. Moreover, these studies found no consistent relation between disgust and insula activation; only Moll et al. (2005) found insula activation, and that for socio-moral harm scenarios rather than for non-moral disgust.

The studies in this small literature are difficult to compare and assess for replicability because of the different approaches taken. For example, Schaich Borg et al. (2008) used first-person imagination tasks involving various transgressions, which proved highly stimulating to the brain, especially in the case of imagined incest. Other studies, like the majority of moral psychology behavioral experiments, have used third-person scenarios or pictures, but with many differences and extraneous elements even within the same study. This makes it hard to distinguish emotional processes from other cognitive or motivational activations.

The entanglement of different scenarios with non-emotional brain processes may mean that we need a different approach to get at questions about the true constitution of the disgust that people report. Although a recent study of whole-brain machine-learning paradigms showed some promise to better identify emotion-related activation, the pattern associated with disgust showed little resemblance to previous findings (Kassam, Markey, et al., 2013). Another possibility is to keep constant the sensory or conceptual elicitors, but to look at activation as it correlates with individual differences in susceptibility to disgust, compared to other emotions. Until both experimental design and neuroscience techniques advance to the point where a clearer view is possible, there will be uncertainty about exactly how these measures support or challenge findings about moral disgust from self-report instruments.

Appraisals in elicitation studies: the socio-moral character hypothesis

The studies reviewed so far, comparing bodily-moral to socio-moral disgust sources, tend to associate disgust exclusively or primarily with bodily-moral elicitors, once anger is accounted for. These results are particularly problematic for an explanation that ties moral disgust to non-bodily violations that involve deception or exploitation, such as Miller's (1997) or Haidt's (2003). Most of the socio-moral violations in the reviewed studies, which were linked to anger more than disgust, involved lying (as in the human steak example or sexual/business relationship example). However, there are other studies that make the case for aspects of disgust being associated with socio-moral violations even taking anger into account. Cannon et al. (2011), for example, found that fairness as well as purity violations elicited facial muscle movements consistent with disgust but not anger, in contrast to direct harm violations, which elicited angry rather than disgusted facial movements. As we have also seen, Gutierrez et al. (2012) did not completely exclude the role of disgust from judgments of socio-moral violations, even controlling for anger.

The existence of socio-moral disgust, if granted, cries out for an alternate appraisal account to that involving the body. Keep in mind that IFT's appraisal function does not limit each emotion to only one eliciting theme. We have recently proposed that socio-moral disgust is most clearly delineated from anger in that it responds to information about an individual's bad moral character, as opposed to the information about the consequences of his or her acts. Recall that our previous studies of the elicitors of anger and disgust gave mixed results about the contribution of character judgment to disgust feelings (Giner-Sorolla et al., 2012; Russell & Giner-Sorolla, 2011a). However, since then, the research literature has given initial support to the socio-moral character hypothesis by tying character to purity violations. Most relevant is evidence showing that harmful acts are less likely to be attributed to person factors than impure acts are (Chakroff & Young, 2015).

Similarly, additional evidence comparing moral norms has shown that individuals who act impurely one time are expected to violate both harm and purity norms in the future. When one violates harm norms, however, it is expected that future transgressions will remain within the harm domain (Chakroff, P. S. Russell, Piazza, & Young, 2016). Finally, P. S. Russell and Piazza (2015), in addition to bolstering evidence for bodily-moral disgust and socio-moral anger, also found heightened disgust toward people who consented to and desired transgressive acts, whereas anger responded to people who were seen as carrying out those acts; desire, here, can be seen as a stronger cue to character. In effect, it seems that a violation of bodily-moral norms, and the associated emotion of moral disgust, leaves a more thorough and permanent mark on an individual. This taint has the ability to cross moral domains (Chakroff et al., 2016) and even the boundary between reality and fiction (Sabo & Giner-Sorolla, 2017).

This evidence indirectly suggests that bodily-moral violations elicit both bad character inferences and disgust. The link also suggests that disgust towards non-purity violations, such as harm and unfairness, might be explained by negative character inferences about the person enacting them. If disgust can be evoked from non-purity violations, then it is a great departure

from disgust's original function as a mechanism of disease avoidance (Oaten, Stevenson, & Case, 2009) to a socio-moral mechanism that helps us avoid not only disgusting objects, but disgusting people as well. The character hypothesis was perhaps foreshadowed in the model of Ortony, Clore, and Collins (1990), which labeled disgust as an emotion felt towards objects and anger as an emotion felt towards situations (see also next section). Specifically, we propose that feelings of moral disgust are not only evoked from acts that violate bodily moral norms, but, more generally, from acts that relay information about one's bad moral character, thus drawing the clearest distinction between disgust and anger.

One piece of evidence from our lab in support of character-based disgust examined how one judges other people who imagine, or consume through various types of fiction, immoral acts, as compared to those who commit the same immoral acts in real-life (Sabo & Giner-Sorolla, 2017). Across five experiments, we presented participants with vignettes that described either harmful or impure acts. An act of harm, for example, would have described a man who was acting irrationally, unfairly, and unkindly by verbally degrading someone, by destroying material goods, or by being manipulative and subversive. By contrast, impure vignettes described people engaging in bizarre, uncommon, and strange, but entirely consensual, sexual behaviors. Participants were randomly presented with a single vignette that described either a harm or a purity code violation. Further randomization presented the act as occurring in real-life, as being imagined, as something that was watched in a film, or as something that was played in a video game. Participants made a variety of judgments towards the man described in the vignette, including anger and disgust and the man's perceived moral character.

Across the experiments, an asymmetry was identified between harmful and impure acts that occurred in real versus fictional contexts. More specifically, the act of imagining committing a prototypically harmful act was not seen as morally reprehensible, even though it was deemed immoral to commit that same act in the context of real-life. In other words, there was a significant "pass" given to how morally wrong it was to imagine harm, relative to actually

committing harm. The same “pass” did not, however, appear for violations of purity. Regardless of context, impure acts tended to be equal in terms of moral wrongness; it was just about as immoral to imagine oneself committing a purity code violation as it was to actually commit that same act.

In these studies, evaluations of purity violations, which are linked to the emotion of disgust, did not differ much across contexts. On the other hand, evaluations of violations of harm violations, which are linked to anger, varied dramatically. This difference also extended to the actual emotions reported. In a meta-analysis across all relevant studies, we found that disgust, compared to anger, was mitigated much less by real vs. fictional contexts of harm, a contrast that is shown by the y-axis in Figure 7. Also, in purity contexts, the real vs. fictional contrast was uniformly low for disgust and anger alike. Even in harm contexts, disgust appears to be an inflexible and associative emotion that tracks such signs of bad human character as malicious imaginings and desires.

Insert Figure 7 around here

Further establishing the character hypothesis, the experiments of Sabo and Giner-Sorolla (2017) explored the extent to which judgments of moral character could explain the discrepancy between real and fictional immoral behavior. An analysis of moderated mediation suggested that the critical difference in the overall moral wrongness between fictional acts of harm and purity was that fictional purity code violations, but not harm code violations, were seen as a signal of a bad moral character.

This research suggests that negative character judgments can be activated in the absence of real impurities when fictional impurities are displayed in their stead. Indeed, further research has advanced our position that moral disgust is uniquely different from anger and that negative character information is one of its strongest elicitors, even in the absence of impurities, physical or otherwise. Across three experiments, Giner-Sorolla and Chapman (2017) presented vignettes that crossed information about an agent’s moral character with the harmful

consequences of the individual's actions. Overall, anger arose from harm whereas disgust arose from evidence of bad character.

Experiment 1 was an extension of Tannenbaum, Uhlmann, and Diermeier (2011) in which a scenario describes a man that learns of his girlfriend's infidelity and then proceeds to either beat her or beat her cat, depending on condition. In the original experiment, participants judged the man in the cat beating scenario to have worse character than the man in the woman beating scenario, even though the violence towards the woman was more morally wrong. To replicate and extend on these findings, Giner-Sorolla and Chapman (2017, Experiment 1) presented the original vignettes, measured character, moral wrongness as a proxy of act evaluations, and then innovated by adding measures of anger and disgust. As in the original experiment, the woman beater's actions were judged to be more wrong than the cat beater's, but the cat beater had worse moral character than the woman beater. Moreover, the added emotion measures indicated that higher levels of disgust, but not anger, were associated with more negative judgments of moral character, thus providing further evidence for the socio-moral character hypothesis.

In an attempt to make further distinctions between judgments of act and character, Experiments 2 and 3 (Giner-Sorolla & Chapman, 2017) actively manipulated the moral character of the vignettes' agent by varying the extent to which he desired to harm, intended to harm, as well as the consequences of his actions (Cushman, 2008). In line with Cushman's original findings, desire had the greatest effect on judgments of moral character, but furthermore, when controlling for anger, character predicted disgust, even though the immoral acts were not related to impurity (see Figure 8).

Insert Figure 8 around here

Overall, the results of these experiments contribute towards the socio-moral disgust hypothesis by advancing our position that disgust relates to judgments of bad character, unlike anger, which is more related to the judgments of acts themselves. Furthermore, the findings of

these experiments indicate that one does not need to explicitly violate bodily moral norms in order to evoke moral disgust. Thus far, the research from our lab (e.g., Giner-Sorolla & Chapman, 2017; Sabo & Giner-Sorolla, 2017) has demonstrated that fictional impurities essentially proxy as real impurities, so far as moral condemnation is concerned. Even more concretely, it has been shown that disgust, more than anger, can be elicited from acts that are purely harmful such as cheating, lying, or stealing, so long as they reveal information about a tainted moral character. What remains to be determined is how the character hypothesis can explain the existing differences between studies that found socio-moral disgust independently of anger, and studies that did not. Perhaps, to mention just one possibility, some kinds of violations, such as unfairness, are seen as more indicative of character than others, such as harm, when presented briefly in a vignette.

To wrap up what elicitation studies can tell us about the nature of moral disgust, there is clear evidence of disgust in response to bodily-moral violations, some evidence of disgust in response to socio-moral violations, and emerging evidence that socio-moral disgust is linked to signs of bad character, rather than evaluations of outcomes. Research has supported these claims even when controlling for anger, defending somewhat against the claim that the use of disgust language is only a synonym for anger. But whether the bodily- and socio-moral manifestations of disgust represent distinct subjective states, united by a single label, is a more difficult question to answer from these studies that focused on elicitors rather than characteristics of disgust. From evidence such as Gutierrez et al. (2012), socio-moral disgust seems to be more related to anger language than is bodily-moral disgust. However, this could just as well be a co-activation of another basic emotion under the “one disgust” hypothesis, rather than an intrinsic feature of a special, socio-moral disgust.

The associative function

Associations to disgust: Evidence from incidental disgust manipulations

The associative function of emotions is distinct from appraisal in that it can potentially operate in reverse. That is, whereas appraisals start with judgments of some kind of moral wrong and produce emotions integrally, associative thinking has the potential to activate wrongness judgments by mere association with feelings of disgust, including feelings created by irrelevant sources. Pizarro, Inbar, and Helion (2011) have framed the controversy with three separate questions. They first ask whether disgust can be produced, integrally, as a process outcome of moral judgment processes. As we have seen, the elicitor literature overwhelmingly answers this question “yes,” but the next two draw on a different literature entirely. Can incidental disgust from sources not relevant to a judgment -- say, from smelling foul odors or seeing someone vomit just beforehand -- make moral judgments harsher? And, in a stronger version of the second question, can incidental disgust add a moral element to judgments that were not moral otherwise? These latter two questions are more controversial in their support from the literature. Assessing the evidence pro and contra will be the main aim of this section.

Trying to manipulate both incidental disgust and anger feelings in parallel has its own challenges. As noted in a previous review (P. S. Russell & Giner-Sorolla, 2013), disgust can be distinctively evoked by presenting a picture, but pictures that elicit anger also elicit other emotions such as fear or sympathy, and may be more sensitive to interpretation, context, and cultural differences. Methods that involve reminiscence or imagination about disgusting and infuriating events, though more comparable, have a confound problem. They necessarily involve bringing up events that differ on other dimensions such as social content, blame, the kind of moral violation involved, and so on. Sometimes, as in Whitton et al. (2014), entirely distinct methods of induction are used (pictures for disgust, personal rumination for anger), which reduces comparability even further.

Environmental elicitors of incidental disgust, such as foul odor sprays, vile tastes, revoltingly messy desks, or fake vomit, have also been tried (e.g. Eskine, Kacirik, & Prinz, 2011; Inbar, Pizarro & Bloom, 2011; Olatunji, Punchocar, & Cox, 2016; Schnall, Haidt, Clore, & Jordan, 2008). However, finding an anger-evocative control for such manipulations is even more difficult, and mere discomfort is often taken as a next-best negative affect control (as in Olatunji et al., 2016, who immersed hands in either warm water, painfully cold water, or fake vomit.⁵) One possibility in these treatments (Royzman, 2014; Goodwin & Landy, 2015a, 2015b) is that the experimenters might become blamed for the discomfort or disgust experienced by participants, so that extreme disgust manipulations could also boost anger, culpability, and other related feelings and cognitions. Finding a discomfort control that increases general negative feelings by the same amount as a disgust manipulation, as Olatunji et al. (2016) have done, at least makes sure that the amount of experimenter-directed anger can remain constant across conditions.

Indeed, it is a recently contested question whether manipulations of incidental disgust do affect moral judgment. The studies cited in the previous paragraphs, and others, have all reported positive results, with disgust increasing the extremity of judgments of wrongness. Landy and Goodwin (2015), however, meta-analyzed the literature and concluded that there was little consistent evidence for effects of incidental disgust on moral judgment. Specifically, effects were found: a) among published studies but not unpublished studies, suggesting a publication bias; b) among studies that used sensory-environmental disgust manipulations but not those that used pictures or imagination; and c) overall, to be of small magnitude, $d = .11$. Among the few studies that tested the capacity of disgust to moralize non-moral stimuli, the analysis also concluded that an effect did exist, but perhaps reliant on publication bias.

⁵ The recipe for really convincing “vomit,” if you are curious, involves mixing cream of mushroom soup, cream of chicken soup, black beans, and fried gluten pieces.

Schnall, Haidt, et al. (2015) replied to the negative conclusions of the meta-analysis, emphasizing the positive findings in the meta-analysis and the importance of two moderating factors that, if not checked, would lead to underestimates of these effects: a) as a number of studies showed, individual sensitivity to bodily cues augments effects, so that high levels of sensitivity may be necessary; b) studies that measured emotional responses in an overly obvious way may have alerted participants to the source of their feelings and thereby negated the feelings' effects, as Schwarz and Clore's feelings-as-information theory (1996) would predict. Under feelings-as-information, incidental effects must hit a small methodological window, activating the awareness of feelings, but stopping short of letting people connect this awareness with an awareness of its source or of its influence. Goodwin and Landy, in their reply (2015b), are skeptical about the "window" and treat it as merely a contradiction in terms.

Although we appreciate the logic of feelings-as-information theory, we must note that this "sweet spot" for manipulations means that proper calibration of the necessary conditions is essential for achieving successful and replicable results in this field, in line with recommendations for studying implicit influence in light of the recent methodological crisis (e.g., Cesario, 2014). Without calibration, the theory is unfalsifiable; any replication or extension that fails can be explained away as a methodological wild pitch, too obvious or subtle to hit the strike zone. We also agree that noxious environments may create moral blame and personal hostility through other emotions such as anger, suggesting the use of equally noxious (and not just sadness-inducing) controls, as Olatunji et al. (2016) have done.

The feelings-as-information theory prescribes a more detailed and conditional role for the intervention of emotions in judgment, compared to the mere activation of judgments implied by IFT's association function. Feelings-as-information mechanisms appear, in IFT terms, to be more a part of the self-regulation function of disgust. In self-regulation, the persistence of a feeling is drawn upon to guide decisions about whether to continue or cease activity towards a goal. The self-regulation function, it seems, can sometimes be fooled by extraneous feelings not

generated by the moral situation itself, but those feelings in turn can be regulated by the realization that they are not relevant to judgment.

When we think about ways in which the more direct and immediate mechanism of association might play a part in the effects of incidental disgust, there are two cautions to keep in mind. First, the direction of association proposed for incidental disgust may simply be too tenuous to reliably activate moral disapproval. As one example, the pathological role that associative disgust activation plays in disease-relevant phobias, obsessive-compulsive disorder, eating disorder, injection-injury phobia, and other clinical syndromes is well documented (Olatunji & Sawchuk, 2005). However, there is no indication that in persons who feel strong associative disgust toward an object, such as spiders, any old instance of incidental disgust--toward rotten fruit, for example--brings forth unbidden thoughts of those spiders. Even in a non-phobic person, the number of possible disgusting stimuli are too numerous and diffuse for this to work. List a hundred different disgusting things, and you'll probably get most of the way there - if you're able to stop at a hundred. It seems implausible, although under-researched, that the mere experience of disgust should bring to mind everything disgusting in your life, from pizza face-down on the floor to your least favorite politician, in such a way that the specific associations between disgust and immoral actions come up and influence judgments of the present case.

A second insight concerns the targeted nature of emotional associations. Disgust in particular, which has been characterized as an object-focused emotion (Ortony, Clore, & Collins, 1990), has a tendency to cling to things, places, and people. Disgust may be more influential when incidental, morally irrelevant disgust cues are associated with the target of moral consideration, instead of floating free in the air. For example, a person may be judged more harshly if they are seen wearing a shirt splattered with their own vomit, than a shirt splattered with their mom's spaghetti. In the consumer domain, to give one example of research, milk is less appealing if seen in the same shopping basket as a disgust-related (but

not literally contagious) product such as tampons (Morales & Fitzsimons, 2007). The challenge for similar findings in social and moral domains would be to show a specific effect, such that disgusting associations, more than other negative ones, transfer to moral evaluations of the target, more than to evaluations of their friendliness or competence.

One example might be found in research on stigma by association; for example, heterosexual men are judged more negatively if they have gay friends (Neuberg, Smith, Hoffman, & F. J. Russell, 1994). Although this general effect can be explained by non-associative inferences about the target's own willingness to associate, it has also been shown on an implicit level when the association is merely coincidental (Pryor, Reeder, & Monroe, 2012). It may not be a coincidence that the stigmas used in these studies--homosexuality, obesity--are also prejudices with a strong disgust component (Inbar et al., 2012; Vartanian, 2010).

The legal realm is a promising field in which to study object-focused incidental effects of disgust. Legal decision-makers are usually shielded from ambient disgust elicitors, but some aspects of the crime may evoke disgust in a way that is irrelevant or prejudicial to the task of deciding culpability and punishment. Capestany and Harris (2014) found that equally legally severe crimes were sentenced more harshly if they contained vivid disgusting elements than otherwise, an effect backed up by increased activity in the disgust-related brain region of the insula. However, the methodology used to manipulate disgust also varied other aspects, such as presence of actual harm, so the moral irrelevance of the manipulation was not completely established in that study. Salerno (in press) more carefully manipulated disgust in a legal setting while keeping probative evidence the same by varying whether crime scene photos shown to mock jurors were in color or black and white. Disgust reactions explained harsher decisions as a result of the color photos, despite the variation having no bearing on the facts of the case.

Giner-Sorolla and P. S. Russell (2009) speculated that a particularly tragic illustration of the associative nature of disgust is the stigma applied to the victims of sexual and other

disgusting offenses. Evidence for this dynamic, however, is mostly indirect. Self-disgust is visible in the reactions of victims themselves (Badour, Feldner, et al., 2013; Feldner, Frala, et al., 2010), and high sexual disgust sensitivity predicts post-traumatic symptoms in non-offending parents of sexually abused children (van Delft, Finkenauer, Tybur, & Lamers-Winkelmann, 2016). Disclosure of child sexual abuse history is sometimes met with disgust (Ullman, 2002), and victims of past sexual abuse tend to be judged more harshly when there is some reason to do so, such as when they have done wrong themselves (Warner, Branscombe, Garczynski, & Solomon, 2011). Niemi and Young (2016) also found a specific tendency to view victims of sexual offenses as contaminated--an appraisal consonant with disgust--and this tendency grew stronger the more participants endorsed "binding" values of conformity and purity. However, research has not yet spelled out complete connections between sexual victimization, associative disgust, and stigmatization in the eyes of others. As Niemi and Young's (2016) value correlations suggest, this role of disgust may be particularly important in traditionalist cultures where female chastity is highly valued, and where female victims of rape are sometimes punished or even murdered, out of moral condemnation and a desire to "cleanse" the shamed family (Zia Lari, 2011).

In conclusion, ambient incidental disgust does not seem to have strong and consistent effects on moral judgment, but this does not necessarily mean that disgust is unrelated to morality. The associative function of disgust in IFT proposes a stronger role for incidental disgust brought about by morally irrelevant aspects of the person or act under consideration. Existing evidence suggests that this targeted disgust transfer might be more robustly observed than transfer from unrelated experiences or sensations.

Association vs. appraisal: Evidence from the cognitive characteristics of disgust

Besides the incidental associations of emotion, other key features distinguish the associative and appraisal functions of emotion. Associations compared to appraisals are more

automatic, more superficial in their processing of the stimulus, less accessible to reasoned processing, and less flexible in their application. A number of studies have looked at the cognitive consequences of various disgust elicitor types. Simpson, Carter, Anthony, and Overton (2006) compared core disgust elicitors to socio-moral elicitors, using photographs. Consistent with findings in the previous section, they found that socio-moral disgust was characterized by higher levels of concurrent anger, and a higher correlation of disgust with anger, compared to core disgust. They also looked at the development of each emotion over time -- immediately on exposure, then 15 and 30 minutes after. Disgust was the only emotion that changed over time, and this change was significantly moderated by the type of elicitor. Disgust responses to socio-moral stimuli grew over time, whereas core disgust responses stayed the same or slightly went down (it is hard to tell which, because they did not report simple effects tests).

These results suggest that socio-moral disgust is less immediate than core-elicited disgust, taking longer to emerge after stimulus presentation. As we have remarked in the methodology section, disgust seems to arise more readily than anger from pictures, so it is not clear whether this effect would generalize to story elicitors. However, a number of experiments from our lab have supported the hypothesis that in moral situations, disgust compared to anger is less flexible in its reactions to mitigating factors, less capable of being spontaneously justified with reasons, and less demanding of cognitive resources in its effect on judgment. In a previous review, we called this the unreasoning disgust hypothesis (P. S. Russell & Giner-Sorolla, 2013). From an IFT perspective, an emotion that is triggered intuitively and without regard for context fits the profile of the associative function of emotion more than the profile of the appraisal function. The cognitive properties of moral disgust bear on its function, with important consequences for how much we should trust disgust to do the right thing in legal and other decision-making contexts (Nussbaum, 2004; P. S. Russell & Giner-Sorolla, July 2011).

Non-moral disgust has been shown to defy reasoning, appearing even in contexts where it is clear that disgust is not warranted--such as when interacting with plastic cockroaches (Rozin et al., 1986). Contagious, irrational aspects of moral disgust--possibly related to moral character appraisals--also appear to interfere with willingness to do things such as wear a murderer's sweater (e.g., Rozin, Markwith, & McCauley, 1994). Our lab has taken a number of approaches in testing the context insensitivity of moral disgust, in each case contrasting it against the rival moral emotion of anger. P. S. Russell and Giner-Sorolla (2011a), already mentioned as a study of elicitors, also included conditions where the lab-created product was served intentionally, versus unintentionally (e.g., the cloned human steak was created in a lab mix-up with normal beef cells, and eaten unknowingly). Controlling for the anger-disgust correlation, anger was increased when the wrong was intentional, but disgust was not. This result was borne out in regressions using the manipulation check variables: perceived intentionality affected anger, not disgust. Our results were supported by contemporaneous studies showing that intentionality mattered more in judgments of harm versus purity wrongs, although these studies did not measure emotions (Young & Saxe, 2011)

Doing something unintentionally, although important in everyday moral judgment and in the law, is not the only mitigating context when judging moral wrong. Another of our studies took a more open-ended approach (P. S. Russell & Giner-Sorolla, 2011c). We asked participants to judge either a purity or a harm violation, including reporting feelings of anger and disgust. Participants then had to list mitigating factors that could change their overall moral decision. They then had to imagine that all these factors were in play, and re-judge the violation in that new context. Among both types of violations, participant-generated mitigating factors reduced the anger felt, but not the disgust felt, although disgust overall was higher for purity violations. Piazza, P. S. Russell, and Sousa (2013) continued in this vein with two studies showing that pre-existing levels of anger were negatively related to the ability to imagine mitigating circumstances, whereas disgust had nothing to do with ability to imagine mitigating

circumstances, further showing the greater context sensitivity of anger versus disgust. Across all three of these studies, the anger-disgust difference was found for bodily-moral and socio-moral violations alike.

We have already mentioned two published experiments that used a cognitive load manipulation (Gutierrez & Giner-Sorolla, 2007), which consisted of having to answer while remembering an eight-digit number versus while remembering the number 1. Both of these studies found equivalent mean levels of anger and disgust regardless of load. However, it is still possible that disgust's influence on moral judgment would be stronger under load conditions, showing a more automatic and associative nature. For both published studies, we conducted a regression re-analysis of the influence of composite measures of anger and disgust on a scale of the four moral evaluation items. This analysis, not included in the original article (by editorial request, to save space), showed that disgust only had a significant influence on moral judgment independently of anger when a bodily-moral violation (taboo) was being judged under load (see Table 2). To this evidence, we can add a similar analysis of a previous study of moral judgment (Gutierrez & Giner-Sorolla, unpublished), which used three bodily-moral violation scenarios (sibling incest, the necrophilia club, and a prostitute who works even though she has a sexually transmitted disease) and three socio-moral violation scenarios (a burglar who applies to teach at a school despite his criminal past, and two stories of men who seek revenge for wrongs done to them). Although participant numbers were low ($N = 44$ across two conditions), the load manipulation was strong, an attention-occupying task involving the tracking of flute tones taken from Skitka, Mullen, et al. (2002). As shown in Table 2, once again, disgust was only an influence on judgment under load and only when judging bodily-moral violations.

Finally, if disgust is a more associative functional emotion than anger is, people should be less able to articulate explicit appraisal-based reasons for their disgust than for their anger, because those reasons are less present in the processes that generate the emotion. This possibility is implicit from the content of moral dumbfounding studies (Bjorklund et al. 2000), in

which people could not provide reasons for their negative judgments of disgust-inducing bodily-moral scenarios such as sibling incest. To more directly examine an unconfounded contrast between disgust and anger, we asked people to list the reasons why they felt either disgust or anger towards the same stigmatized social groups such as pedophiles (P. S. Russell & Giner-Sorolla, 2011b). Statements were coded for whether or not they actually contained elaborated reasons that brought in concepts other than mere evaluation and emotion. For example “Because they are evil” would be an unelaborated reason, merely restating an evaluation of the group, whereas “Because they destroy children’s innocence” would be an elaborated reason.

In Experiment 1, which focused on the bodily-moral stigmatized group of pedophiles, people came up with nearly twice as many elaborated reasons when explaining anger as when explaining disgust, whereas disgust was explained using mostly non-elaborated reasons, both comparisons $p < .005$. These included ten cases in which disgust was explained using a form of the word “disgust” itself, e.g. “Because they are disgusting.” None of the other emotions, including fear and contempt, elicited such tautological responses. Study 2 described three bodily-moral (sexually deviant groups, e.g., voyeurs) and three socio-moral deviant groups (non-sexual criminals, e.g., terrorists). Disgust again evoked fewer elaborated reasons than anger, but only for bodily moral groups. Study 3 again compared bodily-moral and socio-moral deviants, but also compared the free generation of reasons with endorsement of a number of experimenter-provided reasons. Once again, disgust evoked fewer elaborated reasons, but only for bodily-moral violations and only when reasons were not provided. In other words, people did not disagree with elaborated reasons for bodily-moral disgust when provided (e.g., “They can spread disease to children”), but simply did not usually have them accessible to mind. This result prefigures Uhlmann and Zhu’s (2014) finding, in which asking people to justify their reactions to bodily-moral violations in terms of the violator’s character greatly reduced the moral dumbfounding effect. That finding supports both the accessibility interpretation of dumbfounding and (indirectly) the character appraisal hypothesis of moral disgust.

Overall, this line of research has given support to the “unreasoning disgust” thesis that disgust, compared to anger, is less of a measured, flexible appraisal and exerts a more automatic, intuitive, and associative effect on moral judgment. By always comparing disgust to anger, and sometimes to other emotions such as contempt, we have avoided the possibility that reported disgust is only being used metaphorically. However, there is less clear evidence bearing on whether bodily-morally and socio-morally elicited disgusts show different cognitive characteristics. For post-hoc reasoning and automatic influence under load, bodily-moral disgust but not socio-moral disgust appears unreasoning, in line with the often irrational-seeming nature of non-moral disgust. But in several studies, both bodily-moral and socio-moral disgust, unlike anger, seemed relatively impervious to mitigating contexts including intentionality, another key test of the associative versus appraisal nature of these feelings.

The self-regulation function

Moving on from the appraisal and associative functions, our IFT perspective leads us to a persistent if controversial and understudied function claimed for disgust that fits with the theory’s function of self-regulation. Animal-reminder disgust, or more broadly existential disgust, has been proposed as a reaction to things that bring to mind our similarity with nonhuman animals, especially their mortal nature. By promoting aversion to such things and their associated thoughts, existential disgust reactions supposedly allow us to maintain the illusion that we are clean, spiritual, and non-mortal beings. Disgust, then, leads to avoidance of mental images and behaviors that might cause existential stress, in line with a self-regulation view of emotion. Haidt et al. (1997) suggest several characteristics of “animal-reminder” disgust: it is managed by cultural norms intended to set us apart from animals (e.g., in matters of grooming, eating, sex, or body modification); it often espouses a “middle-distance” norm in food and sex, where we avoid things too close (e.g. incest, cannibalism) or too far (e.g., bestiality, eating slugs); it is maintained by a sacralization of the body beyond literal concerns about health.

As originally described, animal-reminder disgust suffers from conceptual confusion. It includes hygienic and sexual concerns that are more parsimoniously explained by the appraisal functions of avoiding infection and unsuitable mating. Bodily-moral disgust also includes aversions to practices that no animal indulges in, like bizarre body modification. Further confusing matters, “animal-reminder” disgust has been studied extensively as a reaction to viewing injuries, mutilation, death, or blood, in line with the “animal reminder” label for one factor of the DS-R (Olatunji et al., 2007). But this reaction, if it indeed merits the term “disgust,” seems to be quite different in its phenomenology and behavioral signature from other forms of disgust (Shenhav & Mendes, 2014; Kupfer, in press).

An experimental literature on existential disgust has emerged, which largely manipulates reminders of people’s eventual death (mortality salience, or MS), manipulates reminders of human-animal similarities, or measures accessibility of death thoughts as an outcome. Although MS heightens disgust sensitivity in general (Goldenberg, Pyszczynski, et al., 2001), this could merely be due to death increasing concern about disease. More telling are studies which draw a link between mortality awareness, creatureliness, and negative views of otherwise healthy biological processes, such as sex (Goldenberg, Pyszczynski, et al., 1999), pregnancy (Goldenberg, Goplen, Cox, & Arndt, 2007), breastfeeding (Cox, Goldenberg, Arndt, & Pyszczynski, 2007), or the female breast in a medical context (Goldenberg, Arndt, Hart, & Routledge, 2008). Hairiness is another sign of animality that, when seen as inappropriate (e.g., women’s body hair) is related to disgust sensitivity (Tiggeman & Lewis, 2004); norms about the body, such as thinness, are reinforced under MS as well (Goldenberg, Arndt, Hart, & Brown, 2005).

These interpretations of disgust have also been met with doubt and contrary data. Fessler and Navarrete (2005) found that as people get older, hence closer to death, their disgust at death decreases rather than increases, and also failed to replicate MS priming effects on disgust in a Latin American culture. Kollareth and J. A. Russell (2016) found that being

reminded of human-animal similarities that were not disgusting for other reasons such as hygiene (e.g., that humans and tigers both sleep) was not sufficient to create disgust, whereas viewing injuries and mutilated parts did not by itself especially evoke animal-human similarities. Sometimes, in fact, humans seek out comparisons to animals that are seen as having positive qualities -- strong as a bull, wise as an owl.

Taking a second look at the confirming literature, transgressions that are more harshly judged under reminders of death or animality are actually cultural conventions about the body, and not just animal reminders, considering the U.S. context of most of this research. Women's breasts are taboo to show, which makes breastfeeding a problematic activity. Women, too, have norms of hairlessness and thinness to follow, which pregnancy also threatens. The proposed chain from bodily transgression to reminder of animal nature to existential threat of death to disgust reaction is a laborious one. It is much more parsimonious to explain the expression of disgust at all these bodily-conventional violations as a way to reinforce cultural boundaries. This process is similar to the many other ways that existential threats, and more generally threats to meaning, can motivate a defensive bolstering of cultural certainties (for reviews, see Pyszczynski, Solomon, & Greenberg, 2015; Heine, Proulx, & Vohs, 2006). Death anxiety seems to lose its sting when a subculture is accustomed to seeing dead bodies every day, as shown by research among the corpse-handlers of the Ganges in India (Fernandez, Castano, & Singh, 2010), just as disgust towards cadavers among medical students fades with exposure (Rozin, 2008). However, little research has compared the effectiveness of disgust-based responses to other cultural-emotional ways of managing anxiety and uncertainty, or whether disgust as opposed to other emotions is particularly suited to handling certain kinds of existential threat. Overall, many questions remain about the self-regulatory functions claimed for moral disgust.

The communication function

Disgust as moral signal. The final function in IFT, communication, presents a challenge for much of the research literature on moral disgust that has relied on expressive measures such as verbal self-report or facial expression measurement. A recent account argues that disgust is often expressed towards socio-moral violations in line with the expresser's communicative aims, rather than with their internal feeling state (Kupfer & Giner-Sorolla, 2016). This idea is consistent with the behavioral ecology view that expressions of emotion do not only function to advertise the internal state of the expresser, but also have an important strategic function in signalling social motivations to others (Fridlund, 1994; Hinde, 1985; Royzman & Kurzban, 2011), and with recent perspectives on the interpersonal functions of emotions that emphasize the ability of expressions to influence observers' impressions and behavior (Fischer & Manstead, 2008; Giner-Sorolla, 2012; Hareli & Hess, 2012; Parkinson, 2005; Van Kleef, 2009). For a highly interdependent species like humans, it is vitally important to maintain a reputation as a prosocial and moral individual in order to reap the benefits of cooperation and avoid the costs of social exclusion (Kurzban & Leary, 2001; Nowak & Sigmund, 2005; Trivers, 1971). The emotions we express can be especially informative about our moral versus selfish motives and are therefore crucial tools for reputation management (Barasch, Levine, Berman, & Small, 2014; Frank, 1988).

One way to enhance moral reputation is to publicly condemn the immoral actions of other people, thereby signaling one's own virtue. Conversely, failing to issue condemnations where appropriate (such as President Trump's equivocation about the August 2017 far-right rally in Charlottesville) are taken as signs of moral weakness or turpitude. Although both anger and disgust are emotions of condemnation, our research has demonstrated that an expression of disgust is more likely to be perceived as morally motivated, whereas anger is more likely to be perceived as selfishly motivated (Kupfer & Giner-Sorolla, 2016). In the first two studies, participants saw scenarios in which a target expressed either anger or disgust towards a

wrongdoing. Without giving any specific information about its content, we asked participants to infer the target's motives for condemning the wrongdoing. In two studies, the target who expressed disgust was perceived as more likely to be motivated by moral concerns, whereas the target who expressed anger was perceived as more likely to be motivated by self-interest. We then investigated participants' deliberate expression choices by giving them a scenario in which they were the victim of a wrongdoing, but their goal was either to convey moral motives behind their condemnation or to protest harm to their own interests. As can be seen from Figure 9, participants were more likely to choose the disgust verbal label and facial expression when their aim was to communicate morally motivated condemnation.

Insert Figure 9 about here

A fourth study investigated whether participants would choose to *express* disgust to communicate moral motives, even if they would normally *feel* anger. We presented participants with an anger-eliciting scenario in which the participant was cheated out of money they were entitled to; a comparison condition found that over 70% would predominantly *feel* anger. One group of participants were given the aim of protesting harm to themselves, and again over 70% chose to express anger. Another group were given the aim to convey moral concern about having been cheated. The relative likelihood of expressing disgust increased to the extent that they were just as likely to express disgust as anger, despite the scenario primarily inducing *feelings* of anger. These findings confirm that the decision to express disgust does not just depend on what is felt internally, but also on what one aims to communicate, even if the moral violation has no impure content. If we want to know why people report disgust even towards violations without impure or bodily content, we should consider that it might not be because they feel nausea or appraise contamination or impurity (Chapman, Kim, Susskind, & Anderson, 2009; Horberg et al., 2009), but instead because people use disgust to create certain impressions about their motives.

Unlike some other accounts (e.g., Nabi, 2002), our moral signalling account shows that moral disgust is not merely a metaphor for anger, because the two expressions contain different information. If disgust communicates condemnation without the selfish connotations of anger, then it might have additional uses. Tybur et al. (2013) suggest that disgust is used as a signal to uphold preferred rules of conduct by convincing third parties that an important norm has been violated and discouraging others from committing the same wrongdoings. In this way, expressing disgust functions as a low-cost form of social punishment (Molho, Tybur, Güler, Balliet, & Hofmann, 2017).

Avoiding moral “contamination” for reputation management. Another way to communicate a good moral reputation is to avoid visibly associating with immoral people or objects, especially if there is a risk of being observed by third parties. Otherwise, observers might infer immorality by association (Pryor, Reeder, & Monroe, 2012). Behaviors, including avoidance of immoral objects and apparent contamination concern towards them (e.g., a Nazi’s armband, Haidt, McCauley, & Rozin, 1994), are often taken as evidence that people have an internal state of disgust (Eskine, Novreske, & Richards, 2013; Horberg et al., 2009; Rozin, Haidt, & McCauley, 2008). However, these effects may in fact be motivated by reputation management concerns: people do not want to be *visibly* associated with immorality, so they treat immoral objects as *if* they are contaminating.

We devised a behavioral choice paradigm that enabled a direct competition between contamination and reputation motives by giving participants a choice between contact with an immoral object and display of an immoral object (Kupfer & Giner-Sorolla, under review). Following Haidt et al. (1994), we used a Nazi armband because, in Western populations, Nazis are reliably found to be considered highly immoral and disgusting (Rozin et al., 2008). In a hypothetical scenario (Study 1), participants chose between wearing a Nazi armband on top of their t-shirt sleeve, so that it was visible but not directly touching their skin, or underneath their t-shirt sleeve so that it directly against their skin but not visible. Results strongly supported the

reputation management account: significantly more participants chose to wear the armband underneath their t-shirt sleeve, so that it was not visible, even though this brought it into direct contact with their skin, than chose to wear it on top of their sleeve so that it was visible. We also asked participants to rate the importance of different reasons for their decision. As can be seen from Figure 10, participants rated contagion concern (e.g., “I did not want to get contaminated by touching it”) to be of minimal importance, whereas reputation concerns (e.g., “I would not want to seem like I support Nazis”) were of great importance, especially to those who chose to wear the armband underneath the t-shirt sleeve so that it was not on display. Participants who chose to wear the armband on top of the t-shirt sleeve did not do so because of concerns about moral contamination but merely because they were acting out of convention (“This is the way armbands are supposed to be worn”).

Insert Figure 10 about here

We replicated these findings in a subsequent behavioral experiment in a lab (Study 2). By including audience and private conditions, we showed that the desire to conceal the armband (which was an actual historical artifact) was enhanced when participants knew they would subsequently be seen by the experimenter. In Study 3, we measured third-party judgements of people who had worn the Nazi armband under versus over their clothing. Targets who had worn the armband visibly but not in contact with their skin were rated as more immoral and disgusting than targets who had worn the armband against their skin but not visible. Furthermore, targets who wore the armband visibly were rated as significantly *more* contaminated than targets who wore it hidden, even though the latter had been in direct contact with the morally disgusting object.

These findings are inconsistent with the idea that people intuitively believe that immoral stimuli are contagious, whether by a physical or spiritual essence (e.g., Nemeroff & Rozin, 2000). Instead, behavior, reported motives, and third party judgements were more consistent with our suggestion that people are motivated to avoid immoral stimuli because they are

concerned about being *seen* to associate with them. Across all studies, participants reported strong disgust towards Nazis, yet there was little evidence that they appraised their artifacts as contaminating. These findings are a further example of an expressive “disgust” that seems to lack the key cognitive element of contamination that others have suggested (e.g., Graham, Haidt, & Nosek, 2009; Horberg et al., 2009; Rozin et al., 2008), and they reinforce the importance of considering the interpersonal communicative and impression management functions of emotions.

These initial findings open up the possibility that verbal and facial expressions of moral disgust, as well as the apparent contagiousness of morally disgusting stimuli, can have communicative intent, even when disgust is not felt, and even when there is no contamination appraisal. Rather, expressions of disgust can be used to communicate morally motivated condemnation, and behaving *as if* immorality is contaminating can be motivated by a desire to avoid observers’ inferences of immorality by association. Potentially, these findings support the hypotheses that expressions of moral disgust observed in other studies, whether verbally expressed or measured facially, could be performed to give the impression of moral motivation and fastidiousness to the researcher, or formed into an automatic associative response through long practice of communicating moral disgust. Although these studies so far have looked at situations where disgust is felt in response to unfairness and moral evil, it might be instructive to see whether expressions of disgust vs. anger toward bodily-moral, socio-moral, and core elicitors intensify when there is a like-minded audience.

Conclusion: Moral disgust and its diverse functions

In this chapter, we have presented evidence for the value of an IFT approach to moral disgust. We have shown that disgust can respond to a variety of elicitors, some of which, like bad character or socio-moral violation, are abstract, situational, and general enough to qualify as appraisals. At the same time, moral disgust also shows some of the features of a more

automatic association, shown by our lab's findings on the cognitive simplicity and stubbornness of bodily-moral disgust, and the observation that object-related incidental disgust may be more influential than ambient incidental disgust. Socio-moral disgust, in those studies, seems to be more "appraised" and less associative, but also appears to linger even though the circumstances underpinning it change, and may actually increase the more it is thought about (Simpson et al., 2006). Whether disgust is "smart" or "dumb" in response to changing evidence is not a mere academic matter. As a factor that can influence legal, health, and social decisions, disgust often has effects that are socially undesirable, in that they do not follow legal standards for judgment, scientifically justified health concerns, or social standards of fairness. As one of several socially influential emotions, disgust must be approached differently depending on how it can be controlled. If disgust's associative nature makes it relatively impervious to change by developing understanding of changing circumstances, then perhaps it is better reduced by more primal means, such as social influence or personal experiences based on the principles of extinction conditioning and counterconditioning.

The self-regulation function of moral disgust has been studied only in limited contexts. A provisional interpretation is that disgust at the violation of bodily-moral norms helps people affirm their connection to larger cultural structures that make humanity unique, rather than literally averting fear of death or a dreaded similarity to animals. In this regard, the "tamper-proof," unquestioned associations that go along with bodily-moral disgust might be ideally suited to anchor a defensive belief system. Social norms also motivate the communication function of disgust. The emotion not only communicates to other people what is bad and rotten out there, but in moral contexts, communicates that one cares about what is bad and rotten. If disgust helps appraise character and bodily-moral wrong, then showing you are a sensitive judge of character and wrong may be advantageous, even if you actually feel angry, anxious, or blasé. Ultimately, communication may undermine the other functions of disgust by encouraging people

to project a hands-off, avoidant, morally pure public image, even when the situation calls for appraisals and action more suited to anger or sheer terror.

We can also show some tentative answers to the questions raised along the way about the unitary or multiple nature of moral disgust, from a componential point of view. It turns out that verbal self-reports, facial endorsement measures, and even direct observation or EMG measurement of facial expressions can only take us so far. Because some of our work suggests that these expressive aspects can become decoupled from underlying physiological, neurological, feeling, and behavioral tendencies, a literature based primarily on expression will not be able to resolve the most lingering doubts without the aid of harder measures. Currently, we have seen that there is some evidence that bodily-moral violations engage gastric reflexes and involve distinctive brain response patterns. But there has not yet been the winning combination: a well-controlled research design that can distinguish among different disgust elicitors, together with telling physiological and neurological measures that can find distinctive emotional signatures.

If we look only within expressive measures, however, there is evidence for two separate elicitor classes of moral disgust, bodily-moral and socio-moral. Generally speaking, socio-moral disgust at violations involving harm or breach of rights is strongly co-activated with anger and shares some features in common with anger. Therefore, one might argue that we have here merely a blend of two different emotions, not a separate emotional tendency. However, the recent discovery of bad-character disgust has more potential to distinguish itself from anger. Bodily-moral disgust, in contrast to socio-moral disgust, is more clearly its own thing, with elicitors distinct from non-moral forms of disgust, acquiring and enforcing social norms about the use of the body. If these norms once came about to manage infection and good reproduction, they have taken on a life of their own. Now, culturally determined standards involving the body, but not literally about disease or poor sexual fitness, get caught up in bodily-moral disgust. As examples, we may take our own culture's aversion to hairiness out of place, moderate amounts

of body fat, and lack of appropriate grooming. Or we may take the Heian court culture of medieval Japan, in which well-bred people blackened their teeth, so that showing a full set of white teeth--by any biological standard a mark of good health--was considered unseemly and repulsive.

Disgust, in its seeming multiplicity and potential for deception, continues to be a fascinating emotion with which to approach moral phenomena. We have seen that the multiple functions of disgust, with the potential to deploy them strategically, defensively, automatically, or deliberately, make it anything but a simplistic state. Indeed, we should not mistake the objects of disgust for a description of disgust. True, it reacts to low and perverse things. True, it paints its targets simplistically, as vermin or excrement to be avoided. And true, it can react to live animals, animal flesh, or an animal-like lack of culture. But it is precisely because it is a reaction to and against all these things that disgust marks us out as human, as morally sensitive, as elevated. Grappling with these contradictions, and with the contradictions of disgust's many functions and its complicated structure, is precisely what makes researching this emotion so rewarding.

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Table 1. Coefficients for disgust predicting anger ratings, by measurement and scenario type, Giner-Sorolla, Crispim and Salerno (unpublished). 95% confidence interval lower and upper bounds appear in brackets.

Measurement type	Scenario type			
	Socio-moral	Bodily-moral	Frustration	Infection disgust
Parallel	.71 [.65, .76]	.63 [.56, .70]	.41 [.30, .53]	.15 [.08, .22]
Orthogonal	.42 [.35, .48]	.34 [.27, .42]	.31 [.11, .50]	.03 [-.02, .07]

Table 2. Summary of emotion influences on act evaluation, by cognitive load condition, in two published and one unpublished study. Beta coefficients and significance levels (*: $p < .05$; **: $p < .01$; ***: $p < .001$) are shown.

	No taboo, no load	No taboo, load	Taboo, no load	Taboo, load
Gutierrez & Giner-Sorolla (2007), Study 2				
Anger (composite)	.61***	.44**	.39*	.31*
Disgust (composite)	.07	.08	.02	.35*
Gutierrez & Giner-Sorolla (2007), Study 3				
Anger (composite)	-.13	.53*	.79*	.27
Disgust (composite)	.40	-.40	-.42	.54**
Gutierrez & Giner-Sorolla (unpublished)				
Anger (composite)	.50**	.52**	.66**	.09
Disgust (composite)	.01	-.19	-.15	.50**

Figure Captions

Figure 1. Grid used by Salerno and Peter-Hagene (2013) to separate anger and disgust ratings. Reproduced from article, *Psychological Science* (permissions needed)

Figure 2. Standardized levels of anger and disgust (without covarying) as a function of the harm and taboo manipulations, Gutierrez & Giner-Sorolla (2007), Study 2. Reproduced from article, *Emotion* (permissions needed).

Figure 3. Means and 95% confidence intervals for the full design in P. S. Russell & Giner-Sorolla (2011a), showing different responsiveness of anger and disgust to the three experimental conditions.

Figure 4. Emotion results from Giner-Sorolla et al. (2012), Study 2, showing anger (top panel) and disgust (bottom panel) responding to manipulations of harm and bodily abnormality in a 3 x 3 design. Reproduced from article, *Cognition & Emotion* (permissions needed).

Figure 5. Regression coefficients predicting disgust word use from anger and disgust face endorsement as well as anger word use, Gutierrez et al. (2012). Reproduced from *Cognition & Emotion* (permission needed)

Figure 6. Negative emotion means and 95% confidence intervals from Giner-Sorolla (2017), unpublished data, showing greater disgust toward body modifications than toward equally negative and unusual fashions.

Figure 7. Mean effect size and 95% confidence intervals for reality minus fiction contrasts on anger and disgust. Meta-analytic results from the experiments of Sabo and Giner-Sorolla (2017). The Y axis represents the mean difference in emotion (with standard deviation) between real and fictional acts of harm and purity. Larger values indicate larger mean differences in emotion between real and fictional contexts. Reproduced from *Journal of Experimental Psychology: General* (permission needed)

Figure 8. Mediation analysis from Chapman and Giner-Sorolla (2017, study 3). Effect of desire manipulation on disgust via character. *** = $p < .001$. Reproduced from *Psychological Science* (permission needed)

Figure 9. Categorical anger/disgust expression choices by communicative aim, (Experiment 3, Kupfer & Giner-Sorolla, 2016). Reproduced from *Social Psychological and Personality Science* (permission needed)

Figure 10. Reasons given by participants for their choices (Study 1, Kupfer & Giner-Sorolla, under review). Error bars represent 95% confidence intervals.

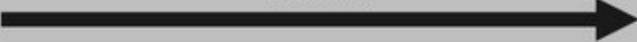
 ANGER	Extremely Angry	5-1	5-2	5-3	5-4	5-5
	Very Angry	4-1	4-2	4-3	4-4	4-5
	Angry	3-1	3-2	3-3	3-4	3-5
	Somewhat Angry	2-1	2-2	2-3	2-4	2-5
	Not at all Angry	1-1	1-2	1-3	1-4	1-5
		Not at all Disgusted	Somewhat Disgusted	Disgusted	Very Disgusted	Extremely Disgusted
		DISGUST 				

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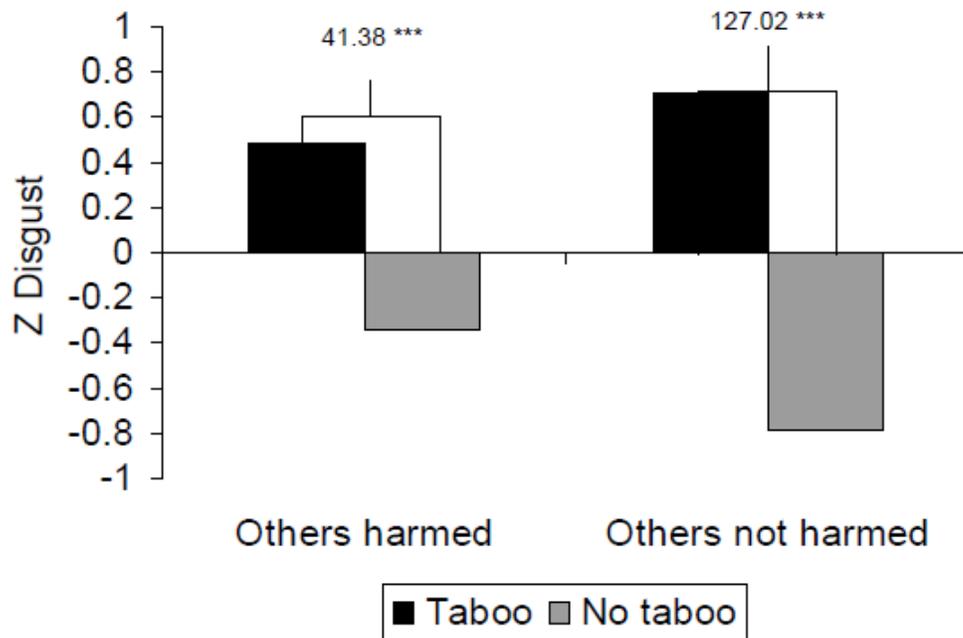
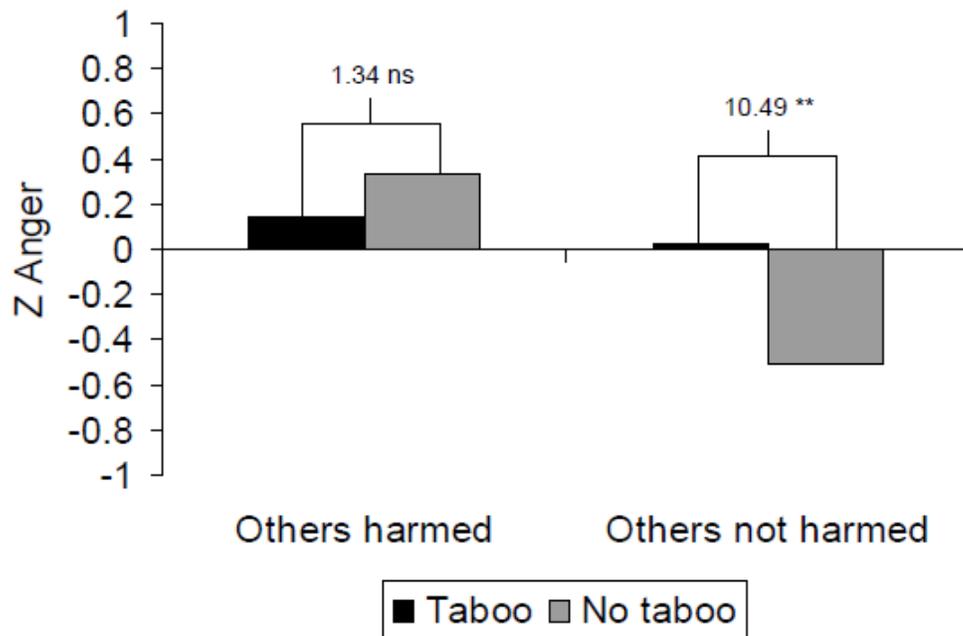
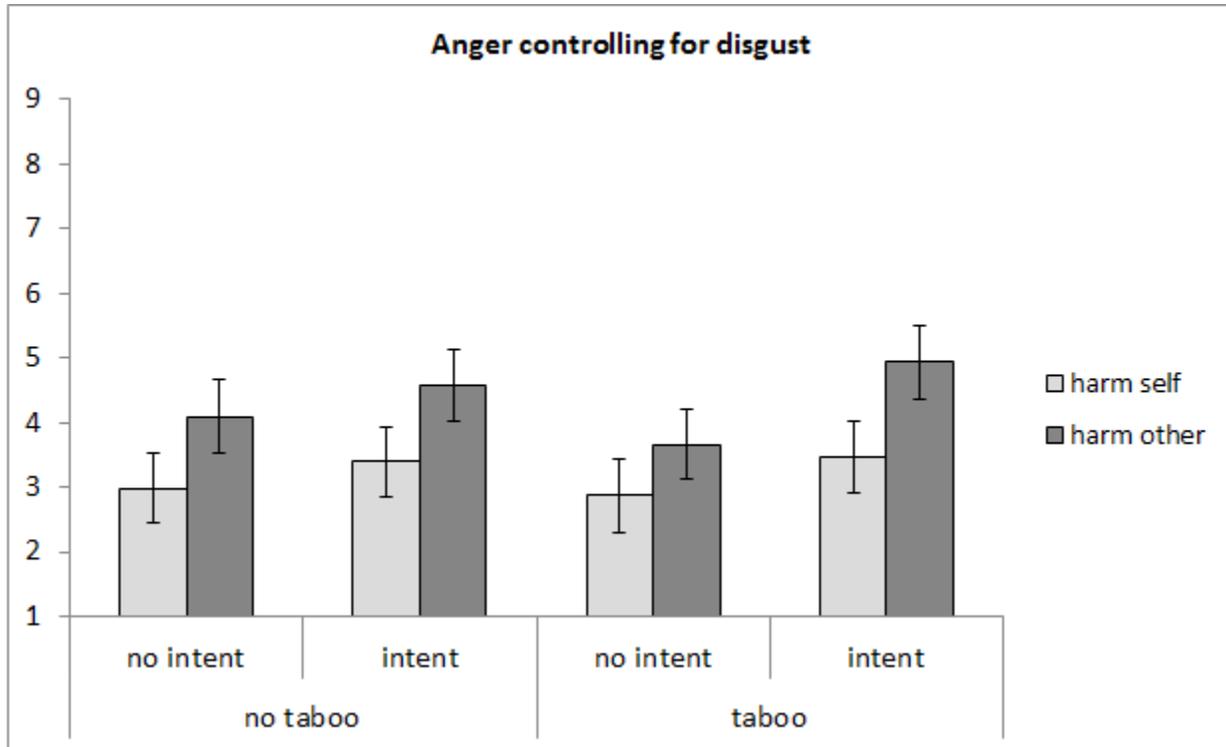


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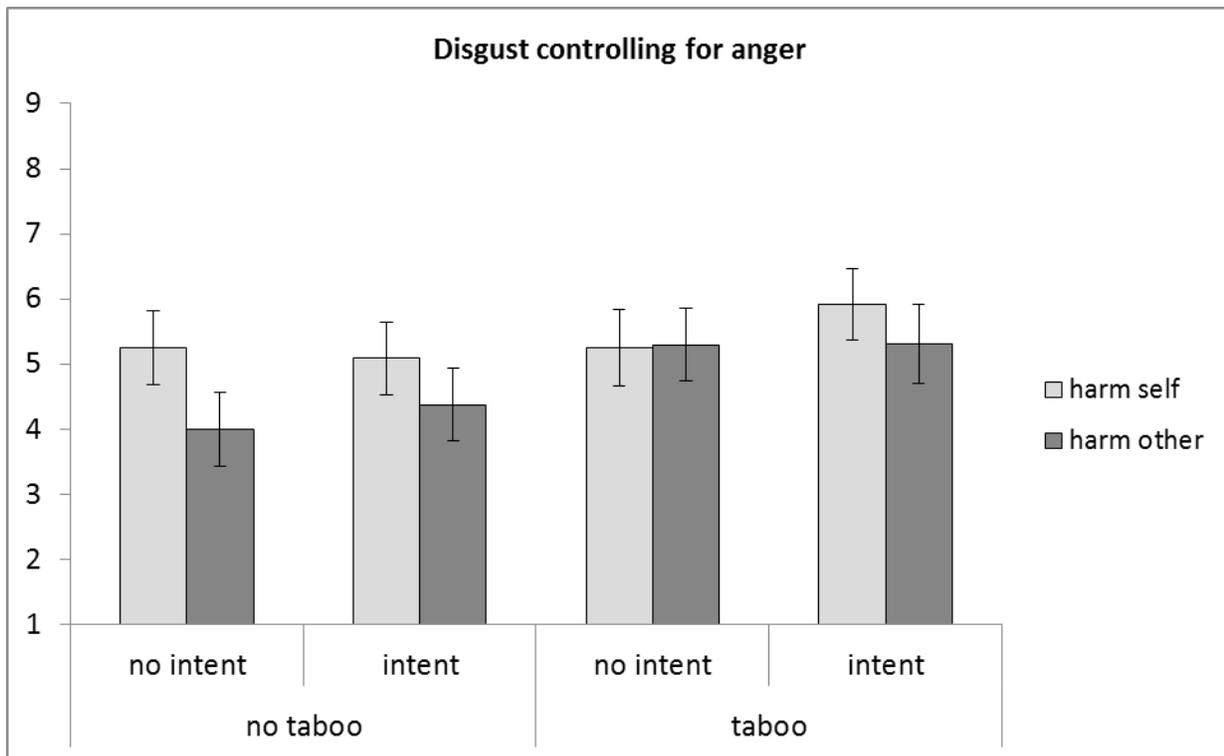


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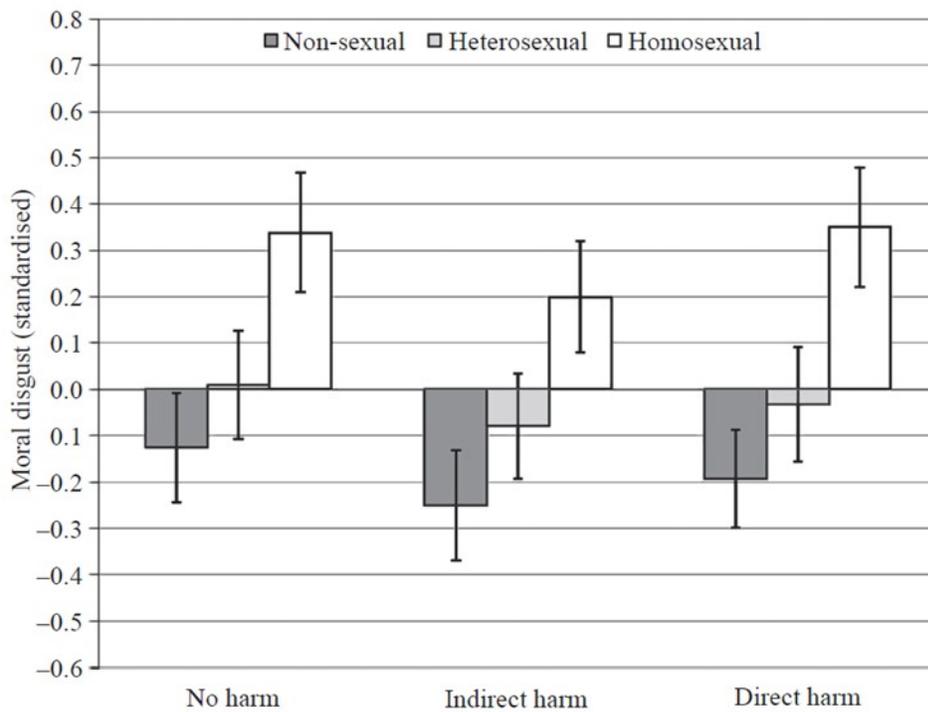
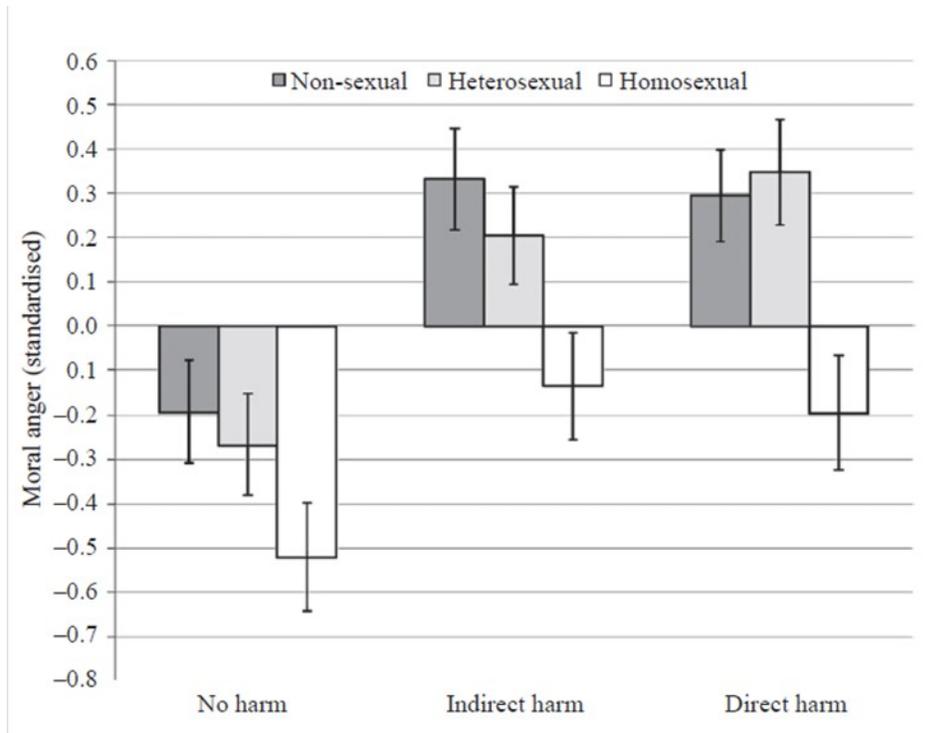


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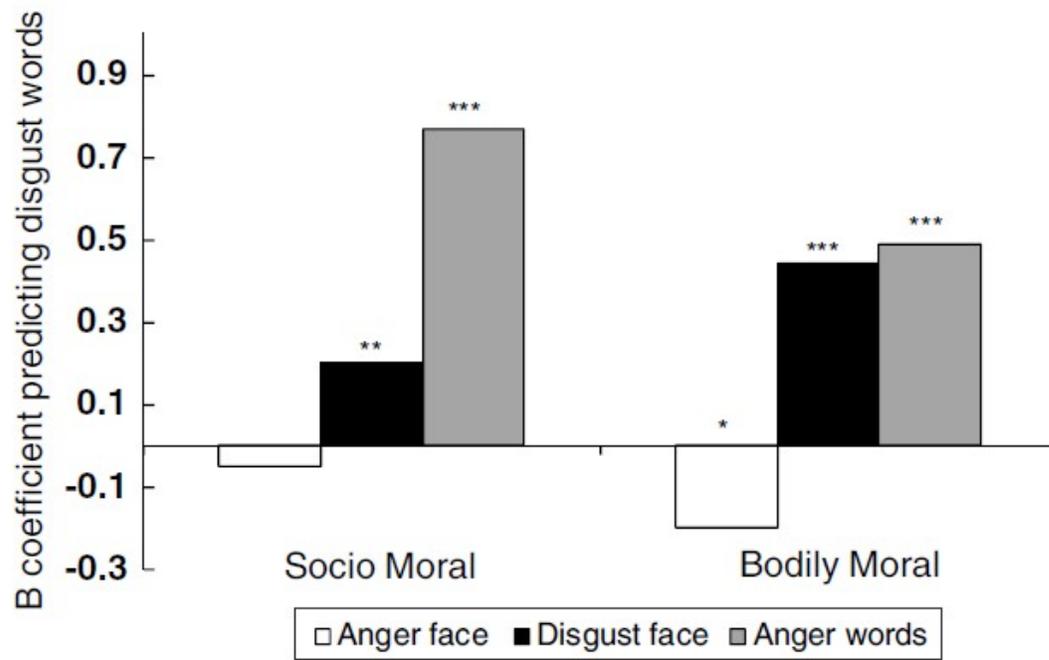


Figure 5. Regression coefficients predicting disgust word use from anger and disgust face endorsement as well as anger word use, Gutierrez et al. (2012). Disgust faces, compared to anger words, were a relatively stronger predictor of disgust word use in bodily moral scenarios than socio-moral scenarios. Reproduced from *Cognition & Emotion* (permission needed)

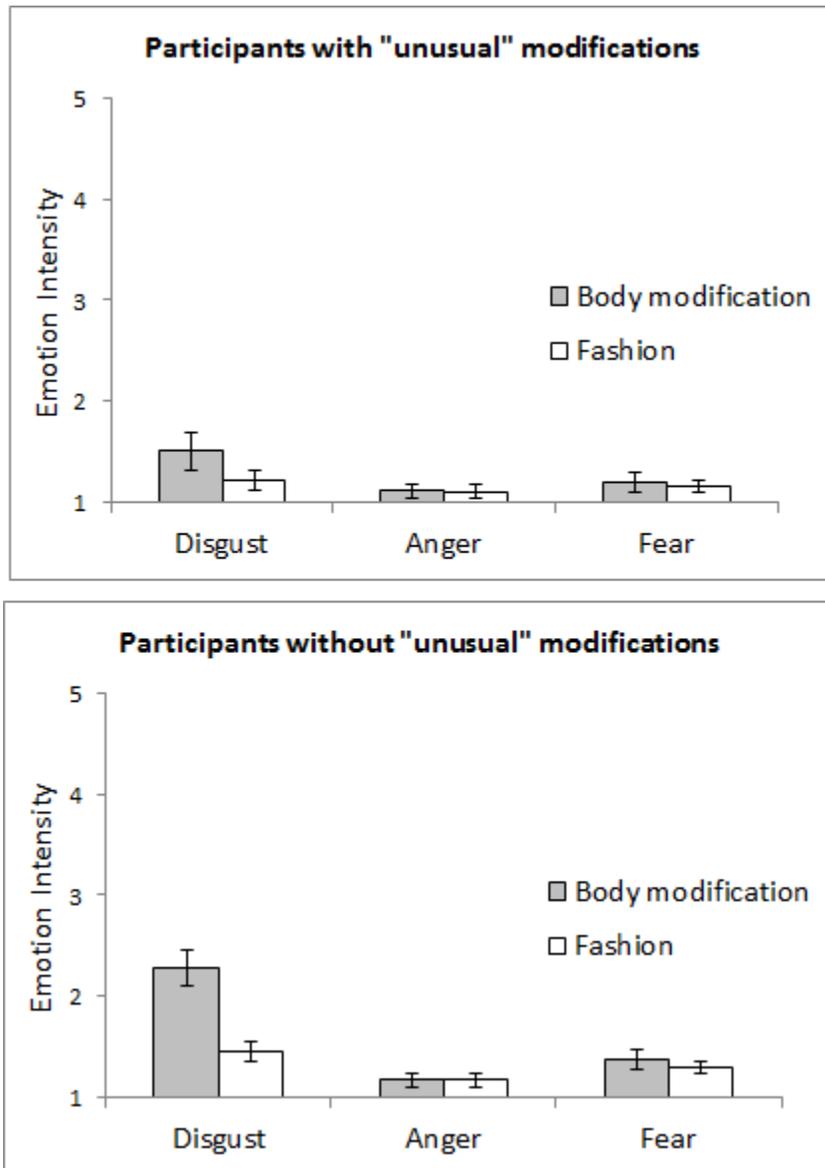


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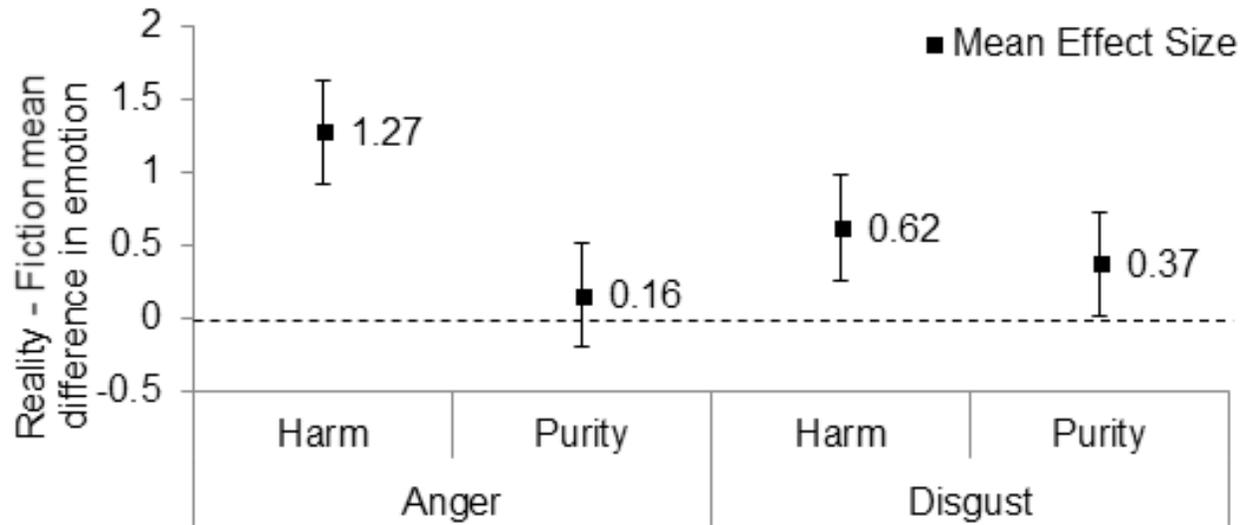


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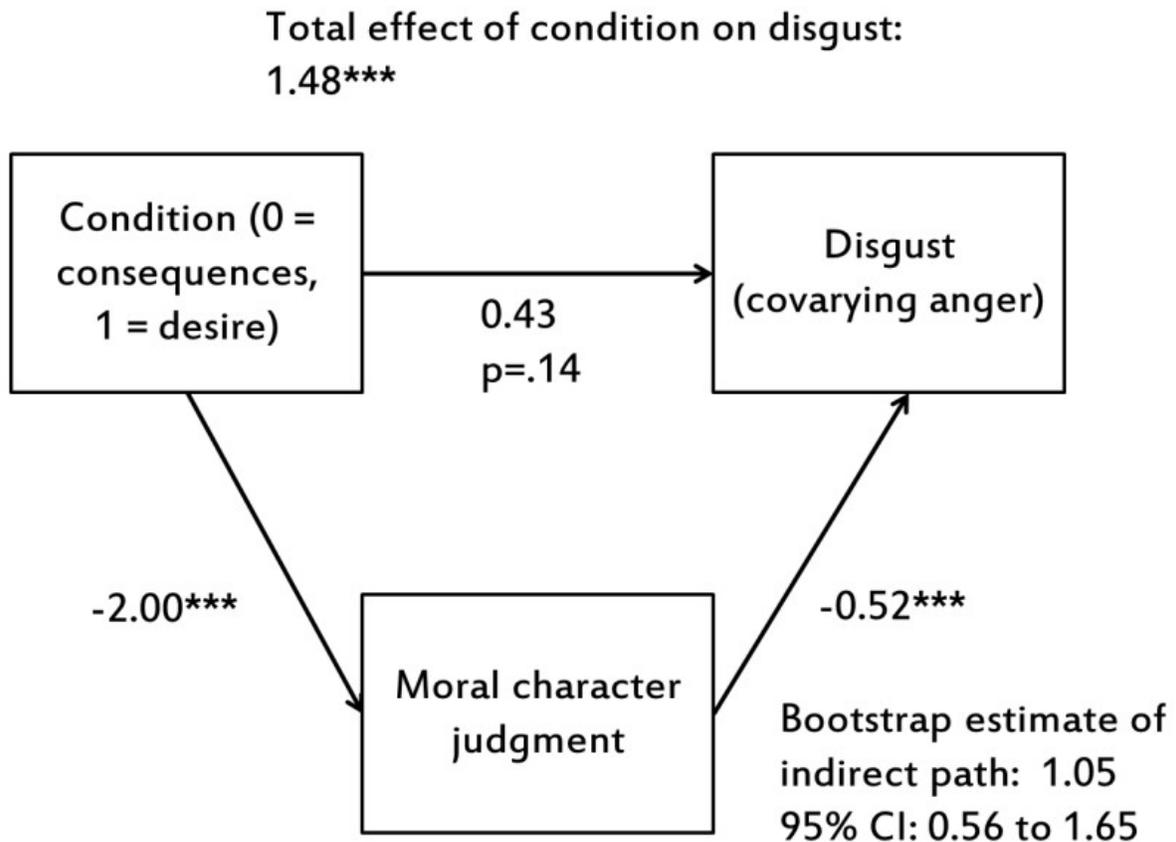


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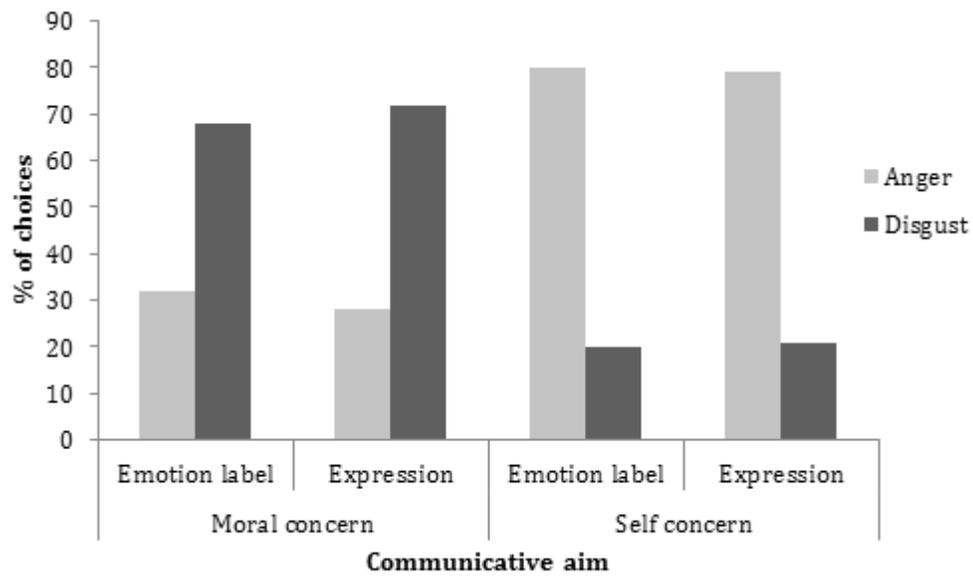


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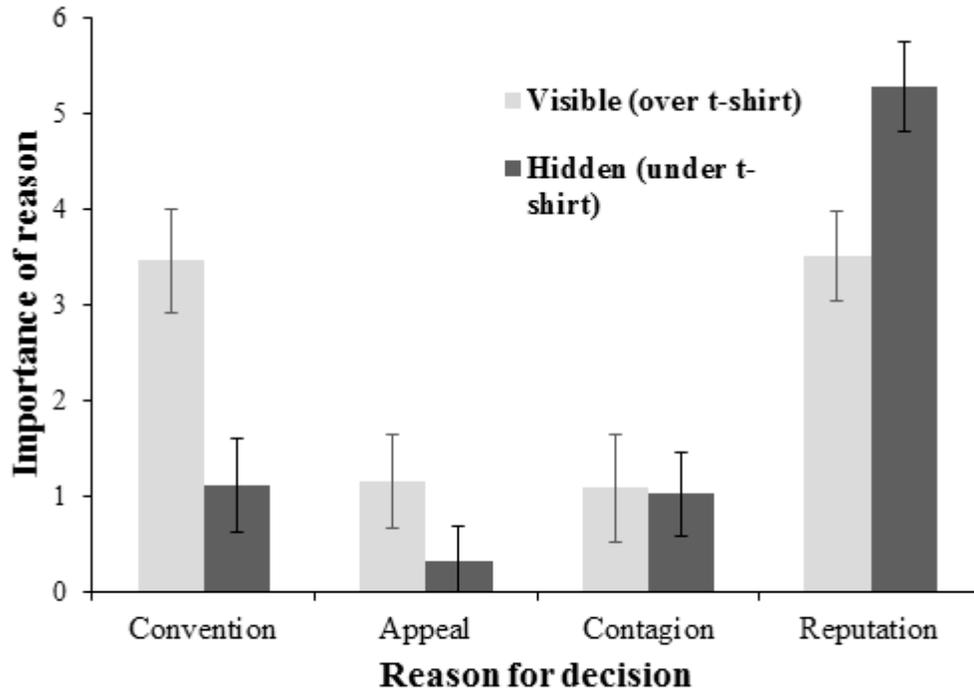


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